

Report to Congress:

***PROPOSED METHOD OF INCORPORATING
HEALTH STATUS RISK ADJUSTERS INTO
MEDICARE+CHOICE PAYMENTS***

**Prepared by the Health Care Financing Administration,
Office of Strategic Planning,
Research and Evaluation Group, Division of Payment Research**

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REPORT TO CONGRESS: PROPOSED METHOD OF INCORPORATING HEALTH STATUS RISK ADJUSTERS INTO MEDICARE+CHOICE PAYMENTS

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EXECUTIVE SUMMARY

Under Section 1853(a)(3) of the Social Security Act as enacted by Section 4001 of Subtitle A of the Balanced Budget Act (BBA) of 1997, the Secretary of the Department of Health and Human Services must “implement a risk adjustment methodology that accounts for variations in per capita costs based on health status and other demographic factors for payment [to Medicare+Choice organizations] starting no later than January 1, 2000.” The Secretary must develop a method of risk adjustment, submit a report of that method, and have that method evaluated by an “outside independent actuary of the actuarial soundness of the proposal.” In response to this BBA mandate, this document outlines the Health Care Financing Administration’s (HCFA) risk adjustment methodology, describes the integration of risk adjustment into the Medicare+Choice payment system, and presents estimated aggregate impacts resulting from this change.

Medicare Managed Care Payments prior to the BBA

Since the inception of the Medicare managed care program, capitated payments to plans have been set using an Adjusted Average Per Capita Cost (AAPCC) methodology. The logic of this approach was to base capitated payments on average cost experience found in fee for service Medicare. Because it was assumed that expenditures for enrollees in managed care would be lower due to care coordination efficiencies, the Medicare estimated fee-for-service costs are discounted by 5 percent. In order to account for local differences in the health needs of beneficiaries, and related differences in spending, these average costs are estimated at the county level, and standardized according to the average demographics observed for beneficiaries in that county. Thus, the basic components of the AAPCC include average fee-for-service costs in the county and an average county demographic factor score. These county AAPCC figures have been expressed in an annual county rate book, which has been the basis for all capitated payments for Medicare managed care enrollees.

While the county rate book is the basis for payments, final Medicare capitated payments are also risk adjusted according to the actual demographic profile of each enrollee. The demographic factors used as part of the county rate book calculation were the same factors used to adjust final payment amounts for the demographic characteristics of individual enrollees: age, sex, institutional status, and eligibility for Medicaid. This payment methodology can be best summarized by this (simplified) formula:

$$\text{Payment} = (0.95) \times (\text{County Per Capita Costs} / \text{Avg. County Demographic Score}) \times \text{Enrollee Demographic Score}$$

It is the 1997 version of this AAPCC county rate book that is, by law, the basis of Medicare+Choice capitated payments under BBA.

Concerns over the use of demographic-only payment adjusters arose from mounting evidence of selection bias, which occurs when healthier-than-average enrollees are attracted to

plans. If payments are not adjusted for the health status of managed care enrollees relative to those remaining in FFS, plans can be over or under paid. Thus, a major goal of this BBA mandate is to pay Medicare HMOs based on better estimates of health care costs of the population they enroll (relative to fee-for-service), thereby addressing biased selection in Medicare's risk program. The focus of the proposed method is to replace the demographic adjusters with risk adjusters based on enrollees' estimated relative health status.

Background on Risk Adjustment

The notion of improved health status risk adjusters surfaced in the early 1980's, when models using prior Medicare claims expenditures were investigated. By adding diagnostic information to demographic-only adjusters, the ability of the risk adjustment models to predict expenditures was greatly improved. By the late 1980's, the "Diagnostic Cost Groups" (DCGs) model was developed using demographic and inpatient hospitalization data to predict enrollee expenditures. In the early 1990's, risk adjustment research took the next logical step of combining ambulatory and physician usage data with in-patient service use information to generate comprehensive models. HCFA funded the development of a number of risk adjustment models as potential options for use within a payment system, including the Principal In-Patient Diagnostic Cost Group (PIP-DCG) and the Hierarchical Coexisting Conditions (HCC) models (developed by a consortium of researchers at Boston University, Health Economics Research and Harvard University School of Medicine) and Ambulatory Clinical Group (ACGs) systems (developed by Johns Hopkins University and the Lewin Group).

Selection of the PIP-DCG Model

A prospective PIP-DCG model was chosen to fulfill the mandate for risk adjustment implementation on January 1, 2000 based on two criteria: 1) model performance, and 2) data availability. Based on previous research, the maximum explained variation that a prospective risk adjustment model is likely to achieve for an individual is between 20 and 25 percent, with the remainder attributed to random or unforeseeable events (such as expenditures related to accidents). The PIP-DCG model explains about 6 percent of individual variation, while the more complex comprehensive models (such as the HCCs and ACGs) explain about 9 percent. Currently used demographic-only adjusters explain only about 1 percent of the variation in health spending among individuals. Even the PIP-DCG model, therefore, offers a substantial improvement in model performance over the current demographic-only adjustments. However, in an insurance application, a more relevant measure is how well the model performs for groups.

This concept can be assessed using a "predictive ratio," i.e., the predicted expenditures divided by actual expenditures for a group. For large, random groups of beneficiaries, all the models have fairly high predictive ratios and predict expenditures fairly well. In a payment system application, however, the risk adjustment must also predict expenditures reasonably accurately for groups that are small and/or with individuals exhibiting high health expenditures, or groups of people with particular diseases (since not all Medicare+Choice plans will have large

or completely randomly distributed enrollment populations). By this standard, the PIP-DCG model exhibits far better predictive ratios than the current demographic-only method for non-random groups. More comprehensive and sophisticated HCC and ACG models would improve these ratios even further.

The second selection criteria considered in choosing a risk adjustment model for application in the Medicare+Choice payment system relates to the available data. The BBA mandated the collection of inpatient discharge data, but precluded collection of other data in time for implementation of risk adjustment on January 1, 2000. Medicare+Choice plans submitted data for the “start-up” year of this data mandate (discharges from July 1997 to June 1998) through the late fall of 1998. Given the current availability on only inpatient discharge data, the only feasible risk adjustment approach for implementation by 2000 is the PIP-DCG model, which can be implemented using inpatient diagnostic information combined with administratively available demographic information. The primary strength of an inpatient only diagnoses model is the availability of reliable data, which is familiar to providers as a result of hospitals coding and collecting such data since the mid-1980s.

There are concerns that implementation of an inpatient-data driven risk adjuster may create an incentive to increase hospitalization and is not as robust in predicting costs as a comprehensive mode. To a certain extent, inappropriate incentives can be mitigated by filtering out short stays or diagnoses that are clinically vague, non-predictive of future expenditure, and/or only infrequently treated in in-patient settings. These steps were taken in the development of the PIP-DCG model. In addition, implementation of the PIP-DCG model is a first step towards implementation of a comprehensive risk adjuster, which the current phase-in schedule provides for within 4 years of implementation.

The PIP-DCG Model

Briefly, under the PIP-DCG model, individuals are assigned to a single PIP-DCG group based on the principal inpatient diagnosis they experienced that has the greatest future cost implications. The model also uses age, sex, original reason for Medicare entitlement (disability) and entitlement to state payments for Medicaid, to derive a predicted expenditure level. This predicted expenditure amount is then converted to beneficiary relative risk factors by dividing individuals’ predicted expenditures by the national mean. The model is also prospectively based; in other words, base year inpatient diagnoses are used in the model to predict payment year health expenditures. Because this model was developed and calibrated using a year of inpatient diagnoses, a full year of data is essential for assigning beneficiary risk factors. For implementation in January 2000, HCFA will use a “time shifted” approach, where diagnostic information from July 1998 through June 1999 will be used to assigned risk factors that take effect January 1, 2000; the data collection year has been “shifted” back by 6 months to allow final payment factors to be assigned to beneficiaries at the start of the payment year.

Model Development and Description: In the PIP-DCG risk adjustment system, hospitalizations are used as markers for a particularly ill and high cost subset of beneficiaries for whom higher payments will be made in the next year. However, incremental costs associated with beneficiaries who have been hospitalized for conditions used in the PIP-DCG system are no longer in the base payment category. Payments for people in the base payment category decrease as payments are increased for beneficiaries identified as high cost. Because an inpatient hospital-based system depends on data from just one site of service, only a subset of conditions are recognized for increased payments. That is, the system should recognize admissions for which inpatient care is most frequently appropriate and which are predictive of higher future costs. For example, admissions for diseases most commonly treated on an outpatient basis should remain in the base group and should not be used for upwards adjustment, since inclusion of these admissions would provide an inappropriate incentive for hospitalization.

The PIP-DCG model was estimated using diagnostic information for Medicare FFS enrollees from inpatient hospital stays during calendar year 1995, and Medicare costs in the following year. The sample used in the estimation analyses consisted of individuals included in the 5-percent sample of Medicare beneficiaries who were alive and enrolled in Medicare during all of 1995, and on January 1, 1996. These criteria for the estimation sample were set because the most accurate models use a full year diagnostic information in estimating following year costs for surviving beneficiaries. Beneficiaries with certain characteristics, for example, HMO enrollees, end-stage renal disease enrollees, and new Medicare eligibles in 1996, were excluded from the analyses. In general, these exclusions were made to increase confidence that a complete set of Medicare claims for each beneficiary in the sample data set was included in the model development. The final estimation data set included approximately 1.4 million Medicare beneficiaries.

While the PIP-DCG model uses only inpatient diagnoses in creating the risk adjustment classification system, the model *predicts total expected costs* for the following year across multiple sites of services. Consequently, all Medicare expenditures, other than those for hospice care, were included in the calculation. Medicare expenditures for hospice care were not included because Medicare+Choice organizations are not responsible for hospice care. The model was estimated assuming no time lag between the base year (diagnostic information) and the predicted expenditures; that is, calendar year 1995 beneficiary diagnoses were used to predict calendar year 1996 expenditures.

Diagnostic classification: The risk adjustment model estimation process begins with a classification system, forming the inherent logic of the model. For the PIP-DCG model, principal inpatient diagnoses are classified into diagnosis groups (DxGroups). The DxGroups comprise an exhaustive classification of all valid International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnostic codes. The primary criteria in forming the DxGroups were clinical coherence and an adequate sample size to estimate average expenditures. Beneficiaries with multiple different inpatient diagnoses could have multiple hospital stays, and would potentially be assigned multiple DxGroups.

Creation of PIP-DCG groups: Next, DxGroups were aggregated into payment groups, or PIP-DCGs, using a sorting algorithm that ranked DxGroups based on 1996 actual expenditures. Highest expenditure DxGroups were grouped into the “highest” PIP-DCG. Once beneficiaries with the highest costs were placed into a DxGroup, those beneficiaries and all their associated expenditures were removed from the data for other DxGroups and then the DxGroups were re-ranked. The DxGroups with the next most costly diagnoses were grouped into the next highest numbered PIP-DCG, and those beneficiaries were removed from the remaining DxGroups. The process was repeated until each beneficiary and his or her expenditures were assigned to a single PIP-DCG group. Beneficiaries with multiple inpatient diagnoses were placed in their highest expenditure PIP-DCG group. In this way, each PIP-DCG group was defined according to average total expenditures for beneficiaries with inpatient diagnoses, which were first categorized, grouped, and sorted using the DxGroups. Based upon this sorting algorithm, more than 20 initial PIP-DCGs were defined. Lower average expenditure PIP-DCG groups had lower cost ranges (or intervals), while the highest average expenditure PIP-DCG groups had wider ranges.¹

Modifications to the PIP-DCG Model: After the initial sorting of DxGroups into PIP-DCG groups was complete, a clinical panel reviewed the placement of the DxGroups and their resulting predicted expenditures, to determine the appropriateness of their application in a payment model. Through this process, 75 DxGroups (covering about 1/3 of the admissions) were identified as: (1) representing only a minor or transitory disease or disorder, not clinically likely to result in significant future medical costs, (2) rarely the main cause of an inpatient stay, or (3) vague or ambiguous. These groups, as recommended by the clinical panel, were identified as those most likely to result in inconsistent or inappropriate reimbursements and were placed (with their associated expenditures) in the base payment category (for which the payment is a function of demographic factors). Examples of these groups include the DxGroup for fluid/electrolyte disorders and malnutrition. Though the treatment for individuals with these diagnoses is often quite costly in the following year, the diagnosis is clinically vague and, therefore, represented a likely target for coding “creep.” The clinical panel concluded that many of the sickest individuals with this diagnosis were likely to have another more specific hospitalization that would trigger appropriate increased reimbursements. Then, the remaining DxGroups were resorted and placed into revised DCGs for the payment model. A total of 15 PIP-DCGs (above the base payment category) are included in the final payment model. Costs for persons with excluded hospital discharges, as well as no discharges, are included in the demographically-based payment amounts, as they are under the current Adjusted Average Per Capita Cost (AAPCC) system.

¹ The PIP-DCG groupings were further refined using a number of criteria. First, each original PIP-DCG group retained its identity in the final payment model only if it contained at least 1,000 beneficiaries in the original sample; this minimum sample size was defined to assure stability of estimated payments in the model. If sample sizes were smaller than 1,000, the potential PIP-DCG was expanded to include DxGroups with average expenditures in the next lower range until the sample size was satisfied. If at any time during the sorting algorithm a DxGroup had fewer than 50 beneficiaries assigned to it, it was assigned to the base payment category. This base payment category also included all beneficiaries (and expenditures) for whom there was no Inpatient diagnosis during 1995.

As a second strategy to ensure consistent and appropriate payment levels, beneficiary diagnoses reported as a result of a short hospital stay (1 day or less) were left in the base payment category. Since the majority of 1-day stays are for diagnoses already assigned to the base group, the effect on payment is small. Also, short stays are often indicative of less serious, and, hence, less costly cases. It is important to note that these modifications do not mean that these expenditures have been excluded from the model. Rather, the payments associated with these diseases are captured in increased payments for the base payment category.

HCFA received a number of comments (based on the September 8, 1998 Federal Register notice) regarding this decision to “exclude” 1 day stays from the final PIP-DCG groups. Related comments expressed managed care industry concern that a risk adjustment model based only on inpatient diagnoses, particularly one which further excludes short stays, would disadvantage some plans and not provide “credit” for management on an outpatient basis. In response, we must stress that the purpose of the PIP-DCG model is to serve as an interim step towards implementation of a comprehensive risk adjustment model (i.e., one which uses diagnoses from all sites of service). The current AAPCC model makes no adjustments for level of illness, chronic or otherwise. The goal of the PIP-DCG model is to offer a significant improvement over the current system by identifying a relatively small group of high cost, serious illnesses, and provide a marginal additional payment appropriate for these seriously ill beneficiaries. Another rationale for the exclusion of one day stays was to limit possible “gaming” of the new payment system. Plans that might convert treatment of some diseases from outpatient to one day admissions, increase the frequency of short “observational” stays, and otherwise increase the use of short hospital admissions for marginal diagnoses, would trigger potentially large increases in payments while incurring relatively few costs (the costs associated with a one day hospital stay). To further refine the model as a method of identifying the sickest individuals, and to discourage the potential payoff for gaming, we excluded one day stays of any diagnoses for the purpose of triggering increase PIP-DCG payments.

Under the final PIP-DCG payment model, beneficiaries who are hospitalized for chemotherapy (ICD-9 codes V58.1 and V66.2) are treated as exceptions. These codes are indicators of a treatment method, rather than a particular disease. Recognizing, however, that Medicare’s current inpatient coding rules require that the diagnoses for beneficiaries who are hospitalized for chemotherapy must be coded using these V-codes as the principal diagnoses, the most appropriate PIP-DCG group for these beneficiaries would be assigned based on the type of cancer, using a secondary diagnosis. In addition, the final payment model also treats individuals diagnosed with AIDS as an exception. In this case, individuals with a secondary diagnosis of AIDS will be placed in the same PIP-DCG group as individuals with a reported principal diagnosis of AIDS. The rationale for this decision is HCFA’s analysis showed that individuals with a secondary diagnosis of AIDS tended to have expenditures close to those admitted explicitly for the treatment of AIDS.

Addition of Demographic and Other Factors: Twenty-four age/sex cells were included

that mirror the splits currently used in Medicare's current demographic adjustment methodology. For the purposes of calibrating the model, beneficiaries are assigned to more than one age cell if they aged into a new cell during 1996. For example, a beneficiary aged 69 on January 1, 1996 but who turned 70 years old later in 1996, is assigned to both the 65-69 and the 70-74 age cells as a fraction of eligible months in each cell. The value of the age/sex variable is weighted by the proportion of 12 months the person is in that cell. Payments for all months are thus set to the weighted average of the two payments and no change is necessary in the birthday month.

In the development of the final payment model, HCFA considered the inclusion of other demographic variables. The purpose of including other demographic independent variables was to take into consideration the unique cost implications of characteristics not related to admissions, and to increase the accuracy of the payment estimates for subgroups of the Medicare population. The additional independent variables considered for inclusion were:

- Originally disabled;
- Medicaid status;
- Institutional status; and
- Working aged.

Originally disabled: A beneficiary is defined as originally disabled if he or she is currently entitled to Medicare as an aged beneficiary, but was originally entitled by reason of disability. The other three categories of independent variables are currently used in Medicare's demographic adjustment methodology, although not necessarily in the way proposed here. Preliminary analyses showed that Medicare expenditures for beneficiaries who were originally disabled or Medicaid enrolled were substantially higher than predicted by age, sex, and principal hospital diagnoses. Data on these characteristics for beneficiaries are available in HCFA administrative files. Analyses showed that if these factors were not taken into consideration in the calibration, the model would not predict the average expenditures of several important, and higher-cost, Medicare subgroups. In the payment model, the value of the originally-disabled variable differs by age/sex group. This means that for a given age/sex cell, predicted costs vary between those who were originally disabled and those who were not originally disabled. Alternatively, it allows for the possibility that the trajectory of expected costs as beneficiaries age could differ between the originally disabled and those not originally disabled.

Medicaid eligibility: Currently, Medicaid status is a concurrent adjustment factor for Medicare capitation payments. That is, a Medicare beneficiary is placed into an AAPCC "rate cell" payment category each month based on his or her current Medicaid enrollment status. For the purposes of risk adjustment under the PIP-DCG system, we defined Medicaid status as enrollment in Medicaid in any single month during the diagnosis year (e.g., all or part of 1995). Thus, in the PIP-DCG risk adjustment system, beneficiaries who are Medicaid-eligible at any time during the data collection year will be eligible for the Medicaid payment increment for the entire payment year; payments will no longer vary according to month-to-month Medicaid eligibility in the payment year. The value of this variable also varies according to the age/sex

groups.

Institutional status: Another independent variable considered for inclusion was institutional status. Institutional status is currently used in the AAPCC methodology as a concurrent risk adjuster. For each prior month in a certified institution, payment for a beneficiary is made at the higher institutional rate cell amount the following month. It is included as a marker for higher expected concurrent cost. HCFA's analysis using Medicare Current Beneficiary Survey (MCBS) data showed that the PIP-DCG model accurately predicts the average costs of the entire group of institutionalized beneficiaries. This suggests that there is no need for an institutional factor. However, our analysis also showed that mean actual Medicare payments for those in post-acute care facilities are far greater than those for long-term care facilities. In Medicare, a SNF stay requires a preceding hospital stay. The payment system is designed to set Medicare rates that are correct on the average for groups of enrollees. It does not pay based on actual events in the payment year. If it did, we would also recoup payments for those who incur very low costs in the payment year. Thus this method does not pay more for the particular group that spends some time in a SNF. While those in long term care facilities incur more costs than average Medicare beneficiaries, they incur less costs than predicted by the PIP-DCG model. An institutional factor for this population would actually be negative if implemented. The incentives for identifying the long term institutionalized and reporting on this group are low when the result is a payment reduction. We have therefore decided not to pay based on this site of service. There are relatively few enrollees in this group and the overpayments will be small. Given these considerations, HCFA will not include an institutional status factor in the payment model.

To estimate the final coefficients of the PIP-DCG calibration model, HCFA regressed annualized 1996 expenditures on the 15 PIP-DCGs, age/sex groups, originally disabled status, and Medicaid status. The model is specified so that there is a separate variable for each age/sex group. To this there is an additional vector of age/sex variables for those who were originally disabled, and a vector of age/sex variables for those who were Medicaid enrollees.

Demographic-only factors for new enrollees: As described earlier, the model was calibrated using only beneficiaries for whom Medicare data existed in 1995 and 1996. One essential element of this model is that it requires diagnoses in the year before payment is made. Therefore, the model cannot predict expenditures for beneficiaries for whom Medicare does not have diagnosis data. The Medicare program cannot compile diagnosis data on beneficiaries for the year before they enter the program. Thus, no prior diagnosis information exists for the new disabled beneficiaries and age-in beneficiaries². Predicted expected cost estimates were derived for these beneficiaries using only demographic factors. Two similar, but different methods were used to predict expenditure estimates for the age-ins in the 65-69 age groups and other new eligibles. Those age 70 and above, and those under 65, were assigned the mean predicted expenditure for beneficiaries in the same age/sex/Medicaid status cell. For the age-ins between

² The term "age-in" refers to beneficiaries who first become entitled to Medicare on the basis of their age. While most beneficiaries "age-in" at age 65, some beneficiaries, e.g. the working aged, choose to delay seeking Medicare entitlement until they are older.

age 65 and 69, a different procedure was used because the mean predicted value for the age bracket was based mainly on persons 67-69 years old in 1996. Actual expenditures in 1996 for persons 67-74 years old were computed and used in a regression to predict the missing age groups. For all new enrollees, payments based on Medicaid eligibility will be made retroactively, once enrollment can be established and verified.

Actuarial graduation of the final payment model factors: HCFA's Office of the Actuary revised the age/sex demographic coefficients. Upon review, the age/sex coefficients for the originally disabled, and Medicaid recipients were found to be somewhat irregular in pattern. This pattern, if uncorrected, would have led to irregular changes in payments as beneficiaries in these groups aged. Therefore, these coefficients were refined by HCFA actuaries so that the predicted payment patterns across age groups within each of those categories was smoothed.

The following diagram summarizes the proposed system cells:

		Base Payment: Everyone Receives	Add Differentials for:		
			Medicaid Eligibility	Previously Disabled	PIP
Claims experience	Age Category	By Gender	If Medicaid eligible in base year	If disabled in base year	If Dx scored in PIP-DCG in base year
Less than one year	Under 65	5 cells by gender	5 cells by gender	not applicable	
	Over 65	11 cells by gender	11 cells by gender		
One or more years	Under 65	5 cells by gender	5 cells by gender	not applicable	15 PIP cells
	Over 65	7 cells by gender	7 cells by gender	7 cells by gender	

Working Aged Adjustment: The PIP-DCG model was calibrated using Medicare beneficiaries not covered by employer or other group policies. For beneficiaries with employer insurance, Medicare is the secondary payor and its liability is much smaller than for those who are not working. Using administrative data, it is estimated that, on the average, Medicare's liability for the working-aged is 21 percent of the liability for those for whom Medicare is the primary payer. Therefore, payments made to beneficiaries in this status will be reduced to 21 percent of what they would have been.

Assignment of risk factors: After Medicare+Choice organizations submit inpatient hospital discharge data for the base year year, we will use the demographic information and diagnostic information from all Medicare+Choice organizations a beneficiary may have joined and from FFS to determine the appropriate risk factor for each beneficiary. It is at this point that information regarding beneficiary Medicaid eligibility (in any single month during the diagnosis data collection year), original reason for Medicare entitlement (originally disabled), identification as a new enrollee, beneficiary age, sex and working-aged status (beneficiary covered under a employer insurance) are determined using Medicare administrative data files, and are used along with inpatient diagnostic data to assign the appropriate risk factor.

When a Medicare+Choice organization forwards beneficiary enrollment information to HCFA, we, in turn, will send the organization the appropriate risk factor for the beneficiary, as well as the resultant payment. Because the risk factor is *computed for each individual beneficiary for a given year*, the factor follows that beneficiary. In addition, since all beneficiaries will have risk factors, information will be immediately available for payment purposes as beneficiaries move among Medicare+Choice organizations.

Medicare+Choice Risk Adjusted Payment Model

To determine risk adjusted monthly payment amounts for each Medicare+Choice enrollee, individual risk factors (described above) will be multiplied by the appropriate payment rate for the county determined under section 1853 of the Act. To make this calculation appropriately, an adjustment to these rate book amounts will be required before applying the risk adjustment factors discussed above. This adjustment, or rescaling factor, is necessary in order to account for the fact that the existing county rate book is already scaled to the set of demographic factors used under the current system, but not to the risk factors we will be using under the new system. If the PIP-DCG model risk adjustment factors were applied to unadjusted county rate book amounts, this would create inaccurate payments.

The application of the rescaling factor in effect translates the rate book amounts into the same language used under the risk adjustment methodology. As a result of rescaling, payment using the risk-based rate book for a person with the average risk factor in a county would be the same as payment for a person with the average demographic factor in that county using the original demographic-based rate book. (However, a person with the average demographic factor does not necessarily have the average risk factor.) To the extent that an organization enrolls sicker people, the organization will receive higher payments. By itself, the rescaling process is payment neutral (which is not the same as budget neutral). That is, the apparent effects of the rescaling factor on the resulting county rates is exactly offset by the estimated effects of moving from demographic to risk factor standardization in assignment of individual enrollee factors. By itself, rescaling does not raise or lower payments. Whether aggregate payments to a plan increase or decrease depends upon the risk profile, i.e. health status, of the beneficiaries enrolled in the plan.

Calculation of the Rescaling Factor: The essential purpose of the implementation of risk adjustment is the *substitution* of individual enrollee demographic factors with a new individual

enrollee risk adjustment methodology. But this substitution should take place in *two* places: in the standardization of county rates, and in the method of estimating relative risk of individual enrollees. BBA modifications to the rate book make a direct rate book standardization substitution difficult because the 1997 demographic AAPCC rates are the basis for future rate books.

The old (demographically-based) AAPCC rate book represented the cost to Medicare in a given county for the national average beneficiary measured demographically. County rates were calculated by dividing county per capita costs by county average demographic factors. Prior to BBA, these rates were updated annually. However, because of BBA modifications, all Medicare+Choice county rates have their basis in the 1997 AAPCC Rate Book. Thus, the factors used in calculating this 1997 Rate Book are “locked in” – including the average county demographic factors. Also, the 2 percent minimum increase must be based on the prior year’s rates. Despite these policy complications, it is important to apply the new enrollee risk adjustment methods to an appropriately standardized rate book. This is the case because, if we were to shift from an enrollee *demographic* factor to *risk-based* adjustments, while maintaining the factors underlying the current rate book, a critical inconsistency would be created in the overall payment methodology. The risk adjustment methodology adds disease information to purely demographic information. Though attempting to measure the same thing -- relative health status -- the range of factors for the demographic-only and risk factors differs. This is in part simply because the measurement range (or “ruler”) of risk factors exceeds that of the old demographic-only factors, and because the new risk factors are able to distinguish differences in health status more accurately. However, because the “rulers” differ between demographic and risk factors, a technical modification is necessary for payments to remain methodologically correct. Without some adjustment, this inconsistency between the standardization factors used in the county rates and the enrollee risk factors will result haphazardly in either significant underpayments or overpayments, depending on the county.

Use of a rescaling factor: The most direct and accurate way to fix this problem would be to calculate both the average county and individual enrollee factors on the same scale – as originally done when both were calculated using demographic factors. Unfortunately, this is not possible since the rate book (including the demographic basis for the average county factor) is set by law. However, a “county rescaling factor,” which is part of the risk adjustment methodology, places both the county and enrollee factors back on a comparable scale. The rescaling factor for each county will be defined as the ratio of the following:

$$\text{County Rescaling Factor} = \frac{(\text{Risk County Rate})}{(\text{Demographic County Rate})}$$

The denominator of this ratio (the demographic county rate) is simply the county rate calculated under the current system. The numerator (risk county rate) is the county rate properly standardized to the new risk adjustment factors.

Transition Policy

HCFA has decided to include a transition period as a component of our risk adjustment methodology, initially using a blend of payment amounts under the current demographic system and the PIP-DCG risk adjustment methodology. Under a blend, payment amounts for each enrollee would be separately determined using the demographic and risk methodologies (i.e., taking the separate demographic and risk rate books and applying the demographic and risk adjustments, respectively). Those payments amounts would then be blended according to the percentages for the transition year.

HCFA determined that the blend method can provide adequate safeguards against abrupt changes, in particular by providing initially for a low blend percentage of the risk-adjusted payment rate. We have therefore decided that the first year blend percentages will be 90 percent of the demographically adjusted rates, and 10 percent of the risk-adjusted payment rate. We have also decided to implement a five-year transition, which will culminate in full implementation of comprehensive risk adjustment in the fifth year. Specifically, we have decided upon the following transition schedule:

CY 2000	90 percent demographic method	10 percent PIP-DCG method
CY 2001	70 percent demographic method	30 percent PIP-DCG method
CY 2002	45 percent demographic method	55 percent PIP-DCG method
CY 2003	20 percent demographic method	80 percent PIP-DCG method
CY 2004	100 percent comprehensive risk adjustment (using full encounter data)	

In order to implement comprehensive risk adjustment in CY 2004, we will soon be providing plans with guidance concerning requirements for submission of outpatient, physician, and other non-inpatient hospital data.

HCFA's preliminary analyses of the first year's impact of risk adjustment indicate that these blend percentages should significantly reduce the initial impact to organizations of risk adjustment. Specifically, these analyses suggest that the decrease in aggregate payments to Medicare+Choice organizations under this transition from risk adjustment alone will be less than 1 percent in the first transition year. While the impact on specific organizations will vary, this preliminary analysis also suggests that the maximum decrease in payment to organizations from risk adjustment alone will be less than 2 percent. This maximum reduction would be offset by the minimum 2 percent update guaranteed under the BBA payment methodology, so that plans would not experience a reduction in payment in 2000 due to risk adjustment relative to payments in 1999. We will continue to monitor the impacts on organizations throughout the transition period, and will consider interim modifications to the PIP-DCG model if specific problems emerge.

Summary of HCFA's Proposed Approach for 2000

The approach HCFA will use to meet the year 2000 mandate for risk adjusted payments will:

- (1) Be based on inpatient data;

- (2) Apply individual enrollee risk scores in determining fully capitated payments;
- (3) Utilize a prospective PIP-DCG risk adjuster to estimate relative beneficiary risk scores;
- (4) Apply separate demographic-only factors to new Medicare enrollees for whom no diagnostic history is available;
- (5) Apply a rescaling factor to address differences between demographic factors in the rate book and new risk adjusters;
- (6) Use 6 month old diagnostic data to assign PIP-DCG categories (the “time shift” model, as opposed to using the most recent data and making retroactive adjustments of payment rates part way through the year);
- (7) Allow for a reconciliation after the payment year to account for late submissions of inpatient discharge data;
- (8) Phase-in the effects of risk adjustment, beginning with a blend of 90 percent of the demographically adjusted payment rate, and 10 percent of the risk-adjusted payment rate in the first year (CY 2000); and
- (9) Implement processes to collect encounter data on additional services, and move to a full risk adjustment model as soon as is feasible.

Independent Actuarial Review

The BBA mandate, aside from requiring this Report to Congress outlining HCFA’s proposed methodology, also required an independent actuarial review of that method. To meet this requirement, HCFA arranged for a panel of experts under the aegis of the American Academy of Actuaries to review and comment on both the risk adjustment model and its application in Medicare+Choice payments. In summary, the Academy found the PIP-DCG based payment method as proposed by HCFA to be actuarially sound, though some concerns were noted regarding implementation issues; they conclude: “On balance, and with a phase-in, the proposed risk adjustment method appears to be a reasonable step in what should be a long-term evolutionary process.” The full text of the Academy Work Group’s report is attached as Appendix 4.

CHAPTER 1: PURPOSE AND BACKGROUND

Since 1985, Medicare payments to risk contracting Health Maintenance Organizations (HMOs) for aged and disabled beneficiaries have been based on actuarial estimates of the per capita cost Medicare incurs paying claims on a fee-for-service (FFS) basis in a beneficiary's county of residence. (Medicare's costs in paying claims for beneficiaries with end-stage renal disease are not considered in these county estimates, but are treated separately on a statewide basis.) These county estimates have been adjusted for the demographic composition of that county (age, gender, Medicaid eligibility status, working aged status, and institutional status) in order to produce a figure representing the costs that would be incurred by Medicare on behalf of a national average Medicare beneficiary living in that county. These county per capita payment rates, adjusted for the national average beneficiary, have been published annually as the county rate book. Prior to January 1998, monthly payments to HMOs for each enrollee were based on this county rate book amount, adjusted for the enrollee's demographic factors. This methodology is known as the "Adjusted Average Per Capita Cost" (AAPCC) methodology, and HMOs with Medicare contracts under section 1876 of the Social Security Act (the Act) were paid on this basis between 1985 and 1997.

In enacting the new Part C of Title XVIII to create the Medicare+Choice program, the Congress provided, in a new section 1853 of the Act, for a revised methodology for paying organizations that enter into Medicare+Choice (M+C) contracts. Under this new methodology, the equivalent of the above-described county rate book (that is, the county-wide amount that is adjusted by an individual enrollee's demographic status to determine the final payment amount)

is based on the greatest of three amounts. The first amount is a new blended payment rate methodology that would combine local and national rates in setting county rates. The second amount is a new minimum specified rate amount (for example, \$367 per month per enrollee in 1998). The third amount is based on a 2 percent increase over the prior year's rates, with the rate book for 1997 serving as the baseline. As in the case of the AAPCC methodology described above, monthly payments are the county rates under section 1853 of the Act, adjusted for the demographic status of each enrollee.

Under section 1876(k)(3) of the Act, the new Medicare+Choice payment methodology under section 1853 of the Act applies to existing HMO contracts under section 1876 for 1998. This methodology has also applied to Medicare+Choice organizations since contracts with such organizations first became effective January 1, 1999. Section 1853(a)(3) of the Act requires the Secretary to develop and implement a new risk adjustment methodology to be used to adjust the county-wide rates under section 1853 of the Act to reflect the expected relative health status of each enrollee. This new methodology, which must be implemented by January 1, 2000, will replace the current method of adjusting county-wide rates that are based only on the demographic factors of age, gender, Medicaid eligibility, working aged status, and institutional status. The goal is to pay Medicare+Choice organizations based on better estimates of their enrollees' health care utilization relative to the fee-for-service (FFS) population.

While the Medicare+Choice legislation mandates the implementation of risk adjustment in general, the legislation provides the Secretary with broad discretion to develop a risk

adjustment methodology that would “account for variations in per capita costs based on health status and other demographic factors.” Related to this mandate, BBA provides the Secretary with additional authorities and reporting requirements. To support risk adjustment, BBA gives the Secretary the authority to collect inpatient hospital discharge data (for admissions occurring on or after July 1997). The Secretary may also require the submission of “full encounter” data (inpatient, outpatient, physician, and other services), for beneficiary services occurring on or after July 1, 1998. These expanded data could be used to implement a more extensive risk adjustment system. The legislation is not specific as to how risk adjustment is to be implemented. Instead, the Secretary was required to submit a Report to Congress outlining the risk adjustment methodology that will be implemented beginning in 2000. That report must be accompanied by an independent actuarial review of the Secretary’s proposed methodology.

This document fulfills the reporting mandate, and will outline the Health Care Financing Administration (HCFA’s) proposed methodology for implementation of risk adjusted Medicare+Choice payments in January 2000. This report will also provide HCFA’s rationale for the proposed methodology, a description of how health status risk adjusters will be applied to the Medicare+Choice rate book, projected impacts of this payment change, and possible future policy directions.

Background: Risk Adjustment and Medicare

The Medicare program has maintained a long-term interest in risk adjusters and risk

adjusted payment systems, most of it related specifically to the managed care program. Recent intense work on the development of improved risk adjustment methodologies was prompted largely by research on selection bias in the Medicare risk program, and the need for a more refined payment method that adjusts for the health status of the beneficiary.

Prior to BBA, Medicare risk payments to managed care plans were based on actuarial estimates of per capita Medicare fee-for-service costs in each county for the aged and disabled groups of beneficiaries. These county payment estimates were adjusted for the demographic composition of the county so they mirrored the cost of a national-average Medicare beneficiary (if this national-average beneficiary were situated in that county.) The demographic factors used to make these adjustments were the relative costs of beneficiaries grouped by age, sex, welfare status and institutional status. The per capita payments (multiplied by .95), and adjusted for the county average demographic factors, have been published annually as the County Rate Book. Actual payments for each enrollee have been the product of the Rate Book amount for the enrollee's county of residence, and the enrollee's individual demographic factor. Implemented in 1985, this payment system was called the "Adjusted Average Per Capita Cost" (AAPCC) methodology. It is the 1997 version of this AAPCC county rate book that is, by law, the basis of Medicare+Choice program.

Many criticisms have been made of the AAPCC payment system, ultimately leading to the reforms mandated under BBA. Some criticisms focused on the county-basis for the payment rate cells. Under the AAPCC system, managed care plans were expected (on average) to be

competitive with fee-for-service in each county. Many people believed, however, that the differences in payment levels across counties were too extreme, that payment levels in many communities were either too low or too high, and that year to year changes in payment levels were too unpredictable. These issues were addressed under BBA through modifications to the county rate book methodology. Beginning in January 1998, Medicare 1997 county rates will form the basis for all future payments. Using the 1997 rates, national and county levels will be blended, a minimum payment level will be set, and year to year changes will be related to a discounted national rate of increase.

Most other concerns about Medicare's managed care payment system related to mounting evidence of selection bias. Since AAPCC capitated payments were based on 95 percent of expected payments for fee-for-service beneficiaries, in theory, the HMO program should have lowered costs for Medicare enrollees by 5 percent. Despite this, evidence for selection bias suggests overpayment by Medicare. Capitated payment provides incentives for plans to minimize medical costs by enrolling the healthiest of Medicare beneficiaries. From the perspective of the beneficiaries, Medicare HMOs may seem more attractive to healthier beneficiaries (who don't anticipate using many medical services, and therefore have fewer provider preferences), and beneficiaries who lack long-standing ties to specific providers and may therefore be willing to consider switching to HMOs. This "selection" by beneficiaries complimented efforts by some plans to enroll the lowest risk Medicare beneficiaries. Selection bias is possible because demographic risk adjusters, intended to adjust for variations in individual enrollees' health expenditures, proved weak in explaining these differences (Lubitz, Beebe, and Riley, 1985;

Newhouse, 1986; Ash, et. al. 1989). But in some cases, beneficiaries with greater need for services might be attracted to HMOs offering little or no monthly premiums, coverage of regular Medicare co-pays and deductibles, and additional benefits not covered under Medicare fee-for-service (FFS) such as outpatient prescription drugs. To address these problems, the BBA mandates implementation of health status risk adjusters as a substitute for demographic factors.

Selection bias: What is the evidence for selection bias in the Medicare risk program?

Studies examining relative health status and expenditures of Medicare HMO enrollees versus fee-for-service beneficiaries began even prior to national implementation of the Medicare risk program.¹ Research evaluating Medicare HMO demonstrations, begun in the early 1980's in preparation for the risk program, raised questions about the accuracy of capitated payments that were adjusted using demographic factors only (Eggers and Prihoda, 1982; Lubitz, Beebe, and Riley, 1985). Subsequent evaluations of the national risk program (funded by HCFA and conducted by Mathematica Policy Research (MPR)) found that HMO enrollees had substantially lower reimbursements during the two years prior to enrollment than non-enrollees after adjusting for demographic risk factors used in the AAPCC payments (Hill and Brown, 1990). MPR estimated that due to selection bias, even taking into account the 5 percent discount on the AAPCC already in effect, Medicare payments were an average of 5.7 percent higher than they would have been if the HMO beneficiaries had remained in fee-for-service. Without the 5 percent cut for efficiency, the payments would have been 11.3 percent too high (Brown, et. al., 1993).

¹ The Medicare risk program, also known as the TEFRA risk program, was mandated as a result of the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982. This federal law created the risk contract provisions under which HMOs contracted with HCFA prior to January 1, 1999.

Numerous other studies conducted over the last decade have contributed additional evidence of selection bias using a number of alternative analytical measures: pre-enrollee use and costs, mortality rates, self-reported health status, functional status, and health assessment measures of new HMO “joiners.” (Riley, Lubitz, and Rabey, 1991; Physician Payment Review Commission, 1996; Riley et. al. 1996; Ingber, 1998). HCFA internal studies of new Medicare managed care enrollees projected average plan payment reductions for this group of between 9 and 18 percent, depending on whether an inpatient or comprehensive risk adjustment model is applied. Though the magnitude of selection bias, and resulting estimated overpayment, varies between 5 and 20 percent, the general conclusion is the same: Medicare HMO enrollees, on average, are healthier than beneficiaries remaining in FFS controlling for the demographic factors used in AAPCC-based payments. Two published studies have found no evidence of selection bias. However, one of these studies was based only on data from two counties in Minnesota, known to be particularly unrepresentative (Dowd, et. al., 1996). The other was based on a very small sample of Medicare managed care beneficiaries (Rodgers and Smith, 1996). The preponderance of evidence suggests that Medicare HMO enrollees are, at least on average, healthier and therefore less costly than FFS beneficiaries of the same age and sex.

Risk Adjustment Research: HCFA-sponsored research to develop improved risk adjusters for Medicare managed care payment began almost immediately following the early selection bias findings. The main focus of this early research was based on the assumption that an individual’s health spending was related to diagnosed illnesses. Based on this idea, research focused on using

the diagnosis codes found on fee-for-service claims to explain variation in health spending among individuals. But initially, diagnosis coding of claims was incomplete. The earliest risk adjustment work was based on prior use of services, but suffered from a lack of diagnostic information. Medicare claims data of the early 1980's (Lubitz, et. al., 1985) provided researchers with some information on what services were provided, but not why. The implementation of prospective payment for hospitals vastly improved the diagnostic information available on hospital bills. As a result, the next phase of work focused on inpatient diagnoses as predictors of future health status. "Diagnostic Cost Groups" (DCGs) models were developed based on the premise that, combined with demographic factors, predictable health expenditures were related to hospitalizations (Ellis and Ash, 1988; Ellis and Ash, 1989).

As reporting of diagnoses became better on other types of claims, the next refinement of risk adjustment research took the logical step of combining both ambulatory and inpatient service use information in order to improve explanatory power in predicting total expenditures. The research also focused on systems that avoid direct measures of prior utilization, expenditures, or procedures. Risk adjustment systems that use direct measures bring undesirable incentives for increased utilization or particular modes of practice, and are better for retrospective profiling rather than for payment applications. Because HCFA's primary interest in risk adjustment at this point was for reform of managed care payment systems, funded research used diagnoses as the primary measure of health status.

By 1991, HCFA had begun receiving reliable diagnoses on physician claims and, as a

result, risk adjustment development work was vigorously pursued. Two main directions were taken: models based on Diagnostic Cost Group (DCG) methodologies and models based on Ambulatory Cost Group, now Adjusted Clinical Group (or ACGs) systems. In the case of DCG-based models, the major challenge was the incorporation of outpatient and physician services into the inpatient-based original methodology. Conversely, the ACG models required integration of inpatient services to the original ambulatory care basis of the method.

DCG-based models were developed by a consortium of researchers at Boston University, Health Economics Research and Harvard University School of Medicine, and resulted in the Principal Inpatient (PIP-DCG) and Hierarchical Co-existing Conditions (HCC) models (Ellis, et. al., 1996; Pope, et. al., 1997). Research to refine the original inpatient diagnosis driven DCG model was also conducted by the Boston/HER/Harvard consortium; the latest refinement is the PIP-DCG risk adjuster. Parallel developmental research to expand ACG-based risk adjusters was also conducted by researchers at Johns Hopkins University and Lewin (Weiner, et. al., 1996a; Weiner, et al., 1996b). Two new versions developed from the original ACG model are now available: the ADG-HosDom model uses ambulatory and hospital diagnoses as well a category of diagnoses with over 50% hospital admission rates; the ADG-MDC model uses ambulatory diagnoses and a count of hospital admissions by their major diagnostic categories. The ACG and DCG models were developed to prospectively adjust payments (i.e. use diagnostic information from year one to adjust payments in the next payment year.)

In most of the encounter based risk adjustment methods HCFA has developed, the risk

adjustment models can be calibrated to estimate expenditures in two ways: prospectively and concurrently. Concurrent models are typically developed for health status adjustments in research; however, these applications could be applied to a concurrent payment system. What are the differences between prospective and concurrent risk-based payment models? In the prospective models, diagnoses/conditions from a base year are used to estimate future year payments. By their nature, prospective models rely on conditions that have future cost implications. For example, in prospective models, diagnoses related to many cancers have strong importance since a person who is diagnosed with serious cancer in year one is likely to use many health services in year two. In this sense, prospective risk adjustment models base payments on predictable variations in costs.

Concurrent models use current year diagnoses/conditions to estimate current year payments. These models use all conditions identified in the payment year, whether they are randomly occurring or predictable. For example, in a concurrent risk adjuster model, an individual hospitalized for an appendectomy will be placed in a moderate risk category, since this hospitalization had a significant impact on the individual's current year expenditures. Under a prospective model, hospitalization for an appendectomy is not predictive of the next year's expenditures, and therefore this diagnosis would have little impact on a prospectively determined risk score. Therefore, a hospital based concurrent model would be akin to a DRG-model and move closer to a fee-for-service system because of the dominant effect of the hospital stay.

HCFA is proposing a prospective model for implementation for a number of reasons.

First, prospective models have been recommended by researchers and actuaries as having fewer incentives for gaming because they predict future costs rather than reward behavior (Dunn, et al.,1996). Second, prospective models establish final payment rates 3-4 months into the payment year (assuming a 3 month data lag): much sooner than concurrent models (for which final payment rates are not known until 3-4 months after the end of the payment year). Feedback from the managed care industry suggest that organizations have a preference for knowing final rates as soon as possible. Finally, prospective models place greater payment weights on diagnoses associated with chronic illnesses, which seems more consistent with the health care management approach of managed care.

Although encounter data based risk adjusters became a primary focus of HCFA sponsored research, alternatives were also sought. As one alternative, HCFA sponsored research on survey-based risk adjusters (sometimes also known as functional status adjusters). These rely on survey information from beneficiaries rather than encounter data (Gruenberg, et al, 1996; Pope, 1997; Kane, et. al., 1998). These models are based on research demonstrating that an individual's perception of his/her own health, estimates of their functional status (measured by Activities of Daily Living (ADLs) and/or Independent Activities of Daily Living (IADLs)), and limited self-reported clinical diagnoses are highly predictive of future health care expenditures (Ware, et. al. 1995; Gruenberg, et. al., 1989). While they do not require encounter data, implementation of payment systems based on survey-based models require surveys of beneficiaries. Such surveys are quite costly. Also, survey data is (by its nature) self-reported information, and is more prone to error on the reporting of medical history and other factors than claims-reported information.

Refined functional status/survey based risk adjuster models specifically for Medicare payment are still under development. One model of functional status adjusted payment will be tested in the payment system for the Second Generation Social HMO demonstration.²

Though much of the risk adjustment development work funded by HCFA was focused on the Medicare population, and intended for potential use in refining the Medicare HMO payment system, research was also encouraged and funded by HCFA to develop risk adjusters for target beneficiary populations, and for non-beneficiary populations. In many cases, risk adjustment development outside of Medicare was prompted by various national health care reform efforts in which fears of uneven selection against various health risk pooling organizations was seen as a major potential problem. To meet the policy demands of national health care reform proposals, HCFA funded the development of encounter based risk adjustment models specifically for the under age-65 population (Carter, 1997; Ash, et. al.,1997). In addition to reform related work, research to develop risk adjusters specifically for vulnerable populations was also pursued, though in most cases only partially funded by HCFA. These research efforts have developed risk adjusters for mental health services (Frank, 1997), for children (Newhouse, et. al, 1993), and the disabled (Kronick, 1997). More detailed descriptions of the development of risk adjustment methodologies for the Medicare population, as well as related HCFA demonstration projects, can be found in a HCFA staff-authored article (Greenwald, et. al, 1998).

² The Second General Social HMO demonstration, also known as SHMO II, is intended to test an alternative managed care delivery system for Medicare beneficiaries, some of whom may be nursing home certifiable. Under this project, annual assessments of beneficiaries' medical conditions and functional status are used both for care planning, and as part of payment rate setting for each enrollee.

Actuarial Alternatives to Risk Adjustment: HCFA also funded research to develop non-risk adjustment improvements to the AAPCC (Wrightson, et al., 1996). The approaches considered included risk sharing, partial capitation, reinsurance, experience rating, and an approach that sets different rates for new enrollees to managed care. HCFA offered risk adjustment, as well as these alternatives, to health plans in the Medicare Choices demonstration program (Greenwald, et al., 1998). While there was initial interest in the risk sharing and other actuarial approaches, this interest faded once the implementation details were negotiated and plans realized that rates are reduced to fund the risk sharing pools and HCFA was not willing to pursue cost-based approaches. Plan interest in partial capitation also diminished once plans realized that Medicare would only cover Medicare-covered services without large administrative mark-ups for the fee-for-service based share of partial capitation payments.

Choosing a Risk Adjustment Method for Medicare

A large amount of theoretical research has been conducted aimed at developing health status risk adjusters for the Medicare population. But by what standards can one method be chosen over another for implementation? The two standards HCFA used in assessing risk adjustment methods were:(1) model performance and (2) data availability. In the development of risk adjusters, the “performance” of various models has typically been measured by improvements in the amount of explained variation in individual health spending. The demographic risk adjusters currently used in Medicare risk program payment explain about 1 percent of variation in expected spending among individual beneficiaries. This is considered

pretty poor. But what is considered “good” performance of a risk adjustment methodology? Based on previous research, 20 percent is generally considered the current upper bound of explainable variation for the Medicare population; the rest may simply be random or unforeseeable, such as expenditures related to accidents (Newhouse et. al. 1989).

If explaining 20 percent of variation in expected/predictable expenditures is considered the best likely to be achieved, then progress of risk adjusters has been considerable. Explained variation is measured by the “R-square” statistic. Current encounter data based models such as the PIP-DCG, the more complex HCC DCG model, and the alternative ACG models, have R-squared statistics between 6 and 9 percent. Survey based models, such as those developed by Gruenberg (1996), have achieved R-squares of about 6 percent for the non-institutionalized, aged Medicare population and about 4 percent for all Medicare beneficiaries. This may not seem very successful, though these figures represent between 30 and 45 percent of the variation considered predictable.

While the R-square statistic is one way to determine relative performance of various risk adjustment methods, it is probably not the most important. R-square statistics measure explained variation among individual enrollees -- in other words, how well the models predict what will happen to individuals. In an insurance application, a more relevant measure is how well the model works for groups. While managed care plans may well be interested in how well these models predict risk scores, and hence payment, for some individuals, their management of risk is based on revenues for groups.

HCFA has therefore placed greater emphasis on assessing the performance of models using predictive ratios. Predictive ratios for groups are the sum of expected expenditures for all individuals in that group as predicted by the risk adjuster model, divided by the sum of actual expenditures observed for all individuals in the group for the year. Comparative information on the performance on various risk adjustment models, according to predictive ratios, is listed in Table 1.1 at the conclusion of this chapter. A predictive ratio of 1.0 represents a perfect prediction of actual expenditures for a group. Ratios under 1.0 indicate under-predicted costs; ratios over 1.0 indicate over-prediction. HCFA evaluated predicted ratios mainly for atypical groups. For large, random groups of beneficiaries, even the demographic factors of the AAPCC system predict well. Comparisons of predictive ratios for different models are more interesting for multiple draws of small, random groups and biased groups, such as: individuals with high versus low health expenditures and groups of people with particular diseases. Analysis of predictive ratios in the context of applied risk adjustment is particularly important since some HMOs (particularly small ones) may not enroll a random beneficiary case mix. In those instances, the risk adjustment methodology must be reasonably accurate, and an improvement over the current system. Performance of the models based on predictive ratios has convinced many researchers that current analytical models are as good as they are likely to get using diagnosis data.

Encounter data: The other factor affecting selection of a risk adjustment method relates to the data required to implement them. In regards to data requirements, currently available risk adjustment models all require basic demographic information, such as age and sex; this

information is available for Medicare beneficiaries as a part of HCFA's current administrative data systems. In addition to demographic information, current risk adjustment models require either diagnostic information from individual visits (generally referred to as "encounter data") or enrollee-reported health status information such as diagnoses and functional status limitations (often referred to as "survey data" since the information is collect through survey methods). Though both survey and encounter based models require significant new data collections, encounter data is generally perceived as the more data intensive approach. This "encounter data problem" was a major reason why implementation or even testing of risk adjusted payment has been very slow. There has been a great reluctance to mandate encounter data, as well as uncertainty as to whether complete data are even available from many Medicare HMOs. Until recently, availability and quality of encounter data obtainable from Medicare HMOs was unknown. There is reason to believe that, given recent advances in information technology, the costs of collecting and transmitting the large amounts of data necessary to implement risk adjustment have dropped. Many organizations may also be collecting encounter-type data as a critical tool in managing care, quality, and costs.

For implementation of risk adjusted Medicare+Choice payments, availability of data became the binding constraint behind selection of a risk adjustment model. As noted previously, BBA mandates the collection of inpatient hospital discharge data, with submission beginning in January 1998. The connection between the collection of inpatient hospital discharge data and risk adjustment by calendar year 2000 implies implementation of an inpatient data only based system

for the first few years. Thus, for implementation in 2000, the risk adjustment method has to rely on only inpatient diagnostic information, paired with administrative data already obtained as part of HCFA's current data system.

Given the importance of the collection of managed care enrollee data in driving the selection of Medicare's risk adjustment approach, it is important to briefly describe HCFA's data collection process. More detailed information is available as an appendix to this chapter. Collection of managed care hospital discharge data has been viewed as a difficult undertaking for two primary reasons. First, as a major new data collection activity, HCFA had to be comfortable that it had both the authority and resources to carry out this requirement. Second, even with appropriate authority and resources, collection of these data present enormous technical issues for both HCFA and the Medicare managed care plans. Issues of authority and resources were more or less addressed through the BBA, which requires Medicare +Choice organizations (and eligible organizations with risk-sharing contracts under section 1876) to submit inpatient hospital data for periods beginning on or after July 1, 1997. Other data as the Secretary deems necessary may be requested for periods beginning on or after July 1, 1998. The general approach for the collection of managed care hospital discharge data was described in the Medicare +Choice regulation. The regulation also identified future dates for the collection of other encounter data. That is, hospital outpatient, SNF, home health, and physician data will be collected on or after October 1, 1999, with other data collected on or after October 1, 2000. A definite schedule for the collection of these data has not yet been determined.

Regarding the building of the technical systems to actually implement the mandate, within 2 months of passage of the BBA, HCFA began to meet with managed care and hospital industry representatives over the requirement to obtain hospital discharge data, retroactively to July 1, 1997. In these meetings, possible problems were identified that organizations and hospitals were likely to face when attempting to recover data for managed care enrollees. As a result of these discussions, the process for submitting hospital discharge data was defined according to two time periods: (1) the “start up year”, or hospital discharge data for discharges from July 1, 1997 - June 30, 1998, and (2) “ongoing implementation”, or hospital discharge data from July 1, 1998 forward. During the start-up year, organizations were allowed multiple options for data formation (including the full UB-92 format, and a summary format), as well as three alternatives for data submission (by the organization, by the hospital, and by a third party).

Hospital discharge data received from organizations for the start up year was compiled into a data base for the purposes of risk adjustment. This data base was constructed by a HCFA contractor, Fu Associates. Along with HCFA staff, the contractor reviewed the start up year hospital discharge data set for patterns that might suggest either missing data or duplicate data. The contractor was also responsible for linking data at the enrollee level. For some beneficiaries, this required linking of data from multiple plans, or combining FFS and plan data, to create for each managed care enrollee a complete year of data encompassing July 1997 to June 1998. In addition, all enrollees in managed care were represented in this data base, even if no claims were submitted by a plan or plans, using demographic information linked from the HCFA eligibility and enrollment files.

HCFA received approximately 1.5 million hospital discharges from managed care plans. Initial data from the start-up year have been used to estimate impacts. Data received and processed through January 1999 will be used to provide organizations with an estimate of their Average Payment Rate (APR), which in turn will be used by organizations in the preparation of their Adjusted Community Rating Proposal (ACRP) for CY 2000. These data will **not** be used for payment. Hospital discharge data from a subsequent period (e.g., July 1998 - June 1999) will be used in determining risk adjustment payments for Medicare +Choice organizations for CY 2000.

The Principal Inpatient Diagnostic Cost Group Model

Given the availability of data limited to inpatient hospital discharges, the risk adjustment approach most feasible for implementation by 2000 is the Principal Inpatient (PIP) Diagnostic Cost Group (DCG) model, or the "PIP-DCG." Given the limitation of an inpatient-only risk adjustment approach (which will be discussed in greater detail in this report), HCFA views implementation of the PIP-DCG model as an interim step in the development of risk adjusted Medicare+Choice payments. As the collection of full encounter data (i.e. diagnoses collected for all sites of service) becomes feasible, HCFA proposes to replace the PIP-DCG methodology with a comprehensive risk adjustment model. This longer term approach will be discussed more fully in Chapter 5.

Briefly, under the PIP-DCG model, diagnostic codes from inpatient hospital discharge

data are used to place individuals in one of 15 diagnosis-based payment groups, each corresponding to a range of expected health expenditures. Although there are a small number of groups, hundreds of hospital based diagnoses are contained in these groups. Individuals are assigned to a single PIP-DCG group based on the principal diagnosis they experienced in that year that has the greatest future cost implications. The model also uses age, sex, original reason for Medicare eligibility (disability) and entitlement to state payments for Medicaid, to derive a predicted payment. These factors alone are used for enrollees who are not assigned to an inpatient diagnostic group (though they are also applied to beneficiaries who are assigned an inpatient group). Because this model was developed and calibrated using a year of inpatient diagnoses, a full year of data is essential for reliable estimates. The model is also prospectively based; in other words, base year inpatient diagnoses are used in the model to predict future payment year health expenditures.

The PIP-DCG risk adjustment model is a refinement of the early DCG risk adjuster developed by Boston University, and tested by HCFA in the DCG demonstrations of the early 1990's. The main difference between the PIP-DCG and the former DCG model is a more refined sorting algorithm using a wider range of diagnoses and a few more diagnosis cost categories (currently 15 instead of 10). HCFA has also re-calibrated this prospective PIP-DCG model using 1995 hospital diagnoses to predict 1996 actual Medicare expenditures. More detail on the PIP-DCG model proposed for year 2000 risk adjustment implementation will be presented later in Chapter 2 of this Report.

In practice, the PIP-DCG model simply adds one dimension to the current payment system in the following way: when a managed care plan enrolls a Medicare beneficiary today, they forward the information to HCFA, and they receive a confirmation of the information necessary to establish the appropriate demographic factor: county of residence, age , gender, and eligibility category. Payment is then determined by multiplying the factor times the appropriate county rate book amount. Under PIP-DCG risk adjustment, an additional step is required for HCFA. After organizations submit hospital discharge data, HCFA will use this information along with its records on fee for service use, to determine the appropriate risk cell for each beneficiary. Essentially this requires a look-up table of inpatient principal diagnoses associated with each risk cell. When the plan forwards enrollment information to HCFA, HCFA in turn sends the plan the appropriate risk cell information, verification of the demographic data, as well as the resultant payment factor. Payment is then determined by multiplying the individual risk factor times the appropriate county rate book amount.

As different as this system for risk adjustment may appear, Medicare is pursuing aspects of payment approaches already implemented by a number of States and private groups. The next section of this chapter will highlight other relevant public and private sector experiences with risk adjusted payments.

State and Private Sector Experiences in Health Status Risk Adjustment

Because health status risk adjustment is evolving, there was limited experience from which Medicare could draw upon in proposing a model for the Medicare+Choice program. Still, health status risk adjusters are gaining acceptance as capitated delivery approaches increase in public sector programs. Twelve states use some risk adjustment mechanism to adjust premiums for their state employee health programs (Lewin-VHI, 1995). Capitated payment systems in state Medicaid 1115 waivers all use some variant of risk adjustment. Common elements of these payment approaches are assessed below, after which the case studies are presented.

Common Elements of Other Risk Adjustment Systems

Refined risk adjustment methodology. A number of new and existing capitated programs that originally applied demographic-only risk factors (similar to the pre-BBA adjusters applied as part of the AAPCC methodology) are now moving towards more sophisticated diagnosis-based models, such as variants of the DCGs and the Hopkins ACG. For these other programs, their rationale for this change is the same as for Medicare; demographic-only adjusters proved inadequate, and diagnostic-based models offer significant improvement in accuracy. For example, the Washington Health Care Authority and the Minneapolis Buyers Health Care Action Group (BHCAG) have substituted their former demographic-only risk adjustment factors with some version of a demographic plus diagnostic/claims type system. The proposed Medicare+Choice program similarly moves towards a more sophisticated risk model, the PIP-DCG, which uses inpatient diagnosis and demographic information to classify patients into risk groups, and will move to a more comprehensive model over the next 4 years.

Plan submitted encounter / claims data. To implement many of these more sophisticated models, plans must submit data at the individual member level. The more sophisticated the risk model, the greater the data requirements. Of the case studies presented here, all payers required enrollee data from plans, ranging from basic demographic to all claims data, as in the Maryland HealthChoice program (inpatient, outpatient, physician, and pharmacy). Difficulties in submitting data has prompted several systems to use an abbreviated data collection form, which has also resulted in the use of less sophisticated risk adjuster models. The Medicare+Choice program currently requires only the submission of inpatient hospital discharge data, although, a full model risk adjuster model (which HCFA plans to move toward in the future) will require additional claims data.

Payer provided stop loss insurance. Stop loss insurance has been used by several payers including: MinnesotaCare, Maryland HealthChoice, and the Minneapolis Buyers Health Care Action Group. Under this arrangement, rates are reduced by the actuarial value of the stop loss insurance provided by the payer. In the Maryland HealthChoice program, stop loss coverage is provided for individual annual hospital inpatient care costs in excess of \$50,000 (threshold in the initial year) and the plans are responsible for 10% of the costs in excess of the threshold. This arrangement gives the plans an economic incentive to manage the care even with the stop loss insurance in effect. A variation of this concept is the adjustor for low enrollment size, which is used in the Colorado Medicaid payment system. The proposed Medicare+Choice does not provide stop-loss coverage or make any adjustment for plan size.

A phase in period. Phase in periods have been used where extreme redistribution of payments is forecast. For the Washington Health Care Authority, the transition policy for 1998 was a 2 percent corridor around the demographic payment. Risk based payments which fell into this plus/minus 2 percent corridor were not modified. Risk based payments outside this corridor were subject to the floor or ceiling 2 percent amounts. Medicare will also use a phase in, or transition period, which will be described later in Chapter 3 of this Report.

Service carve outs. In some programs, certain services are “carved out” of the capitated rates, particularly mental health. The Maryland HealthChoice Medicaid program has a mental health carve out. The Medicare+Choice proposed risk adjustment model has no service carve outs.

Case Studies of Selected Public Sector Programs

State employee health plans: The Washington Health Care Authority (HCA) is a cabinet level agency in the Washington State government that purchases health benefits for 450,000 public employees, retirees, and Basic Health enrollees using a competitive approach. Managed care plans bid a capitated rate for a standard benefit package. After an open enrollment period, the demographic characteristics (age/gender/member status/retiree status/COBRA status) of each plan’s enrollees are used to retroactively adjust final plan payments. A demographic model has been used to adjust payments to health plans since 1988. Each risk category has a weight, which when aggregated by the number of enrollees and summed across all risk cells, results in the final

payment. Health status adjusters, using a 13 category DCG model, are scheduled to fully replace demographic-only risk factors by the year 2000 after a 2 year phase-in period. This DCG based model uses both inpatient and ambulatory diagnostic information collected in the form of encounter data. Encounter data, submitted by plans, was used to compute the health status adjustment weights at the start of the transition year, 1998. These weights, which were computed from 24 month old data, are being refined for the year 2000 phase out of demographic-only adjusters. Health plans will receive a concurrent retroactive payment for the enrollee characteristics in a given plan year, based upon the final weights.

While information is not yet available on the first phase implementation of health status adjusted payments, HCA simulated its payment compared to the demographic-only adjustment model. A fully phased-in, hypothetical health status adjusted model would generate significant changes in payments, compared to the existing demographic model. Data quality problems were blamed for some of the wide redistributive effects. To minimize the redistribution and to allow more time for health plan to build and improve their data collection system, a 2 year phase-in period, to the year 2000, was considered essential (Wilson, et al., 1998).

State purchasing cooperatives. The California Health Insurance Plan (HIPC) was established by a 1992 California statute enabling the establishment of a small group purchasing pool. The concept was to give small employers market power that paralleled that of larger plans. Risk adjustment was used to promote access by minimizing the risk of loss by participating plans, which could result from adverse selection. Plans negotiated capitated contracts with

HIPC, which would later be adjusted for enrollee risk factors. These initial risk adjustors included: gender, family size, and a simplified health status measure based on inpatient data. After a risk assessment of the HIPC enrollees, plans with risk characteristics higher or lower than a 5% corridor received retroactive settlements. Plans within the risk corridor received no adjustment.

The Minneapolis Buyers Health Care Action Group (BHCAG) offers an example of a more complex risk adjusted payment system. The BHCAG contracts with plans to provide capitated products to its 250,000 covered lives. Participating plans bid to provide standardized packages of services. After an enrollment period, the bids are retroactively adjusted using the Hopkins Adjusted Clinical Groups or ACGs. The ACG model requires both inpatient and ambulatory encounter data. Each quarter, the adjusted rates for a rolling 12 month period are compared to the actual fee for service payments and an adjustment is made in the following quarter. Administrative costs, out of network claims, and catastrophic claims (90% of hospital costs (inpatient/outpatient) above \$30,000) are excluded from the capitated system and retroactive adjustments, since these costs are paid by other mechanisms (Knutson, et al., 1998).

State Medicaid Programs. The State of Maryland's risk adjusted payment system is closest conceptually to the proposed model for Medicare+Choice. In July 1997, Maryland began a six month phase in of a managed care, capitated approach to pay for the health services of approximately 84% of the Medicaid beneficiaries in its HealthChoice program. Populations excluded from the system include the dually eligible, very high cost beneficiaries, and

institutionalized beneficiaries who are treated in chronic and long term rehabilitation hospitals and nursing homes. Care is provided by HMO's and Managed Care Organizations (MCO's), which receive a monthly capitated amount to cover all medical care of each beneficiary. Mental health care was carved out of the rates and is provided as a separate specialty managed FFS delivery system. Beneficiaries have a 30 day period to select an HMO or MCO, after which time they will be automatically assigned to a plan. They may disenroll at any time for cause and may change plans during the annual open election period.

In Maryland, capitated rates were established in the first year as a fee for service (FFS) equivalency and were not competitively bid. MCO's and HMO's are required to spend at least 80% of the rate on medical services (to be increased to 85% after 1997). Consequently, they must annually report their profit and losses on the Medicaid business. If the medical service ratios are less than required, the State may adjust the rates. Health plans must submit patient level encounter data (inpatient, outpatient, physicians, pharmacy) to the State, which compiled a patient level data base to determine risk cell payments (State of Maryland, 1996). The FFS data was adjusted to reflect: 1) the provision of stop loss insurance, 2) a mental health carve-out, 3) projected managed care savings of 10%, 4) eliminated marketing costs, and 5) supplemental care carve outs for labor and delivery, neonates, and AIDS patients. In the second year, the rates exclude teaching (GME and IME) costs, since they will be paid directly by Maryland Medicaid to the teaching hospitals

For beneficiaries with less than 6 months claims experience and without an AIDS

diagnosis, the capitated rates were assigned to one of 44 payment cells using only demographic factors (age / gender / location: Baltimore, all other areas) and health status (disabled/AFDC-like). Beneficiaries with 6 months or more claims experience were assigned a health status risk category using the Johns Hopkins ACG classification system. In this grouping scheme, the 44 demographic and health status categories are replaced with 17 ACG categories. Age, location, and gender drop from the risk adjustment scheme. The ACGs are grouped into 17 Resource Adjusted Categories (RACs) with 9 representing AFDC like patients and 8 representing disabled patients. A person with an AIDS diagnosis is assigned to a payment cell differentiated only by location. In the second year of the Section 1115 waiver, the number of rate cells increased by one disabled RAC category (CHPDM, 1998).

In its second year of operations, the Maryland HealthChoice plan described itself as following the HCFA model. Many attributes are similar, including the use of a sophisticated risk model, the use of demographic only data for enrollees lacking claims experience, the absence of negotiation or bidding by plans, and the differentiation of the rate cells by location. There are several differences. Participation in the plan is mandatory for eligible beneficiaries, although they do have a choice of plan providers. Stop loss insurance is used to protect plans from catastrophic losses.

The State of Colorado, like Maryland, is also implementing a claims based risk adjustment system. Under Colorado Medicaid's voluntary participation program, 7 HMOs care for about 30% of the eligible Medicaid population. Prior to fiscal 1997, HMOs were paid a flat

rate using a 7 category payment matrix (age and eligibility type: AFDC, disabled), and a 2 category geographic adjustor (urban Denver/ rural). The rates were based on fee for service claims experience, discounted by a statutory 5%. Since this system did not differentiate severity, some plans could financially benefit by accepting the less severely ill, which would shift the treatment burden to other plans. Plans that experienced a higher than average case mix would suffer financially under this flat rate system.

To remedy this inequitable payment structure, Colorado Medicaid proposed a diagnosis based risk adjustor system termed the Disability Payment System, which was designed by Kronick in 1996-97. This system grouped diagnoses into 43 major categories, which were supplemented by 10 demographic and geographic factors. Encounter data submitted by the plans for 1996 was used to develop a case mix factor for each HMO. If there were an insufficient numbers of enrollees, the predictability of the risk adjustor was considered unreliable at the plan level. Case mix was adjusted for plan enrollees below a threshold by using an averaging technique. Kronick found that participant sample sizes approached the population mean at 500 (disabled enrollees), 1,500 (adults), and 2,500 (children). The averaging formula adjusted the case mix of plans having enrollments especially below two-thirds of the thresholds. The system was implemented in 1997.

As a result of the Disability Payment System, total HMO premiums were increased slightly, by 2%. Some HMO's, such as Kaiser, experienced rate declines (-8.5%) as a result of serving a lower case mix, while others gained, particularly the University of Colorado Children's

Hospital. The first year reaction to this payment system by the plans was generally favorable, although the one with the largest rate reduction, Kaiser, gave notice that it would freeze its Medicaid enrollments at the 1997 levels. The health status risk adjustors are being refined by Kronick and his colleagues (Tollen and Rothman, 1998).

Review of HCFA's Risk Adjustment Methodology

The BBA mandate, aside from requiring this Report to Congress outlining HCFA's proposed methodology, also required an independent actuarial review of the proposed method. To meet this requirement, HCFA arranged for a panel of experts under the aegis of the American Academy of Actuaries to review and comment on the risk adjustment model and its application in Medicare+Choice payments. In summary, the Academy found the PIP-DCG based payment method as proposed by HCFA to be actuarially sound, though some concerns are raised regarding aspects of implementation; they conclude: "On balance, and with a phase-in, the proposed risk adjustment method appears to be a reasonable first step in what should be a long-term evolutionary process." Their comments are discussed in Chapter 5, and their review report is attached as Appendix 4.

Outline of the remaining chapters

The remainder of this Report will present greater detail on the following aspects of risk

adjusted payments for Medicare+Choice organizations:

- o Chapter 2 will present full detail on the PIP-DCG model, proposed by HCFA as the risk adjustment model for year 2000 implementation. This chapter will describe the process used in developing and refining this model, as well as the final model parameters.
- o Chapter 3 will describe how risk adjusted payments will be accomplished in the context of the Medicare+Choice payment system. Details on the calculation of the Medicare+Choice rate book, and the need for a county level conversion factor, will be presented, as well as HCFA's plans for a phase in period.
- o Chapter 4 will present a detailed impact analysis of the probable effects of implementation of risk adjustment.
- o Chapter 5 will summarize the proposed methodology for implementation in January 2000, and provide an overview of the mandated independent actuarial review conducted by the American Academy of Actuaries. The chapter will also describe HCFA's proposed approach to risk adjusted Medicare+Choice payments in the longer term.

Table 1.1: Explanatory Power of Alternative Encounter Data-Based Risk Adjustment Models

<u>All Enrollees</u>	<u>R-Squared</u>
AAPCC	1.0 %
PIP-DCG	5.5 %
HCC	8.6 %
ADG-MDC	6.3 %
ADG-HOSDOM	5.5 %
<u>Biased Groups</u>	<u>Predictive Ratio</u>
Enrollees with Diagnosis: Depression	
AAPCC	0.55
PIP-DCG	0.77
HCC	0.93
ADG-MDC	0.99
ADG-HOSDOM	1.02
Enrollees with Diagnosis: Chronic Obstructive Pulmonary Disease	
AAPCC	0.60
PIP-DCG	0.79
HCC	0.98
ADG-MDC	0.94
ADG-HOSDOM	0.92
Enrollees with Diagnosis: Diabetes without Complications	
AAPCC	0.60
PIP-DCG	0.73
HCC	1.02
ADG-MDC	0.85
ADG-HOSDOM	0.86
Enrollees with Diagnosis: Acute Myocardial Infarction	
AAPCC	0.45
PIP-DCG	0.78
HCC	1.01
ADG-MDC	0.88
ADG-HOSDOM	1.01
First (lowest) Quintile Expenditures	
AAPCC	2.66
PIP-DCG	2.09
HCC	1.21
ADG-MDC	1.19
ADG-HOSDOM	1.08
Fifth (highest) Quintile Expenditures	
AAPCC	0.44
PIP-DCG	0.75
HCC	0.88
ADG-MDC	0.92
ADG-HOSDOM	0.88

CHAPTER 2: DERIVATION OF THE PIP-DCG MODEL

This chapter will address the development, estimation and evaluation of the Principal Inpatient Diagnostic Cost Group (PIP-DCG) risk adjustment model that is the basis of the proposed payment system for Medicare+Choice plans. This model, developed by researchers at Health Economics Research, Inc., Boston and Brandeis Universities, and the Harvard University School of Medicine under funding by HCFA, is the risk adjuster model developed for Medicare which can be implemented using only inpatient data. The derivation and calibration of the model proposed here was a multi-step process, involving economists, other health services researchers, physicians, and policy analysts.

The DCG methodology was originally developed in 1986 by Ash, et. al. (1986). This early work used Medicare FFS data from 1974-1980, and formed the basis for later PIP-DCG work. The PIP-DCG approach uses diagnostic information from hospitalizations occurring during a base year and Medicare costs from the subsequent year to classify beneficiaries into cost groups. These cost groups, PIP-DCGs, together with demographic characteristics are then used to predict Medicare cost in a subsequent year. This original 1986 model was enhanced by Ellis and Ash (1988) using data from 1984-1985. Further refinements to the model were made including those described in Ellis and Ash (1989); Ash, Ellis, and Iezzoni (1990); and Ellis and Pope, et. al. (1996). The model that forms the basis of the proposed payment system is described in Pope and Liu, et. al (1999). It is included as Appendix 2 to this report.

Models that use only diagnoses from the inpatient setting have inherent strengths and weaknesses. Its greatest strengths are that: 1) the data are readily available; and 2) the model predicts costs far better than the existing demographic variables in the AAPCC. Inpatient diagnosis data are easier to obtain because hospitals generally maintain sophisticated claims processing systems consistent with Medicare requirements. Parallel claims systems in other sites of service vary in terms of sophistication. In addition, inpatient diagnoses are likely to be more accurately coded and easier to audit than diagnoses from other sources. To the extent that inpatient admissions are a proxy for severity of illness and greater expected costs, an inpatient-based adjuster can work sufficiently well until a full encounter model can be implemented.

Inpatient models, however, do have limitations. One concern is that a payment system where plans are paid more if a beneficiary is hospitalized creates an incentive towards hospitalization. Because payment will be made on the basis of the principal inpatient diagnosis, there will also be an incentive to reorder diagnoses to potentially game the system. To a certain extent, these problems of inappropriate incentives can be addressed, by filtering out short stays or diagnoses that are only infrequently treated in inpatient settings. A hallmark of managed care plans since their inception has been the emphasis on care management which should lead to lower hospitalization rates in managed care than in the fee for service population. Thus, models that increase payments based on hospitalizations can be seen as contrary to the managed care paradigm. On the other hand, decreased hospitalizations have the effect of reducing costs of care.

Data Used to Develop the Risk Adjustment Model

To properly calibrate the model, it was of paramount importance to correctly define the input data. The sample frame included the universe of beneficiaries appearing in HCFA's five-percent Standard Analytic File sample who were alive and enrolled in Medicare on January 1, 1996, and the entire year of 1995. From this universe, the 1995-1996 modeling sample was defined by excluding the following:

1. beneficiaries covered under the End Stage Renal Disease (ESRD) program during any time during 1995 or 1996;
2. beneficiaries who were not continuously enrolled in both Part A and Part B Medicare for the entire period January 1, 1995 to December 31, 1996, or the period from January 1, 1995 until the month of their death or entrance into a hospice during 1996;
3. beneficiaries enrolled in a Health Maintenance Organization (HMO) at any time during 1995 or 1996;
4. beneficiaries who reported their state of residence as outside the 50 states and Washington, D.C. during 1995 or 1996; and
5. beneficiaries who entered hospices on or prior to January 1, 1996.

Beneficiaries in the ESRD program were excluded because they are a distinct, high cost group with a separate reimbursement system. The second exclusion criterion imposes the requirement that beneficiaries in the sample are eligible for all of 1995 and that all of their 1995 claims for identifying diagnoses exist. It also imposed the requirement that a full set of 1996 claims on which to estimate their costs also exists. This sample excluded any one becoming eligible during January 1, 1995 to December 31, 1996. Thus, new Medicare eligibles (e.g., 65 year olds) are not present in the prediction year (1996) of the sample. However, the sample includes both people who lived on into 1997 and those dying during 1996.

The fifth exclusion ensured a complete 1995 diagnosis profile for the study sample. Hospice care is primarily palliative, and so diagnostic information on hospice residents may be incomplete. Moreover, Medicare regulations specify that Medicare+Choice plans are not responsible for hospice care, so predicting expenditures for hospice residents is not relevant to the Medicare+Choice program. For the purpose of data construction, if a beneficiary entered a hospice in 1996, collection of cost data ended at that time and the beneficiary is treated as if he/she is enrolled only until that month. Thus, if a beneficiary entered a hospice on March 15, he is treated as if he is enrolled in FFS for 3 months. The exclusion process removed less than 50,000 beneficiaries from the data base. The final study sample included approximately 1.4 million Medicare beneficiaries.

Development of the Principal Inpatient Diagnostic Cost Group (PIP-DCG) Model

In constructing a risk adjustment model, it is important to determine which set of conditions should be used to adjust payments. Under the current AAPCC payment system, all enrollees are placed in a base group paid according to demographic characteristics. In the PIP-DCG risk adjustment system, hospitalizations are used as markers for a particularly ill and high cost subset of beneficiaries for whom higher payments will be made in the next year. However, the costs associated with beneficiaries who have been hospitalized are no longer in the base payment category. Payments for people in the base payment category decrease as payments are increased for beneficiaries identified as high cost.

Because an inpatient diagnosis-based system depends on a person's site of service, only a subset of conditions should be recognized for increased payments. That is, the system should recognize admissions for which inpatient care is most frequently appropriate and which are predictive of higher future costs. For example, admissions for diseases most commonly treated on an outpatient basis should remain in the base group and should not be used for upwards adjustment.

While the PIP-DCG model uses only inpatient diagnoses in creating the risk adjustment classification system, the model *predicts total expected costs* for the following year across multiple sites of services. Consequently, all Medicare expenditures, other than those for hospice care, were included in the calibration. Medicare expenditures for hospice care were not included because Medicare+Choice organizations are not responsible for hospice care. The model was estimated assuming no time lag between the data collection year and the predicted expenditures; that is, calendar year 1995 beneficiary diagnoses were used to predict calendar year 1996 expenditures.

From Diagnosis Groups (DxGroups) to PIP-DCGs

Diagnostic classification: The risk adjustment model estimation process begins with a classification system, forming the inherent logic of the model. For the PIP-DCG model, principal inpatient diagnoses are classified into diagnosis groups (DxGroups). The DxGroups comprise an exhaustive classification of all valid International Classification of Diseases, Ninth

Revision, Clinical Modification (ICD-9-CM) diagnostic codes. The primary criteria used in forming the DxGroups were clinical coherence and an adequate sample size to estimate average expenditures. More specifically, all DxGroups are based on the following principles:

- o DxGroups separate diagnoses by anticipated costliness;
- o DxGroups should have a sample size of at least 500, when clinically possible;
- o DxGroups should be clinically homogeneous and meaningful;
- o Alternative codes that can be used for the same medical condition should be grouped together; and
- o Each reimbursable ICD-9-CM code should belong to one and only one DxGroup.

Beneficiaries with multiple different inpatient diagnoses resulting from multiple hospital stays would be assigned multiple DxGroups.

Creation of Preliminary PIP-DCG groups: Next, DxGroups were aggregated into payment groups, or PIP-DCGs, using a sorting algorithm that ranked DxGroups based on 1996 actual expenditures. Highest expenditure DxGroups were grouped into the “highest” PIP-DCG. Once beneficiaries with the highest costs were placed into a DxGroup, those beneficiaries and all their associated expenditures were removed from the data for other DxGroups and then the DxGroups were re-ranked. The DxGroups with the next most costly diagnoses were grouped into the next highest numbered PIP-DCG, and those beneficiaries were removed from the remaining DxGroups. The process was repeated until each beneficiary and his or her

expenditures were assigned to a single PIP-DCG group. Beneficiaries with multiple inpatient diagnoses were placed in their highest expenditure PIP-DCG group.

In this way, each PIP-DCG group was defined according to average total expenditures for beneficiaries with inpatient diagnoses, which were first categorized, grouped, and sorted using the DxGroups. Using this sorting algorithm, more than 20 initial PIP-DCGs were defined. Lower average expenditure PIP-DCG groups had narrower cost ranges (or intervals), while the highest average expenditure PIP-DCG groups had wider ranges.³

Modifications to the PIP-DCG Model

Ultimately, not all DxGroups remained in their sorted PIP-DCG group placement. A number of DxGroups were excluded from their original PIP-DCG placement because it is not desirable to trigger higher payments for all inpatient diagnoses. Attaching future higher capitation payments to principal inpatient diagnoses can incentivize admissions. If all diagnoses were considered for higher payments, even relatively healthy people might be admitted for minor diagnoses in order to obtain higher payments. Unlike a unit of payment system such as the Diagnosis-Related Groups (DRGs), the aim is not to reimburse plans for each hospital admission.

³ The PIP-DCG groupings were further refined using a number of criteria. First, each original PIP-DCG group retained its identity in the final payment model only if it contained at least 1,000 beneficiaries in the original sample; this minimum sample size was defined to assure stability of estimated payments in the model. If sample sizes were smaller than 1,000, the potential PIP-DCG was expanded to include DxGroups with average expenditures in the next lower range until the sample size was satisfied. If at any time during the sorting algorithm a DxGroup had fewer than 50 beneficiaries assigned to it, it was assigned to the base payment category. This base payment category also included all beneficiaries (and expenditures) for whom there was no inpatient diagnosis during 1995.

For these reasons, the following general criteria were established to exclude DxGroups from their sorted PIP-DCG destinations:

- o The DxGroup represents a clearly defined and clinically significant disease, disorder, state, or event;
- o The DxGroup contained diagnoses often requiring inpatient hospital care, even in a managed care setting;
- o The DxGroup predicts higher future medical costs.

Unlike the preliminary sorting of DxGroups, final placement of DxGroups into PIP-DCG groups was not an automatic decision algorithm. Rather, these decisions were driven by a clinical panel of experts, contractor research staff, and HCFA staff analysis using clinical and policy-conscious judgement.

Admissions not selected for higher payment: After the initial sorting of DxGroups into PIP-DCG groups was complete, a clinical panel reviewed the placement of the DxGroups and their resulting predicted expenditures, to determine the appropriateness of their application in a payment model. Through this process, 75 DxGroups (covering about 1/3 of the admissions) were identified as: (1) representing only a minor or transitory disease or disorder, not clinically likely to result in significant future medical costs, (2) rarely the main cause of an inpatient stay, or (3) vague or ambiguous. These groups, as recommended by the clinical panel, were identified as those most likely to result in inconsistent or inappropriate reimbursements and were placed

(with their associated expenditures) in the base payment category (for which the payment is a function of demographic factors). Examples of these groups include the DxGroup for fluid/electrolyte disorders and malnutrition. Though the treatment for individuals with this diagnoses are often quite costly in the following year, the diagnosis is clinically vague and, therefore, represented a likely target for coding “creep.” The clinical panel concluded that many of the sickest individuals with this diagnosis were likely to have another more specific hospitalization that would trigger appropriate increased reimbursements. After this reconsideration, the remaining DxGroups were resorted and placed into revised DCGs for the payment model. A total of 15 PIP-DCGs (above the base payment category) are included in the final payment model. Costs for persons with excluded admissions, as well as no admissions, are included in the demographically-based payment amounts, as they are under the current Adjusted Average Per Capita Cost (AAPCC) system.

Short stays: As a second strategy to ensure consistent and appropriate payment levels, beneficiary diagnoses reported as a result of a short hospital stay (1 day or less) were left in the base payment category. Since the majority of 1-day stays are for diagnoses already assigned to the base group, the effect on payment of placing all 1-day stay diagnoses in the base group is small. Also, short stays are often indicative of less serious, and, hence, less costly cases. It is important to note that these modifications do not mean that these expenditures have been excluded from the model. Rather, the payments associated with these diseases are captured in increased payments for the base payment category.

Industry concerns: We received a number of comments from plans (based on the September 8, 1998 notice) regarding this decision to “exclude” 1 day stays from the final PIP-DCG groups. Related comments expressed managed care industry concern that a risk adjustment model based only on inpatient diagnoses, particularly one which further excludes short stays, would disadvantage some plans and not provide “credit” for management on an outpatient basis. In response, we must stress that the purpose of the PIP-DCG model is to serve as an interim step towards implementation of a comprehensive risk adjustment model (i.e. one which uses diagnoses from all sites of service). The current AAPCC model makes no adjustments for level of illness, chronic or otherwise. The goal of the PIP-DCG model is to offer an improvement over the current system by identifying a relatively small group of high cost, serious illnesses, and provide a marginal additional payment appropriate for these seriously ill beneficiaries.

Another rationale for the exclusion of one day stays was to limit possible “gaming” of the new payment system. Plans that might convert treatment of some diseases from outpatient to one day admissions, increase the frequency of short “observational” stays, and otherwise increase the use of short hospital admissions for marginal diagnoses, would trigger potentially large increased payments for relatively low cost (the costs associated with a one day hospital stay). To further refine the model as a method of identifying the sickest individuals, and to discourage the potential payoff for gaming, we excluded one day stays of any diagnoses for the purpose of triggering increase PIP-DCG payments. A HCFA analysis of the extent to which there is any effect on plan payments due to the one day stay policy revealed an effect of less than of one percent.

We placed in the base payment category all vague, non-predictive, and/or marginal diagnoses, as well as diagnoses resulting from one day stays. As a result, only a subgroup of seriously ill beneficiaries remains identified for increased payments. In restricting the adjustment to a small proportion of beneficiaries, the system makes only an incremental change to the current demographic-only system. It is important to recognize that, on average, payments for all beneficiaries remaining in the base category (88 percent of all beneficiaries) are based on demographics, as in the current system. To the extent that Medicare+Choice organizations have had favorable selection when payment is based on demographics, we will continue to overpay for this group.

In regard to plans' concern about the bias in the PIP-DCG system against outpatient management of chronic illnesses and higher incidence of short stays, we agree that a comprehensive model is preferable, and we plan to move toward implementing such a model as expeditiously as possible. However, implementation of the comprehensive risk adjustment model is not operationally feasible for 4 years, because of data constraints on both plans and HCFA. In the interim, the PIP-DCG model offers a substantial improvement over the current system. Also, as HCFA monitors the implementation of the PIP-DCG system, necessary modifications will be considered.

Diagnostic exceptions: Under the final payment PIP-DCG model, beneficiaries who are hospitalized for chemotherapy (ICD9 codes V58.1 and V66.2) are treated as exceptions. These codes are indicators of a treatment method, rather than a particular disease. Recognizing,

however, that Medicare's current inpatient coding rules require that the diagnoses for beneficiaries who are hospitalized for chemotherapy must be coded using these V-codes as the principal diagnoses, the most appropriate PIP-DCG group for these beneficiaries would be assigned based on the type of cancer, using a secondary diagnosis. In addition, the final payment model also treats individuals diagnosed with AIDS as an exception. In this case, individuals with a secondary diagnosis of AIDS will be placed in the same PIP-DCG group as individuals with a reported principal diagnosis of AIDS. The rationale for this decision is HCFA's analysis showed that individuals with a secondary diagnosis of AIDS tended to have expenditures close to those admitted explicitly for the treatment of AIDS.

The final mapping of the DxGroups to the PIP-DCG groups is shown in Table 2.1.

Addition of Demographic and Other Factors

Age and Sex: Twenty-four age/sex cells were included that mirror the splits currently used in Medicare's current demographic adjustment methodology. For the purposes of calibrating the model, beneficiaries are assigned to more than one age cell if they aged into a new cell during 1996. For example, a beneficiary aged 69 on January 1, 1996 but who turned 70 years old later in 1996, is assigned to both the 65-69 and the 70-74 age cells as a fraction of eligible months in each cell. The value of the age/sex variable is the fraction of 12 months the person is in that cell. Payments for all months are thus set to the weighted average of the two payments and no change is necessary in the birthday month.

In the development of the final payment model, we also considered the inclusion of other demographic variables. The purpose of including other demographic independent variables was to take into consideration the unique cost implications of characteristics not related to admissions, and to increase the accuracy of the payment estimates for subgroups of the Medicare population. The additional independent variables considered for inclusion were:

- Originally disabled;
- Medicaid status;
- Institutional status; and
- Working aged.

Treatment of each of these variables in the final model will be discussed separately.

Originally disabled: A beneficiary is defined as originally disabled if he is currently entitled to Medicare as an aged beneficiary, but was originally entitled by reason of disability. The other variables are currently used in Medicare's demographic adjustment methodology, although not necessarily in the way proposed here.

Preliminary analyses showed that Medicare expenditures for beneficiaries who were originally disabled or Medicaid enrolled were substantially higher than predicted by age, sex, and principal hospital diagnoses. Data on these characteristics for beneficiaries are available in HCFA administrative files. Analyses showed that if these factors were not taken into consideration in the calibration, the model would not predict the average expenditures of several important, and higher-cost, Medicare subgroups.

In the demographic model currently used by Medicare, originally disabled is not a risk

factor. Rather, a separate rate book has applied to the currently disabled population. However, we reasoned that the originally disabled may have higher Medicare expenditures than those who were not “originally disabled” (i.e., the elderly who were never entitled by reason of disability). Versions of the PIP-DCG model which did not include factors accounting for original reason for entitlement would call for a payment reduction when a disabled 64 year-old became classified as aged at age 65 because the disabled beneficiaries would be averaged in with healthier 65 year olds.

In the payment model, the originally-disabled payment varies by age/sex group and is in addition to the regular age/sex payment. This means that for a given age/sex cell, predicted costs vary between those who were originally disabled and those who were not originally disabled. Alternatively, it allows for the possibility that the trajectory of expected costs as beneficiaries age could differ between the originally disabled and those not originally disabled.

Medicaid eligibility: Currently, Medicaid status is a concurrent adjustment factor for Medicare capitation payments. That is, a Medicare beneficiary is placed into an AAPCC “rate cell” payment category each month based on his or her current Medicaid enrollment status. For the purposes of risk adjustment, we defined Medicaid status as enrollment in Medicaid in any single month during the data collection year (e.g., all or part of 1995). Thus, in the risk adjustment system, beneficiaries who are Medicaid-eligible at any time during the data collection year will be eligible for the Medicaid payment increment for the entire following year; payments will no longer vary according to month-to-month Medicaid eligibility in the payment year. This add-on payment varies by age/sex group.

Institutional status: Another independent variable considered for inclusion was institutional status. We received a number of comments regarding the inclusion of an institutional adjustment; because of this level of interest, our analysis of the issue will be presented in some detail. Institutional status is currently used in the AAPCC methodology as a concurrent risk adjuster. For each prior month in a certified institution, a beneficiary is paid at the higher institution rate cell amount the following month. It is included as a marker for higher expected concurrent cost. The concern expressed by the commenters is that we will be underpaying for these beneficiaries if we do not make a similar concurrent adjustment in the new system.

In analyzing this issue for the purpose of risk adjustment, we also defined institutional status concurrently, as the fraction of the prediction year institutionalized, i.e., the number of institutional months in the prediction year divided by the number of Medicare eligible months. Because it is very difficult to identify long-term institutional care in claims data, the effect of institutional status was estimated using three concatenated years of the Medicare Current Beneficiary Survey (MCBS), from 1992 to 1994. Using the current definition of the institutionalized, we found that the model accurately predicted average actual costs, i.e. there was no reason for a separate institutionalized factor.

There is, however, great variation in Medicare costs for institutionalized beneficiaries across types of institutions. Certified institutions under HCFA's definition include both post-acute and long-term care facilities. Post-acute care facilities include Skilled Nursing Facilities

(SNFs), Long-term care facilities include nursing homes, mental health facilities, and Intermediate Care Facilities for the Mentally Retarded (ICF/MRs). Three quarters of the institutionalized are in nursing homes. Half of the remainder are in SNFs or the SNF/nursing home combination. About 7 percent are in ICF/MRs, and 3 percent are in mental health facilities.

Our analysis using MCBS data showed that mean actual Medicare payments for those in post-acute care facilities are far greater than those for long-term care facilities. In Medicare, a SNF stay requires a preceding hospital stay. The payment system is designed to pay premiums that are correct on the average for groups of enrollees. It does not pay based on actual events in the payment year. If we did so, we would also recoup payments for those who incur very low costs in the payment year. Thus we do not pay more for the particular group that spend some time in a SNF. Those in long term care facilities incur relatively low costs. An institutional factor for this population would actually be negative if implemented. The incentives for identifying the long term institutionalized and reporting on this group are low when the result is a payment reduction. We have therefore decided not to pay based on this site of service. There are relatively few enrollees in this group and the overpayments will be small.

PIP-DCG Payment Model

To estimate the final coefficients of the PIP-DCG calibration model, HCFA regressed annualized 1996 expenditures on the 15 PIP-DCGs, age/sex groups, originally disabled status,

and Medicaid status. The model is specified so that there is a separate variable for each age/sex group. To this there is an additional vector of age/sex variables for those who were originally disabled, and a vector of age/sex variables for those who were Medicaid enrollees. The final PIP-DCG payment model is shown in Table 2.2.

The regression yields payment estimates based upon fee for service data. It is important to note that these payments are not the payments that will be made to the Medicare+Choice organizations. Payment under the Medicare system will be based upon county rates (as published in the Medicare+Choice rate book) as mandated by BBA. These payment amounts estimated here will be converted into relative risk factors, which in turn modify the appropriate county rate according to the characteristics of the individual Medicare+Choice enrollee. The following discussion pertaining to predicted payments is, therefore, for purposes of illustration.

Increased payments for PIP-DCG categories: The coefficients for PIP-DCGs 5 through 29 show the *marginal* expenditure/payment for a person with a 1995 principal inpatient diagnosis placing them in that PIP-DCG (see Table 2.2). For example, a 73 year old woman with a single 1995 admission diagnosis of ‘Precerebral Arterial Occlusion’ is in PIP-DCG 8, implying an annualized 1996 payment of \$2,998 (age/sex coefficient) + \$4,192 (PIP-DCG 8 coefficient) = \$7,190.

Higher numbered PIP-DCGs yield higher payments. Altogether, persons in PIP-DCGs 5 through 29 comprise approximately 12 percent of the sample, and 68 percent of sample persons

hospitalized in 1995. In other words, the payment PIP-DCG model uses principal hospital diagnoses to risk adjust payments for about 12 percent of all Medicare beneficiaries; the other 88 percent are risk adjusted only by age, sex, and other demographics, much as they are under the current system. Of those hospitalized, 68 percent receive increases in payments in the following year.

Medical education: For the purposes of estimating the final payment factors, it would have been ideal to exclude all Graduate Medical Education (GME) payments (i.e., both indirect and direct medical payments) to hospitals from the 1996 expenditure amounts, but it was not possible to do so. The BBA specifies that GME amounts are to be “carved out” of capitation payments to Medicare+Choice organizations (over a period of 5 years, with full carve out achieved in 2002), and paid directly to teaching hospitals. Through a relatively simple algorithm, it was possible to remove the indirect medical payments, which reflect about two-thirds of total GME payments. Though a portion of GME therefore remained in the costs used for model calibration, there is little effect on payments. It is important to note that the PIP-DCG model is used to compute relative factors only. GME payments will be removed from the rate book amounts in accordance with the requirements of the BBA.

Decedents: To correctly estimate monthly payments for all beneficiaries, including people who died or entered a hospice during 1996, we used a process of weighting by Medicare eligible months in the prediction year. First, annualized 1996 payments were calculated as actual total 1996 payments divided by the fraction of the year each beneficiary is alive or not enrolled in a

hospice. This yielded an average annual cost, which is 12 times the average monthly cost. These annualized payments were then weighted in the regression by the fraction of the year the beneficiary was eligible for Medicare. This process avoids the dilution of costs typically associated with decedents in their last months of life. The process of annualizing and weighting observations resulted in unbiased estimates of the average and total payments for a group in which individuals are eligible for different fractions of the year.

Data collection and time lags: The final payment model was calibrated assuming no time lag between the data collection period (using diagnoses collected between January 1, 1995 through December 31, 1995) and the predicted payment year (beginning January 1, 1996). While this approach results in model coefficients with the maximum predictive accuracy, it also introduced difficult operational issues; under this approach, retroactive payment adjustments would be necessary because hospital discharge records would still be flowing in for some months during the payment year.

An alternative approach proposed in the September 8, 1998 Federal Register notice, called the “time shifted” model, uses data from an earlier period (for example, July 1, 1998 through June 30, 1999) to determine the risk factor for enrollees and payments to Medicare+Choice organizations for calendar year 2000. However, calibration of the model continues to assume no data lag. Using data from an earlier time period introduces some error into the estimates, but we do not believe it introduces any systematic bias. In other words, for every beneficiary for whom increased payments to a Medicare+Choice organization are delayed

as a result of this time lag, there should be another beneficiary for whom decreased payments are similarly delayed. Assuming a relatively large and stable population for a plan, aggregate payments under this approach are not likely to differ from aggregate payments using a method requiring retroactive payment adjustment. On an individual basis, using data from an earlier time period lengthens the time between a hospital stay for an enrollee and compensation to the organization based on the stay, but also continues the higher payment beyond the time it would be paid in a non-shifted system.

In the September 8, 1998 Federal Register notice, HCFA asked plans to comment on: (1) problems Medicare+Choice organizations might encounter with retroactive payment adjustments, and (2) if data from an earlier time period were used, what problems are organizations likely to encounter? Comments received on the notice almost unanimously favored the second approach.

The commenters specifically mentioned the following concerns:

- Medicare+Choice organizations believe that both plans and their providers would find it easier to understand and administer financial interactions if individual risk scores were known before the start of the contract year.
- Retroactive adjustments would increase payment uncertainty for Medicare+Choice organizations. In particular, Medicare+Choice organizations would not know their final per enrollee payments for a year until several months after the ACR for the following year was filed. In addition, providers with percentage-of-premium contracts could experience mid-year adjustments that could require changes to reimbursements for individual providers.
- Implementation of retroactive adjustments would also require additional changes to HCFA's payment systems which would not be required under the alternative. Such changes would not be easy to accomplish in the current implementation schedule.

HCFA agreed with the commenters who recommended that we not adopt the retroactive model at

this time; the increased administrative burdens and greater uncertainty about payment levels render this option unacceptable for the present. Moreover, HCFA does not believe that implementation of this option, using the current PIP-DCG model, would create any systematic bias at the level of the aggregate payment to a plan.

Technical refinements to the calibrated model

Before HCFA finalized this estimated model into a payment system, a number of technical refinements were incorporated, including the development of factors for two sub-populations not addressed in the calibration of the model: the working aged and the newly entitled.

Working Aged Adjustment: The PIP-DCG model was calibrated using Medicare beneficiaries not covered by employer or other group policies. For beneficiaries with employer insurance, Medicare is the secondary payor and its liability is much smaller than for those who are not working. The model for the non-working aged was used to predict payments for the working aged. A regression analysis was run to determine the correction factor needed. It was estimated that, on the average, Medicare's liability for the working-aged in fee-for-service is 21 percent of those for whom Medicare is the primary payer. Therefore, payments made to beneficiaries in this status will be reduced to 21 percent of what they would have been.

Demographic-only factors for new enrollees: As described earlier, the model was

calibrated using only beneficiaries for whom Medicare data existed in 1995 and 1996. One implication of this model is that it requires diagnoses in the year before payment is made. Therefore, the model cannot predict expenditures for beneficiaries for whom Medicare does not have diagnosis data. The Medicare program cannot compile diagnosis data on beneficiaries for the year before they enter the program. Thus, no prior diagnosis information exists for the new disabled beneficiaries and age-in beneficiaries. Predicted expected cost estimates were derived for these beneficiaries using only demographic factors.

Two similar, but different methods were used to predict expenditure estimates for the age-ins in the 65-69 age groups and other new eligibles. Those age 70 and above, and those under 65, were assigned the mean predicted expenditure for beneficiaries with the same age/sex/Medicaid status. For the age-ins between age 65 and 69, a different approach was used because the mean predicted value for the age bracket was based mainly on persons 67-69 years old in 1996. To accomplish this approach, actual expenditures in 1996 for a wider range of persons (67-79 years old) were computed and used in a regression to predict the missing age groups. For all new enrollees, payments based on Medicaid eligibility will be made retroactively, once enrollment can be established and verified.

Actuarial graduation of the final payment model factors: HCFA's Office of the Actuary revised the age/sex demographic coefficients. Upon review, the age/sex coefficients for the originally disabled, and Medicaid recipients were found to be somewhat irregular in pattern. This pattern, if uncorrected, would have led to irregular changes in payments as beneficiaries in

these groups aged. Therefore, these coefficients were refined by HCFA actuaries so that the predicted payment patterns across age groups within each of those categories was smoothed. Several generally accepted actuarial techniques were used to smooth each set of factors. The actuarial techniques used were graduation, regression, interpolation, and judgement. The type of graduation used was Whittaker-Henderson which smoothed the raw payment amounts using a minimization formula based on a linear combination of fit versus smoothness. The fit part of the expression is the summation of the squared differences between the raw data and the smoothed data. The smoothness part of the expression is the summation of squared third differences which approximates a quadratic function. Each of the fit and smoothness component of the formula is minimized simultaneously. Also, the graduation uses weights for each age group and the weights represent the number of Medicare beneficiaries in each cell.

Further detail on the PIP-DCG payment model: Two additional sources of information are available on the final PIP-DCG payment model. Located on HCFA's external Web site (<http://www.hcfa.gov/stats/hmorates/aapccg.htm>) are: (1) basic SAS software for the PIP-DCG grouper, and (2) a detailed text file of the mapping of ICD-9-CM codes to DxGroups, and finally to PIP-DCGs. These files are made available for information purposes, but are subject to minor modifications prior to the final payment notice to be issued on March 1, 1999.

Proposed Payment System Application of the PIP-DCG Model

In its basic form, the PIP-DCG model is an algorithm that uses base year inpatient

diagnoses, along with demographic factors, to predict total health spending in the following year. In applying the PIP-DCG model to risk adjust payments for the Medicare+Choice program, however, the model will be used to determine relative risk factors. To derive the relative risk factors, predicted expenditure estimates from the model are divided by the mean predicted expenditures for FFS beneficiaries. Currently, we estimate this mean to be \$5100. Because the predicted expenditures are used in the form of relative ratios, applied to the rate book, payments are not sensitive to the year of the expenditure data used in the calibration. These relative risk factors will be used, in place of the current demographic factors, to adjust county rate book amounts for the relative health status of the individual enrollee.

Estimating Beneficiary Relative Risk Factors: The PIP-DCG model was developed to be “additive”, meaning that incremental dollars are added based on beneficiary characteristics. Referring to Table 2, the following examples illustrate how the PIP-DCG model will be used for estimating relative risk factors.

Examples: In this example, Beneficiary A was hospitalized twice during the base year. The diagnoses reported were Asthma (PIP-DCG 8) and Staphylococcus Pneumonia (PIP-DCG 18). The highest PIP-DCG category then for this beneficiary is PIP-DCG 18, which carries with it an estimated future year expenditure of \$13,547. The beneficiary is also placed in the appropriate demographic group. In this case, Beneficiary A is male, aged 82. This age group carries an estimated expenditure of \$5,495. In addition, Beneficiary A had originally been Medicare eligible because of a disability (which carries an incremental expenditure of \$1,462),

but is not eligible for Medicaid (no expenditure increment). Adding together these increments based on the PIP-DCG model, the predicted expenditures for this beneficiary are \$20,504.

Beneficiary B had no inpatient admissions during the base year. Therefore, no specific PIP-DCG increment is added; expenditures for non-hospitalized beneficiaries are included in the demographic factors. Beneficiary B is placed in the appropriate age and sex grouping; in this case, female, aged 69, which carries a predicted expenditure of \$2,310. Beneficiary B is also placed in the Aged with Medicaid eligibility group, which adds \$2,207 to her annual predicted expenditures. Since she has never been disabled, no additional expenditures are added. Therefore, total annual predicted expenditures for Beneficiary B are \$4,517.

Because Medicare+Choice program payments are based on the county-wide rates determined under section 1853(c) of the Act, the predicted annual expenditures described above will be converted to relative risk factors. This is accomplished by dividing the predicted expenditures for each beneficiary by the national average predicted expenditure (currently estimated at \$5,100). Individuals whose risk factors are equal to 1.00 are “average.” In the examples described above, Beneficiary A’s relative risk factor is 4.02 (indicating a high expected cost individual), while Beneficiary B’s relative risk factor is 0.89 (indicating a slightly lower than average risk individual).

Assignment of risk factors: After Medicare+Choice organizations submit inpatient hospital discharge data, we will use the demographic information and diagnostic information

from all Medicare+Choice organizations a beneficiary may have joined and from FFS to determine the appropriate risk factor for each beneficiary. It is at this point that information regarding beneficiary Medicaid eligibility (in any single month during the diagnosis data collection year), original reason for Medicare entitlement (originally disabled) for any one month, identification as a new enrollee, beneficiary age, sex and working-aged status (beneficiary covered under a employer insurance) are determined using Medicare administrative data files, and are used along with inpatient diagnostic data to assign the appropriate risk factor.

When a Medicare+Choice organization forwards beneficiary enrollment information to HCFA, we, in turn, will send the organization the appropriate risk factor for the beneficiary, as well as the resultant payment. Because the risk factor is *computed for each individual beneficiary*, the factor follows that beneficiary. In addition, since all beneficiaries will have risk factors, information will be immediately available for payment purposes as beneficiaries move among Medicare+Choice organizations.

Predicted Ratios: To determine how well the PIP-DCG predicts average Medicare payments for beneficiaries hospitalized for various diagnoses, and for other characteristics, the researchers computed mean predicted expenditures, mean actual expenditures, and their ratio (predictive ratio = mean predicted expenditures/mean actual expenditures) for each PIP-DxGroup. The results are shown in Tables 2.3. These predictive ratios should be interpreted cautiously, for two reasons. First, several of the PIP-DxGroups, especially some of the highest-cost ones, have small sample sizes and hence their actual mean expenditures are not estimated

very precisely. Predictive ratios for them are very approximate. Second, the predictive ratios are calculated on the same sample used to estimate the models, not an independent validation sample. This introduces the possibility of over fitting, biasing the predictive ratios to look better (closer to one) than they actually are.

Most of the predictive ratios are less than one. This occurs for a few reasons. First, though this analysis was performed using the same sample of FFS beneficiaries used to estimate the model, diagnoses from all FFS claims (not just hospital diagnoses) were used to assign beneficiaries to the various biased groups. For example, in this analysis, the actual costs for all beneficiaries identified with chronic illness diagnoses (hospitalized and not hospitalized) were compared to PIP-DCG predicted costs, which are driven only by inpatient diagnoses. Under these circumstances, it is expected that predicted costs will fall short of actual costs (i.e. predictive ratio of less than one), since the PIP-DCG model does not use the full set of diagnostic data which would identify and assign increased expenditures to many of the beneficiaries with chronic illnesses.

Another reason that predictive ratios are less than one occurs because the PIP-DCG model predicts expenditures using only a person's single highest-cost admission. The most expensive cases are more likely to be hospitalized multiple times, even in the base year. A single million dollar case who is hospitalized five times in the base year could appear in five different PIP-DxGroups. Since the greatest prediction possible in the PIP-DCG payment model is \$36,759 (for a 95+ year old male in PIP-DCG 29), this single case could, depending on sample sizes,

cause predicted expenditures to fall well short of actual expenditures in five different PIP-DxGroups. Despite this, it is important to note the relative improvement in predictive ratios between the Age-Gender (i.e. AAPCC-like) only model and the PIP-DCG model. In all cases, predictive ratios improve substantially (move closer to 1.00) under the PIP-DCG model.

This important trend is found both in sub-groups for which the Age-Gender model over predicted expenditures, and for groups which were under predicted using only Age-Gender. For example, under the Age-Gender model, the predictive ratio for the group of beneficiaries with expenditures in the first quintile (lowest) was 2.66, indicating over predicted expenditures of 2.66 times actual expenditures. Under the PIP-DCG model, the predictive ratio for this group drops to 2.09; while an over prediction still occurs, it is reduced substantially. On the other hand, the Age-Gender model under predicted expenditures for beneficiaries with chronic conditions; for this group, the predictive ratio was 0.83 using the Age-Gender model. Under the PIP-DCG model, the predictive ratio for individuals with chronic illness rises to 0.89; the improvement for some specific chronic illnesses are more dramatic.

In the payment model, the predictive ratio for individuals with no admissions (in the base year) is 1.07; it exceeds unity. This occurs because of the decision to place individuals with one-day stays into this base group. Because one-third of beneficiaries admitted are grouped with those not admitted in estimating payment weights, payments are over predicted by 7 percent for those not admitted. This misprediction is part of the price that is paid in predictive accuracy for improving payment incentives.

Table 2.1: Diagnoses (DxGroups) Included in Each PIP-DCG -- Payment Model

PIP-DCG 5		
DxGroup	14	Breast Cancer (b)
	131	Ongoing Pregnancy with Complications
	132	Ongoing Pregnancy with No or Minor Complications
PIP-DCG 6		
DxGroup	18	Cancer of Prostate/Testis/Male Genital Organs (b)
PIP-DCG 7		
DxGroup	1	Central Nervous System Infections
	39	Abdominal Hernia, Complicated
	64	Alcohol/Drug Dependence
PIP-DCG 8		
DxGroup	16	Cancer of Uterus/Cervix/Female Genital Organs (b)
	36	Peptic Ulcer
	77	Valvular and Rheumatic Heart Disease
	79	Hypertension, Complicated
	80	Coronary Atherosclerosis
	84	Angina Pectoris
	86	Atrial Arrhythmia
	92	Precerebral Arterial Occlusion
	96	Aortic and Other Arterial Aneurysm
	110	Asthma
	153	Brain Injury
	158	Artificial Opening of Gastrointestinal Tract Status
PIP-DCG 9		
DxGroup	21	Other Cancers (b)
	32	Pancreatitis/Other Pancreatic Disorders
	82	Acute Myocardial Infarction
	94	Transient Cerebral Ischemia
	145	Fractures of Skull and Face
	146	Pelvic Fracture
	147	Hip Fracture
	150	Internal Injuries/Traumatic Amputations/Third Degree Burns
PIP-DCG 10		
DxGroup	11	Colon Cancer (b)
	59	Schizophrenic Disorders
	81	Post-Myocardial Infarction
	83	Unstable Angina
	97	Thromboembolic Vascular Disease
	116	Kidney Infection

	143	Vertebral Fracture Without Spinal Cord Injury
PIP-DCG 11		
DxGroup		
	42	Gastrointestinal Obstruction/Perforation
	45	Gastrointestinal Hemorrhage
	87	Paroxysmal Ventricular Tachycardia
	109	Bacterial Pneumonia
	133	Cellulitis and Bullous Skin Disorders
PIP-DCG 12		
DxGroup		
	4	Tuberculosis
	10	Stomach, Small Bowel, Other Digestive Cancer
	12	Rectal Cancer
	19	Cancer of Bladder, Kidney, Urinary Organs
	22	Benign Brain/Nervous System Neoplasm
	26	Diabetes with Acute Complications/Hypoglycemic Coma
	41	Inflammatory Bowel Disease
	48	Rheumatoid Arthritis and Connective Tissue Disease
	49	Bone/Joint Infections/Necrosis
	56	Dementia
	57	Drug/Alcohol Psychoses
	60	Major Depression
	73	Epilepsy and Other Seizure Disorders
	91	Cerebral Hemorrhage
	93	Stroke
	98	Peripheral Vascular Disease
	111	Pulmonary Fibrosis and Bronchiectasis
	113	Pleural Effusion/Pneumothorax/Empyema
PIP-DCG 14		
DxGroup		
	2	Septicemia/Shock
	29	Adrenal Gland, Metabolic Disorders
	58	Delirium/Hallucinations
	61	Paranoia and Other Psychoses
	63	Anxiety Disorders
	66	Personality Disorders
	70	Degenerative Neurologic Disorders
	144	Spinal Cord Injury
PIP-DCG 16		
DxGroup		
	8	Mouth/Pharynx/Larynx/Other Respiratory Cancer
	13	Lung Cancer
	34	Cirrhosis, Other Liver Disorders
	89	Congestive Heart Failure
	95	Atherosclerosis of Major Vessel
	105	Chronic Obstructive Pulmonary Disease

PIP-DCG 18		
DxGroup		
	17	Cancer of Placenta/Ovary/Uterine Adnexa
	55	Blood/Immune Disorders
	72	Paralytic and Other Neurologic Disorders
	75	Polyneuropathy
	108	Gram-Negative/Staphylococcus Pneumonia
PIP-DCG 20		
DxGroup		
	27	Diabetes with Chronic Complications
	76	Coma and Encephalopathy
	112	Aspiration Pneumonia
	115	Renal Failure/Nephritis
PIP-DCG 23		
DxGroup		
	9	Liver/Pancreas/Esophagus Cancer (b)
	33	End-stage Liver Disorders
	88	Cardio-Respiratory Failure and Shock
	134	Decubitus and Chronic Skin Ulcers
PIP-DCG 26		
DxGroup		
	7	Metastatic Cancer (b)
	20	Brain/Nervous System Cancers (b)
PIP-DCG 29		
DxGroup		
	3	HIV/AIDS (a)
	15	Blood, Lymphatic Cancers/Neoplasms (b)

Notes:

(a) Includes principal and secondary inpatient diagnoses of HIV/AIDS.

(b) Includes principal diagnoses and secondary diagnoses when the principal diagnosis is chemotherapy.

Table 2.2
Payment Model
Beneficiaries Medicare Eligible at Least One Year

Variable	Age/Sex Coefficient	Medicaid Add-on	Originally Disabled Add-on	Disease Add-on
Male:0-34	1,873	639		PIPDCG 5 1,910
Male:35-44	1,939	1,442		PIPDCG 6 2,333
Male:45-54	2,486	1,888		PIPDCG 7 3,556
Male:55-59	3,134	2,025		PIPDCG 8 4,192
Male:60-64	3,874	2,134		PIPDCG 9 4,666
Male:65-69	2,759	2,244	2,115	PIPDCG 10 5,969
Male:70-74	3,598	2,330	2,029	PIPDCG 11 6,480
Male:75-79	4,625	2,353	1,705	PIPDCG 12 8,474
Male:80-84	5,495	2,271	1,462	PIPDCG 14 10,200
Male:85-89	6,414	2,060	1,207	PIPDCG 16 12,435
Male:90-94	7,019	1,688	962	PIPDCG 18 13,547
Male:95+	6,923	1,235	717	PIPDCG 20 17,298
Female:0-34	1,844	981		PIPDCG 23 19,496
Female:35-44	2,055	1,590		PIPDCG 26 22,313
Female:45-54	2,685	1,870		PIPDCG 29 26,464
Female:55-59	3,280	2,025		
Female:60-64	4,544	2,103		
Female:65-69	2,310	2,207	3,083	
Female:70-74	2,998	2,246	2,940	
Female:75-79	3,810	2,314	2,645	
Female:80-84	4,683	2,156	2,119	
Female:85-89	5,589	1,669	1,594	
Female:90-94	5,928	1,178	1,183	
Female:95+	5,754	855	773	

**Table 2.2, cont.
Payment Model
New Beneficiaries**

Variable	Coefficient	Medicaid Add-on
Male, 0-34	2,610	1,139
Male, 35-44	2,849	1,969
Male, 45-54	3,312	2,369
Male, 55-59	4,130	2,546
Male, 60-64	4,889	2,578
Male, 65	2,679	3,328
Male, 66	2,921	3,297
Male, 67	3,162	3,266
Male, 68	3,403	3,235
Male, 69	3,644	3,204
Male, 70-74	4,321	3,028
Male, 75-79	5,537	3,140
Male, 80-84	6,667	3,124
Male, 85-89	7,742	3,108
Male, 90-94	8,494	1,971
Male, 95+	8,505	1,806
Female, 0-34	2,730	1,330
Female, 34-44	2,955	2,157
Female, 45-54	3,550	2,173
Female, 55-59	4,284	2,762
Female, 60-64	5,662	2,298
Female, 65	2,276	3,076
Female, 66	2,468	3,075
Female, 67	2,660	3,074
Female, 68	2,852	3,073
Female, 69	3,044	3,072
Female, 70-74	3,587	2,945
Female, 75-79	4,587	3,030
Female, 80-84	5,664	3,003
Female, 85-89	6,771	2,162
Female, 90-94	7,290	1,670
Female, 95+	7,041	918

Table 2.3
Predictive Ratios¹ for Alternative Risk Adjustment Models, by Validation Subgroup, Five Percent Sample

Validation Group	Number of Observations	Model		
		Age-Gender	Age-Gender + Medicaid and Ever Disabled	Age-Gender+ PIPDCG + Medicaid and Ever Disabled ²
Overall Sample	1,387,105	1.00	1.00	1.00
Age and Gender				
Female, 0-34	7,060	1.00	1.00	1.00
Female, 35-44	13,097	1.00	1.00	1.00
Female, 45-54	16,762	1.00	1.00	1.00
Female, 55-59	10,463	1.00	1.00	1.00
Female, 60-64	13,808	1.00	1.00	1.00
Female, 65-69	138,066	1.00	1.00	1.00
Female, 70-74	195,473	1.00	1.00	1.00
Female, 75-79	165,533	1.00	1.00	1.00
Female, 80-84	125,320	1.00	1.00	1.00
Female, 85-89	77,973	1.00	1.00	1.00
Female, 90-94	35,953	1.00	1.00	1.00
Female, 95+	12,837	1.00	1.00	1.00
Male, 0- 34	11,473	1.00	1.00	1.00
Male, 35-44	21,784	1.00	1.00	1.00
Male, 45-54	25,228	1.00	1.00	1.00
Male, 55-59	13,805	1.00	1.00	1.00
Male, 60-64	17,664	1.00	1.00	1.00
Male, 65-69	112,241	1.00	1.00	1.00
Male, 70-74	145,759	1.00	1.00	1.00
Male, 75-79	110,183	1.00	1.00	1.00
Male, 80-84	69,751	1.00	1.00	1.00
Male, 85-89	33,035	1.00	1.00	1.00
Male, 90-9	411,042	1.00	1.00	1.00
Male, 95+	2,793	1.00	1.00	1.00
Race				
Black	118,843	0.79	0.89	0.90
Non-Black	1,268,262	1.02	1.01	1.01
Medicare Entitlement Status				
Elderly	1,235,960	1.00	1.00	1.00
Disabled	151,145	1.00	1.00	1.00
Other Demographic Characteristics				
Medicare as Secondary Payer	15,461	n/a	0.99	0.99
Ever Disabled	90,792	0.61	0.99	1.00
Medicaid Enrollee, Base Year	205,635	0.70	1.00	1.00
Expenditures, Base Year				
First Quintile (lowest)	277,413	2.66	2.57	2.09
Second Quintile	277,428	1.93	1.88	1.54
Middle Quintile	277,422	1.35	1.35	1.10
Fourth Quintile	277,421	0.95	0.96	0.84
Fifth Quintile (highest)	277,421	0.44	0.47	0.75
Top 5 Percent	69,356	0.27	0.29	0.61
Top 1 Percent	13,872	0.18	0.19	0.47

Table 2.3 (continued)
Predictive Ratios¹ for Alternative Risk Adjustment Models, by Validation Subgroup, Five Percent Sample

Validation Group	Number of Observations	Model		
		Age-Gender	Age-Gender + Medicaid and Ever Disabled	Age-Gender+ PIPDCG + Medicaid and Ever Disabled ²
Hospital Admissions, Base Year				
No admissions	1,127,945	1.32	1.31	1.07
One admission	49,515	0.64	0.66	1.02
Two admissions	62,866	0.48	0.50	0.91
Three or more admissions	46,779	0.28	0.31	0.69
Chronic Conditions³				
Any chronic condition below	958,305	0.83	0.84	0.89
Depression	62,889	0.55	0.59	0.77
Alcohol / Drug Dependence	10,945	0.40	0.44	0.78
Hypertensive Heart / Renal Disease	97,990	0.63	0.65	0.81
Benign /Unspecified Hypertension	558,223	0.82	0.83	0.90
Diabetes with Complications	57,675	0.44	0.47	0.63
Diabetes without Complications	194,852	0.60	0.63	0.73
Heart Failure / Cardiomyopathy	146,059	0.48	0.51	0.74
Acute Myocardial Infarction	26,573	0.45	0.47	0.78
Other Heart Disease	357,088	0.65	0.66	0.80
ChronicObstructivePulmonary	234,004	0.60	0.63	0.79
Colorectal Cancer	6,945	0.59	0.59	0.78
Breast Cancer	28,688	0.77	0.75	0.81
Lung/Pancreas Cancer	10,907	0.35	0.35	0.61
Other Stroke	72,018	0.50	0.53	0.74
Intracerebral Hemorrhage	3,676	0.39	0.42	0.73
Hip Fracture	19,384	0.56	0.59	0.83
Arthritis	253,077	0.77	0.79	0.84

Notes:

1. Predicted ratio is mean predicted expenditures for a group divided by mean actual expenditures.
2. PIP-DCG model excludes one day stays
3. Chronic conditions were defined as persons with a 1995 diagnosis on a Medicare hospital inpatient, outpatient, physician, or other health professional claim.

SOURCE: Health Economics Research, Inc. analysis of 1995 and 1996 5% SAF.

CHAPTER 3: INTEGRATION OF THE PIP-DCG RISK FACTOR INTO THE MEDICARE+CHOICE PAYMENT SYSTEM

While the PIP-DCG methodology is used to assign relative risk scores to beneficiaries, these risk scores are only one part of the risk adjusted payment model. This chapter will describe the Medicare+Choice payment system as it is currently, the issues related to substituting PIP-DCG risk scores for the current demographic factors in the payment formula, and HCFA's proposed method for making risk adjusted Medicare+Choice payments.

Capitated Medicare Managed Care Payments: Adjusted Average Per Capita Costs

Since the inception of the Medicare managed care program, capitated payments to plans care have been set using an Average Adjusted Per Capita Cost (AAPCC) methodology. The logic of this approach was to base capitated payments on average costs found in fee for service. Because it was assumed that expenditures for enrollees in managed care would be lower, the Medicare estimated fee-for-service costs are discounted by 5 percent. In order to account for local differences in the health needs of beneficiaries, and related differences in spending, these average costs are estimated at the county level, and standardized according to the average demographics observed for beneficiaries in that county. Thus, the basic components of the AAPCC include average fee-for-service costs in the county and an average county demographic factor score. These county AAPCC figures have been expressed in an annual county rate book, which is the basis for all managed care payments for Medicare enrollees.

While the county rate book is the basis for payments, final Medicare capitated payments

are also risk adjusted according to the actual demographic profile of each enrollee. The demographic factors used as part of the county rate book calculation were the same factors used to adjust final payment amounts for the demographic characteristics of individual enrollees: age, sex, institutional status, and eligibility for Medicaid. This payment methodology can be best summarized by this (simplified) formula:

$$\text{Payment} = (0.95) \times (\text{County Per Capita Costs} / \text{Avg. County Demographic Score}) \times \text{Enrollee Demographic Score}$$

Or, in even more simplified terms:

$$\text{Payment} = (\text{AAPCC County Rate Book}) \times \text{Enrollee Demographic Score}$$

It is the 1997 version of this AAPCC county rate book that is, by law, the basis of Medicare capitated payments under BBA.

Rate book changes under BBA: The BBA requirements for the Medicare+Choice payment system modified the former way of computing the capitated rate book. This was done to meet a number of policy objectives, including a desire to create a minimum rate for traditionally low rate counties, and a flattening of the variability of county rates by basing these rates in part on local factors, and in part by national experience. While somewhat complex, it is important to understand how the Medicare+Choice rate book is calculated, as it affects implementation of risk adjustment.

Blended rates: Every year after 1997, the Medicare+Choice rates (together making up the “rate book”) for each county are defined as the maximum of three possible categories: the blended capitation rate, minimum “floor” amount, **or** minimum 2 % increase. Of the three options, the blended capitation rate in any given county is by far the most complex, and is defined as:

$$\text{county blended capitation rate} = (\text{area\% factor} * \text{local county capitation rate}) + (\text{national\% factor} * \text{national capitation rate})$$

The area percentage factors for Parts A and B are specified in BBA and are equal to: 90% in 1998; 82% in 1999; 74% in 2000; 66% in 2001; 58% in 2002; 50% in 2003 and after. The national factors for each year are also specified in BBA, and are equal to 100% minus the appropriate area percentage factor.

The local county capitation rate, under BBA, is a function of the 1997 AAPCC county rate book amount for Medicare Parts A and B, multiplied by the United States Per Capita Cost (USPCC) growth percentage increase for Parts A and B. BBA also specifically defines the National Per Capita Medicare+Choice growth Percentage as the actual USPCC growth rate for Medicare Parts A and B growth minus .8 percentage points in 1998, minus .5 percentage points in 1999 through 2002, and actual USPCC Parts A and B growth after the year 2002. In addition, BBA mandates that graduate medical education costs be carved out of the 1997 county rates (20 percent in 1998, 40 percent in 1999, 60 percent in 2000, 80 percent in 2001, and 100 percent thereafter).

Both the local county and national capitation rates are also defined in BBA. The local county capitation rates, beginning in 1998 are calculated as the 1997 AAPCC County Rate Book amount for Parts A and B, multiplied by the national per capita Medicare+Choice growth percentage increase for Parts A and B. Finally, the last piece of the formula is the national capitation rate, which is in turn a function of the national *standardized* capitation rate (calculated separately for Parts A and B). The national *standardized* capitation rate is equal to:

Sum over all counties of: (local A, B capitation rates for the county_(i)) *
(number of ALL beneficiaries in the county_(i))*
(average ALL beneficiary risk adjustment factor
weights)

Divided by:

Sum over all counties of: (number of ALL beneficiaries in the county_(i))*
(average risk factor weights for ALL beneficiaries
in the county)

This component of the rate book calculation is where the local per capita costs are standardized according to the relative risk factor of beneficiaries in that county, relative to the national risk factor mean. Prior to BBA, this risk factor standardization was accomplished using average demographic risk factors. Once risk adjustment is implemented, this standardization should be revised to reflect health status risk factors. This point will be discussed in more detail later in this chapter when the process of restandardization and rescaling is described.

Continuing to define the components of the county rate amounts, the national capitation rate is equal to:

Sum of: ((national standardized cap rate for Parts A) * (actuarial weight for Part A)* (Relative Prices for Part A)) + ((national standardized capitation rate for Part B) * (actuarial weight for Part B)* (Relative Prices for Part B))

Technically, county capitation rates are in large part calculated separately for Parts A and B, resulting in two rate books. When capitation rates are generally discussed for policy purposes, however, the Parts A and B rates are combined.

Floor amounts: The second possible category determining a county's capitation rate under Medicare+Choice is the minimum floor amount. In 1998, BBA specified this floor amount as \$367. For 1999 and beyond, the \$367 amount is trended forward using the national per capita Medicare+Choice growth percentage. In 1999, the minimum floor county rate is \$379. This figure is then split between Parts A and B using national actuarial weights.

Guaranteed 2 percent: The third and final possible category determining a county's capitated rate is the minimum 2 percent increase. This increase is defined in BBA as 1.02 multiplied by the 1997 AAPCC County Rate Book Amount in 1998, then beginning in 1999, 1.02 multiplied by the Medicare +Choice county capitation rate used for payments in the prior year. This means that in 1999, county rate book amounts in all counties were guaranteed an increase of 2 percent over the rates in effect the prior year, regardless of the fact that graduate medical education is being removed from the cost rates and paid separately to teaching hospitals. It is also important to note that even though corrections for previous errors in projecting the

USPCC growth rates are permitted, county rates must still increase by a minimum of 2 percent.

Two additional thoughts are important regarding the 2 percent increase category. First, this increase relates to the county rates, and not to either aggregate or per enrollee payments to plans; payments are a function of the county rates and the risk factor scores assigned to each enrolled beneficiary. Therefore, plan payments can be higher or lower than 2 percent over the prior year, depending on the population enrolled. Second, the requirement that the 2 percent be applied relative to rates in effect the prior year becomes important in understanding the need for a rescaling factor, as will be explained later in this chapter.

Once Medicare+Choice county capitation rates have been determined by the largest of either the blended capitation rate method, minimum “floor”, or minimum 2 percent increase method, other rules apply in the final calculation of the Medicare+Choice rate book. First, a “budget neutrality” factor is applied. Under this budget neutrality calculation, aggregate national estimated payments resulting from the combination of blends, floors, and minimum increases must be equal to aggregate national Part A and B estimated payments under USPCC trended 1997 AAPCC rate book payments. If the blended/floor/minimum increase rates are not at this level, (theoretically) rates are reduced for blend counties to attempt to attain budget neutrality. In 1998 and 1999, this resulted in all counties being either at the floor or the minimum increase without budget neutrality being achieved.

The Need for Rate Book Restandardization and Rescaling

The essential purpose of the implementation of risk adjustment is the *substitution* of individual enrollee demographic factors with a new individual enrollee risk adjustment methodology. But this substitution should take place in *two* places: in the standardization of county rates, and in the method of estimating relative risk of individual enrollees. BBA modifications to the rate book make a direct rate book standardization substitution difficult because the 1997 demographic AAPCC rates are the basis for future rate books.

Demographic standardization: The old (demographically-based) AAPCC rate book represented the cost to Medicare in a given county for the national average beneficiary measured demographically. County rates were calculated by dividing county per capita costs by county average demographic factors. Prior to BBA, these rates were updated annually. However, because of BBA modifications, all Medicare+Choice county rates have their basis in the 1997 AAPCC Rate Book. Thus, the factors used in calculating this 1997 Rate Book are “locked in” – including the average county demographic factors. Also, the 2 percent minimum increase must be based on the prior year’s rates used for payment.

Risk factor standardization: Despite these policy complications, it is important to apply the new enrollee risk adjustment methods to an appropriately standardized rate book. This is the case because, if we were to shift from an enrollee *demographic* factor to *risk-based* adjustments, while maintaining the factors underlying the current rate book, a critical inconsistency would be

created in the overall payment methodology. The risk adjustment methodology adds diagnostic information to purely demographic information. Though attempting to measure the same thing -- relative health status -- the range of factors for the demographic-only and risk factors differs. This is in part simply because the measurement range (or “ruler”) of risk factors exceeds that of the old demographic-only factors, and because the new risk factors are able to distinguish differences in health status more accurately. However, because the “rulers” differ between demographic and risk factors, a technical modification is necessary for payments to remain methodologically correct. Without some adjustment, this inconsistency between the standardization factors used in the county rates and the enrollee risk factors will result haphazardly in either under payments or overpayments, depending on the county.

Example: The best way to illustrate the problem is through the following hypothetical example. Assume that, under the old AAPCC methodology, the average county demographic factor for county A was 1.0, indicating that, based on demographic factors, Medicare beneficiaries in “A” were at the national average. However, under the new risk adjustment methodology to be implemented under BBA, the average risk factor for county “A” is 1.3, indicating under this new measurement system that “A” county Medicare beneficiaries are “sicker” than the national average. In both cases, the same population is being measured during the same year – it’s just that the “rulers” are different.

This difference in rulers -- left uncorrected -- would result in erroneous payments in the following way. Consider a Medicare beneficiary living in county “A” who has a number of

health problems, but whose risk factor is the same as the county average (1.3). Without any correction, the risk adjusted payment system will pay 1.3 times the rate book amount. Assuming monthly per capita costs in county A were \$600, the demographic rate book amount would be \$600 divided by 1.0 (the average demographic factor in county A), or \$600. In other words, under the current system, beneficiaries with demographic factors equal to the county average would be paid \$600. Payments under risk adjustment, however, would be 1.3 times \$600, or \$780. If the rate book were recomputed according to the average risk factor in the county (1.3), the rate would be \$600 divided by 1.3, or \$462. Payment for this average individual would then be \$462 times 1.3, or \$600. This is the correct amount for the average person in county A.

Potential underpayment for some beneficiaries would also occur in the absence of rescaling. For example, assume that the average county demographic factor in hypothetical county “B” is 1.1, or just slightly above the national average. Assume as well that the average county risk factor is estimated at 0.9, indicating a slightly healthier than average beneficiary population compared to the national average. For a Medicare beneficiary residing in county “B,” who is equal to the county average of 0.9, a significant underpayment would result. Assuming per capita costs of \$500, the demographic rate book would be \$500 divided by 1.1, or \$455. Risk adjusted payment for the average person would be .9 times \$455, or \$410. This is significantly less than the \$500 that would be appropriate for the average person in county “B.” If the rate book were appropriately rescaled, the rate book amount would be \$500 divided by .9, or \$556. A beneficiary with the average county risk factor of .9 would therefore receive a risk adjusted payment of .9 times \$556, or \$500.

Use of a rescaling factor: The most direct and accurate way to fix this problem would be to calculate both the average county and individual enrollee factors on the same scale – as originally done when both were calculated using demographic factors. Unfortunately, this is not possible since the rate book (including the demographic basis for the average county factor) is set by law. However, a “county rescaling factor,” which is part of the risk adjustment methodology, places both the county and enrollee factors back on a comparable scale. The rescaling factor for each county will be defined as the ratio of the following:

$$\text{County Rescaling Factor} = \frac{\text{(Risk County Rate)}}{\text{(Demographic County Rate)}}$$

The denominator of this ratio (the demographic county rate) is simply the county rate calculated under the current system. The numerator (risk county rate) is the county rate properly standardized to the new risk adjustment factors. The calculation of these restandardized rates, resulting in risk-based county rates, require a number of steps. The process described here is somewhat simplified, though it provide sufficient understanding for the purpose of explaining the county rescaling factor.

Method for calculating county rescaling factors: First, average county risk factors (using the payment PIP-DCG model, and computed for each county for years 1994, 1995 and 1996, based on 100 percent Medicare FFS data) were developed. The average county risk factors replace the average county demographic factors found in the AAPCC rate book. The average

county risk scores were calculated using the average of 1994, 1995, and 1996 county risk scores. An exception to this approach was taken for counties with small numbers of Medicare beneficiaries, and/or in counties where volatility of scores for 1994, 1995, and 1996 were observed. In these cases, the median of the three scores was used. HCFA's Office of the Actuary (OACT) calculated combined Aged, Disabled, Parts A and B per capita costs for 1997. These combined county costs were standardized by the average county risk factors, making new local restandardized rates. From these new local rates, OACT applied the mandated calculations (e.g. blends/floors, 2 percent increase, budget neutrality, medical education carve outs, etc), consistent with BBA requirements. This process will be used to create a risk rate book, which could be used (in the numerator in the rescaling factor) to determine payments beginning in 2000.⁴

There will technically be two rescaling factors for each county: one to rescale payments for aged enrollees, and the other for disabled enrollees. For example, in a given county, the rescaling factor used in payments for an aged beneficiary is defined as:

$$\frac{(\text{Risk County Rate})}{(\text{Aged Demographic County Rate})}$$

For disabled beneficiaries, the ratio is:

$$\frac{(\text{Risk County Rate})}{(\text{Disabled Demographic County Rate})}$$

⁴ It is important to note that, because of the blend transition policy, payments in 2000 will be based in part on the risk rate book and in part on the demographic rate book.

What differs in each case is only the denominator. Additional information on average county risk factors is available at HCFA's Web site (<http://www.hcfa.gov/stats/hmorates/aapccg.htm>). A file containing estimated county risk factors for the purpose of creating a 1997 risk rate book is posted on the Web site. However, minor revisions to the average county risk factors are possible prior to the annual announcement of payment rates on March 1, 1999.

Payment system application: Risk adjusted payment amounts for enrollees will thus be calculated as follows:

$$\text{Payment} = \frac{\text{Demographic County Rate} * [(\text{Risk County Rate})/(\text{Demographic County Rate})]}{\text{Enrollee Risk Factor}} *$$

This approach preserves BBA requirements while assuring that payments are a function of the enrollee risk factor and the appropriately scaled risk rate book. Preserving the demographic rate book also facilitates implementation of a transition payment system that phases in the new system in stages.

Phase-in of risk adjusted payments

HCFA has determined that the risk adjusted payment system will be phased-in, rather than allowed to take full effect on January 1, 2000. HCFA is proposing a policy of only partially phasing in the PIP-DCG system (for example, 80 percent of effect phased in by year 4) before moving to a full encounter system, as a way of moderating concerns about the bias of an inpatient-only model and the "exclusion" of 1 day stays. At that point, a "full" risk adjustment model

would begin.

The BBA specifically requires “implementation of a risk adjustment methodology... no later than January 1, 2000.” However, the statute grants us broad authority to develop a risk adjustment methodology, and does not prohibit us from including a transition or “phase-in” period as a component of the methodology we develop. In cases in which Congress has specified a change in methodology by statute, rather than granting HCFA the authority to develop the methodology, Congress has included a transition period as a component of the methodology spelled out in the statute (e.g., the physician fee schedule). In other cases, we have built a transition period into regulations providing for payment changes where Congress did not specify a methodology in detail (e.g., the prospective payment system for hospital capital-related costs). In this case, a transition period would not only insure against abrupt swings in payment rates, but could permit HCFA to incorporate non-inpatient encounter data before the maximum impact of risk adjustment takes effect.

We have decided to include a transition period as a component of our risk adjustment methodology, initially using a blend of payment amounts under the current demographic system and the PIP-DCG risk adjustment methodology. Under a blend, payment amounts for each enrollee would be separately determined using the demographic and risk methodologies (i.e., taking the separate demographic and risk rate books and applying the demographic and risk adjustments, respectively). Those payments amounts would then be blended according to the percentages for the transition year.

We have decided to adopt the blend methodology for a number of reasons. One reason is that a blend methodology is both familiar from several previous transitions (e.g., both operating and capital PPS) and easily comprehensible. It also provides the most straightforward manner of proceeding from payment based fully on demographic adjustments to full risk-adjusted payment.

We believe that a blend methodology alone more effectively promotes the goals of risk adjustment during the transition period. To varying degrees, any transition method would weaken the goal of paying more appropriately for the health status of beneficiaries and encouraging plans to engage in less risk selection. Under the blend transition method, there is no full risk adjustment for any enrollee until the end of the transition period. Thus, a blend provides lower payment for enrolling sicker beneficiaries than there would be under full risk adjustment. However, organizations would still receive additional payment proportionate to the blend percentage for enrolling sicker beneficiaries. We believe that the blend method can provide adequate safeguards against abrupt changes, in particular by providing initially for a low blend percentage of the risk-adjusted payment rate. We have therefore decided that the first year blend percentages will be 90 percent of the demographically adjusted rates, and 10 percent of the risk-adjusted payment rate. We have also decided to implement a five-year transition, which will culminate in full implementation of comprehensive risk adjustment, using all encounter data, in the fifth year. Specifically, we have decided upon the following transition schedule:

CY 2000	90 percent demographic method	10 percent PIP-DCG method
CY 2001	70 percent demographic method	30 percent PIP-DCG method

CY 2002	45 percent demographic method	55 percent PIP-DCG method
CY 2003	20 percent demographic method	80 percent PIP-DCG method
CY 2004	100 percent comprehensive risk adjustment (using full encounter data)	

In order to implement comprehensive risk adjustment in 2004, we will soon be providing plans with guidance concerning requirements for submission of outpatient, physician, and other non-inpatient encounter data.

HCFA's preliminary analyses of the first year's impact of risk adjustment indicate that these blend percentages should significantly reduce the initial impact to organizations of risk adjustment. Specifically, these analyses suggest that the average decrease in aggregate payments to Medicare+Choice organizations under this transition from risk adjustment alone will be less than 1 percent in the first transition year. While the impact on specific organizations will vary, this preliminary analysis also suggests that the maximum decrease in payment to any organization from risk adjustment alone will be less than 2 percent. HCFA will continue to monitor the impacts on organizations throughout the transition period.

Treatment of demonstrations: Several commenters on the Federal Register notice asked how the new risk adjustment methodology would apply to current demonstration projects. In particular, these commenters asked about the application of risk adjustment to several important demonstrations that provide services to special populations. These projects are the Social Health Maintenance Organization (SHMO) Demonstration, the Program of All-Inclusive Care for the

Elderly (PACE), EverCare, and the Minnesota Senior Care Project.

The Social HMO Demonstration began in 1985 and is scheduled to continue through December 31, 2000. Congress established the Social HMO Demonstration and authorized an enhanced payment methodology that exceeds traditional Medicare payment in recognition of the additional health services mandated for the project's special population. In addition, the Balanced Budget Act of 1997 (BBA) requires the Secretary to develop a plan to transition the Social HMOs to the Medicare+Choice program with a recommendation for a payment approach that takes into account the risk factors appropriate to the population served.

Like the Social HMO demonstration, PACE also has an enhanced payment methodology that was mandated by Congress to reflect its special population. PACE began in 1987 and will be converted to a permanent benefit under Medicare within the next 3 years. Although EverCare does not have the longevity of the other projects, it is a well established 5-year demonstration that is scheduled to end December 31, 2000. Under the Minnesota Senior Health Options (MSHO) Project, HCFA and the State have integrated the financing, service delivery, and administrative systems of Medicare and Medicaid to create a unique care system for dually eligible beneficiaries in the Twin Cities metropolitan area.

Because of the unique features of these demonstration projects, we are assessing possible refinements to the risk adjustment methodology. This analysis cannot be completed in time to apply any recommended refinements in the year 2000. Therefore, we have decided to delay

implementation of a risk-adjusted payment system for organizations participating in these demonstrations until we have additional information. For these demonstrations, we will temporarily maintain the present payment approaches and not use the Medicare+Choice risk adjustment model in year 2000.

HCFA is working with the organizations participating in these demonstrations to acquire encounter data that are both claims and survey-based and include inpatient, outpatient, and physician data, as well as functional status information. The objective is to evaluate risk adjustment payment options for the special populations they serve. HCFA plans to collect data in 1998, 1999, and 2000. We are examining the possibility of using a hybrid system after the year 2000.

Reconciliation for late hospital discharge data: Plans have approximately 3 months after the end of a data collection year to submit the hospital discharge data that will be used to develop beneficiary risk scores to their fiscal intermediary. For example, plans must submit hospital discharge data for the period July 1, 1998 through June 30, 1999 to their fiscal intermediary by September 17, 1999. If plans submit hospital discharges after this date, they will not be incorporated into payments for CY 2000. However, in response to concerns expressed by plans over this short time frame, HCFA expects to institute a reconciliation process that will take into account late data submissions. Plans should attempt to have all data in by the deadline of September 10, 1999. However, if plans receive UB-92s from hospitals after this date, they may submit the hospital discharge to their fiscal intermediary and the data will be processed. Plans

should note that the deadline for submission of all data from a payment year will be established (probably June 30, 2000 for the period of July 1, 1998 to June 30, 1999). After that date, the fiscal intermediary will no longer accept these data. After the payment year is completed, HCFA will recalculate risk factors for individuals who have late hospital discharges submitted. Then, we will determine any payment adjustments that are required. This reconciliation will be undertaken after the close of a payment year and will be a one-time only reconciliation for each payment year. Additional information on the reconciliation approach will be provided to plans over the next several months.

CHAPTER 4: SIMULATED IMPACT ANALYSES OF THE PIP-DCG-BASED RISK-ADJUSTMENT PAYMENT SYSTEM

This chapter begins with a description of the data used to simulated the impacts of the proposed system relative to the current AAPCC methodology. It continues with a description and discussion of the simulated impacts of risk adjustment by various plan and geographic characteristics.

Under BBA, Medicare+Choice organizations were required to submit data to HCFA regarding inpatient hospital services for periods beginning on July 1, 1997. Data collected for this “start up” year (July 1, 1997 to June 30, 1998) will not be used directly for payment. Rather, these data were collected to estimate the impacts of the PIP-DCG based Medicare+Choice payment system. Plan level impacts from these analyses will also be provided to plans on March 1, 1999 to inform their ACR submission.

Impact Analysis Methods

The impact analysis presented here employed a “point in time” approach. To estimate the payment impact of the risk adjustment change, we compared actual demographic-based payments to estimated risk adjusted payments for the exact same enrollees for September 1998. Aggregated to the plan level, the difference in these amounts represents a reasonable estimate of change in payment due to risk adjustment.

More specifically, Medicare payments to plans on behalf of enrolled beneficiaries were calculated for September 1998, using the PIP-DCG risk adjusted payment method. This was done using the beneficiary population plans actually enrolled for that month. Diagnoses for managed care enrolled beneficiaries (submitted by plans in the start up year data) were used to assign PIP-DCG-based payment expenditures for these enrollees. Risk-based payment estimates were then converted to relative risk factors (see Chapter 3 for more detail). Then, enrollee risk factors were applied to a restandardized BBA county rate book (see Chapter 3 for more detail on this process) to yield risk adjusted monthly payments. Comparing the proposed payment to the actual payments made under the old AAPCC payment yields a typical monthly impact as a result of the new payment system. Once changes in payments at the beneficiary level are estimated, it is a simple process to derive estimates at more aggregated levels such as the plan level or geographic level.

The simulations presented here reflect the data available at the time this report was prepared. Because the data to be used for actual payments (beginning January 1, 2000) will be based on hospital discharge data for the calendar year beginning on July 1, 1998 and ending June 30, 1999, the actual impact of the risk adjustment system relative to the current demographic system at the time of implementation may differ, due primarily to potential changes in plan enrollment profiles and possible improvement in the quality and completeness of plan data. Nevertheless, the impacts reflect the best data and information that we had available at the time of the simulation.

Data representing approximately 1.5 million hospital discharges were submitted to HCFA for over 5.6 million enrollee beneficiaries. In the most recent analysis data set, HCFA included hospital discharge data submitted and processed through January 1999 (including data submitted past the official HCFA start up year cutoff date). Data submitted from plans that were involved in demonstration projects, cost and health care prepayment plans and terminated plans were excluded from the impact analyses presented here. The data set includes discharges for approximately 5.6 million enrollees and 285 plans.

The impacts presented here show estimated figures for both the full effects of the PIP-DCG based payment system (i.e. with no transition period), and for the first implementation year during which a 10 percent phase in was included as part of the methodology. HCFA proposes to blend payments based on the PIP-DCG-based model with payments under the old AAPCC method. To estimate impacts under phase-in years, full impact results can be multiplied by the appropriate proportion of the risk adjustment payments. For example, the first year risk adjusted payment phase-in level is 10 percent. Therefore, to estimate the impact under a 10 percent risk adjusted phase in, the impacts can be multiplied by (.10).

Simulated Impacts

If our methodology did not include a transition period, payments to Medicare+Choice plans would decrease by approximately 7 percent. This is a revision over preliminary estimates of 7.6 percent, which were prepared using an earlier, more limited data set. The majority of

Medicare+Choice organizations would face payment decreases of between 5 and 8 percent.

Tables 4.1 presents the simulated impacts by HCFA administrative regions. No HCFA region will experience increased payments under the proposed system. Table 4.2 presents simulated impacts grouped by State. Only a sample of States are presented here. Table 4.3 presents simulated impacts by plan enrollment size. The variation in impact between the small plans and the large plans does not appear to be systematic.

The results of the simulation show that Medicare+Choice plans are very likely to experience payment decreases under the proposed system, assuming no changes in plan enrollment profiles between September 1998 and implementation in 2000. But the simulations also indicate that the direction and magnitude of the historical overpayment that the Medicare program has made to risk HMO's does not vary by any characteristics such as size or geographic location.

Table 4.1**Payment Summary for Selected Plans by HCFA Administrative Region**

Region	Total Number of Enrollees	Percent Difference (10% Phase-In)	Percent Difference (Full Impact)
01: BOSTON	359,819	-0.51	-5.05
02: NEW YORK	564,252	-0.51	-5.09
03: PHILADELPHIA	583,740	-0.90	-8.96
04: ATLANTA	895,021	-0.81	-8.08
05: CHICAGO	530,558	-0.59	-5.89
06: DALLAS	472,627	-0.87	-8.71
07: KANSAS CITY	154,223	-0.63	-6.27
08: DENVER	128,069	-0.57	-5.70
09: SAN FRANCISCO	1,710,117	-0.72	-7.18
10: SEATTLE	282,765	-0.40	-3.99
TOTAL	5,681,191	-0.70	-7.00

Table 4.2**Payment Summary for Selected Plans Grouped by State**

State	Total Number Of Enrollees	Percent Difference (10% Phase-In)	Percent Difference (Full Impact)
AZ	250,058	-0.47	-4.66
CA	1,393,193	-0.76	-7.61
FL	745,159	-0.83	-8.29
IL	133,986	-0.51	-5.08
MA	188,681	-0.67	-6.67
MI	52,950	-0.92	-9.24
MN	55,022	+0.12	+1.18
NJ	169,294	-1.10	-10.95
NY	394,958	-0.29	-2.89
OH	253,664	-0.68	-6.75
OR	134,743	-0.15	-1.46
PA	499,417	-0.87	-8.66
TX	294,787	-1.01	-10.07
WA	145,375	-0.63	-6.25

Table 4.3**Payment Summary for Selected Plans by Size of Enrollment**

Enrollment Size	Total Number of Enrollees	Percent	Percent
		Difference (10% Phase-In)	Difference (Full Impact)
LESS THAN 500	5,115	-0.64	-6.41
500 - 2,999	88,594	-0.75	-7.47
3,000 - 4,999	99,382	-0.93	-9.30
5,000 - 9,999	354,271	-0.72	-7.21
10,000 - 24,999	1,177,118	-0.68	-6.83
25,000 - 49,999	1,029,859	-0.68	-6.84
50,000 - 99,999	1,471,009	-0.70	-6.98
100,000 OR MORE	1,455,843	-0.71	-7.05
TOTAL	5,681,191	-0.70	-7.00

CHAPTER 5: SUMMARY AND FUTURE POLICY DIRECTIONS

The previous chapters of this Report to Congress have outlined the technical approach that HCFA will pursue in meeting the risk adjustment for Medicare+Choice payment mandate. In summary, the approach HCFA will use to meet the mandate for risk adjusted payments will:

- (1) Be based on inpatient data;
- (2) Apply individual enrollee risk scores in determining fully capitated payments;
- (3) Utilize a prospective PIP-DCG risk adjuster to estimate relative beneficiary risk scores;
- (4) Apply separate demographic-only factors to new Medicare enrollees for whom no diagnostic history is available;
- (5) Apply a rescaling factor to address differences between demographic factors in the rate book and new risk adjusters;
- (6) Use 6 month old diagnostic data to assign PIP-DCG categories (the “time shift” model, as opposed to using the most recent data and making retroactive adjustments of payment rates part way through the year);
- (7) Allow for a reconciliation after the payment year to account for late submissions of hospital discharge data;
- (8) Phase-in the effects of risk adjustment, beginning with a blend of 90 percent of the demographically adjusted payment rate, and 10 percent of the risk-adjusted payment rate in the first year (CY 2000); and
- (9) Implement processes to collect encounter data on additional services, and move to a full risk adjustment model by 2004.

HCFA has already met the first critical date in the implementation schedule of risk adjustment.

On January 15, 1999, HCFA provided 45 day notice to all Medicare managed care plans of the

proposed risk adjustment method; a copy of that notice is attached as Appendix 3. However, the following are additional key dates in the implementation of risk adjustment:

- *March, 1999*

The annual announcement of payment rates will be released on March 1, 1999. This announcement must include the final county rates for CY 2000, the rescaling factor for each county, the PIP-DCG model, and other information necessary to ensure that readers are able to calculate payments.

In addition, each organization will be sent a letter indicating the percentage difference between each plan's payment under risk adjustment and payment under the current system assuming the mix of enrollees they had as of September 1998. The letter will also include the distribution of enrollees for an average month by PIP-DCG category and for other demographic factors (e.g., age, gender, Medicaid status, previously disabled, and working aged), and the distribution of PIP-DCG scores for that organization.

- *September, 1999*

The deadline for receipt of hospital discharge data from the period July 1, 1998 through June 30, 1999 is September 10, 1999. Hospital discharge data received by that date will be used to calculate each enrollee's risk factor to be used in payments to organizations for CY 2000. Data received after that time will be used in a reconciliation process that will be undertaken after the close of the payment year.

- *January, 2000*

Beginning January, 2000, on a monthly basis, the organization will be provided with information on each enrollee, including the county of residence, age, gender, Medicaid status and previously disabled status, PIP-DCG score, and payment amount.

Independent Actuarial Review

In addition to the submission of this Report to Congress, the BBA also mandated that HCFA obtain an independent review of the "actuarial soundness" of the risk adjustment methodology. To fulfill that mandate, HCFA arranged for the American Academy of Actuaries,

an independent public policy organization, to review the final risk adjustment model and the proposed payment methodology. The full text of the Academy's report, *Actuarial Review of the Health Status Risk Adjustor Methodology*, is attached as Appendix 4.

To conduct this review, the Academy formed a Risk Adjustor Work Group consisting of health actuaries who are consultants to health plans and health insurers, as well as staff actuaries employed by health plans and/or insurers. Because of the nature of the congressional mandate (i.e. a review of the actuarial soundness of the proposed methodology, not an analysis of the effects) and data limitations, the Work Group's analysis was focused on the conceptual framework of the risk adjustment methodology.

In summary, the Work Group viewed the PIP-DCG method as the only practical health status risk adjustment alternative available for implementation on January 1, 2000, but noted that there are significant negative implications if the proposed PIP-DCG system is used more than a few years. The Work Group recommended the implementation of a risk adjustment system be based on more comprehensive data as soon as administratively feasible, which is entirely consistent with HCFA's stated intentions. The Academy issued a qualified opinion of the actuarial soundness of the proposal. The measure of "actuarial soundness" applied in this analysis was based on the standards for risk assessment and risk adjustment outlined in the Academy's Health Risk Adjustment Monograph. These standards are: accuracy, practicality and reasonable cost, timeliness and predictability, and resistance to manipulation. In addition,

whether or not the PIP-DCG method meets the following goals of effective risk adjustment was also assessed: 1) Reducing the effects of either inadvertent or intentional risk selection, 2) Compensating carriers fairly and equitably for risks they assume, 3) Maintaining consumer choice, and 4) Protecting the financial soundness of the health care system.

Though the Academy Work Group concluded that the risk adjustment method proposed by HCFA meets the test of “actuarial soundness”, they also expressed reservations about certain elements of the implementation of the system. Their concerns include: 1) some details of the implementation of the PIP-DCG methodology, particularly those related to one day stays, 2) timing and data collection issues, 3) the lack of adequate testing of the potential impact on health plans and beneficiaries, 4) the element of uncertainty arising from the processing of extraordinary amounts of newly collected data, and 5) using only fee-for-service data to determine the risk adjustment weights. Because of these concerns, the Work Group supports HCFA’s decision to include a transition period as a feature of its methodology, so that HCFA and health plans have adequate time assess the impact of the new methodology.

HCFA greatly appreciates the involvement and efforts of the American Academy of Actuaries, and in particular, the Risk Adjustor Work Group, in the implementation health status risk adjustment. The following responds to the concerns and recommendations raised by the Academy:

Methodology: There appears to be only one major disagreement on the methodology: the

exclusion of one day stays. The Work Group believes that the “benefit” of reducing the gaming potential is more than offset by the “cost” of reduced predictive power in the model, the potential to penalize more efficient managed care, and the potential to create an incentive to deny hospitalization. HCFA believes that it is important limit the incentives to convert observational and other marginal hospitalizations to one day stays in order to trigger increased payments under the PIP-DCG system. Also, HCFA believes that the critical issue is not the total proportion of one day stays found in managed care plans, but rather the additional percentage of beneficiaries who are grouped into PIP-DCGs if one day stays are included. Since one day stays are found primarily in the excluded diagnoses (being vague, minor, or transitory), the effect is minimal. In addition, if a beneficiary with an important one day stay also has another serious admission with a longer stay, the one day stay would not be used to assign the beneficiary to a PIP-DCG category.

To examine this issue more fully, we first ran the fee-for-service data through the PIP-DCG model and did not exclude one day stays. The number of beneficiaries placed in PIP-DCG groups increased by 0.5 percentage points. Our impact analysis suggests that the analogous increase using managed care hospital discharge data is higher, 0.9 percentage points. However, subsequent payment impact simulations using the plans’ hospital discharge data suggests that the maximum payment implication of inclusion is less than 0.7 percent under a fully implemented system. This is more than offset by the fact that the system is not being fully phased-in (80% maximum in 2004). This also means that in the first year (CY 2000), the average impact could only be 10 percent of this, or less than 0.07 percent. The true impact is less than the 0.7 percent

change, because most of the coefficients for a model that includes the one day stays would also be lower.

Timing and data collection issues: The Work Group states that adequate time is needed to analyze the large amounts of new data received to support risk adjustment. The data will be used to provide plans with guidance as to the impact of risk adjustment on their plan for the purpose of the ACR process in the Spring of 1999. This start up year data will not be used directly for payment purposes.

HCFA has now had the opportunity to assess the hospital discharge data submitted by the Medicare+Choice plans for discharges occurring between July 1997 and June 1998. The data received appears to be valid and reliable, which suggests that reasonable aggregate and plan level impacts can be produced this year. Total discharges per enrollee average about 0.22, which is only slightly below the plan reported average figures of 0.25 collected through the Health Employer Data Information Set (HEDIS) initiative. Other aspects of the data, such as monthly distributions of admissions and completeness of the diagnostic codes, show no systematic problems. While the data submission process was slow to start, as is expected in the first year of any new process, we are not aware of any remaining bottlenecks of unprocessed claims.

Lack of adequate testing: HCFA agrees that impact testing as suggested by the Academy is reasonable. However, with only a 10% phase-in in the first year of implementation, it is likely that the data may show little impact and behavioral response to the system. HCFA plans to

monitor and analyze the PIP-DCG system through the implementation period, and will consider possible modifications to the PIP-DCG system to address specific problems found through our ongoing monitoring risk adjustment implementation. However, with the emphasis on implementing a comprehensive model in the future, it is likely that much of HCFA's time and resources will be directed towards the goal of implementing a full risk adjustment model. This emphasis is also consistent with the recommendation of the Academy to develop a more comprehensive system as soon as administratively feasible.

Reduce Uncertainty: With the implementation blend of only 10% in the first year, uncertainty in the plan community and among Medicare beneficiaries should be allayed. HCFA's preliminary analysis shows that this blend percentage will significantly reduce the impact to the organizations in the first year and should affect payments by less than 1% in aggregate. While the impact on specific organizations will vary, this analysis also shows that the maximum decrease in payment to organizations will be less than 2%. This maximum reduction would be offset by the minimum 2 percent update guaranteed under the BBA payment methodology, so plans would not experience a reduction in payment in 2000 due to risk adjustment relative to payments in 1999. We will continue to monitor the impacts on organizations throughout the transition period.

Using only fee-for-service data to determine the risk adjustment weights: The use of fee for service data was required under the BBA, and HCFA had no option to use any other data. In addition, it is not clear whether weights for Medicare+Choice plans should be based only on

managed care data, or a combination of Medicare+Choice plan data (HMOs, PPOs, PSOs, and fee-for-service plans) as well as Medicare fee-for-service expenses.

Future Risk Adjustment Policy

HCFA views implementation of the PIP-DCG risk adjustment model as a first step towards reform of the Medicare+Choice payment system. BBA requires collection of inpatient hospital data, clearly implying that these data form the basis of mandated risk adjustment for Medicare in 2000. However, BBA also allows collection of *additional* data, at the discretion of the Secretary. HCFA has determined that it will require the submission of additional data from Medicare+Choice plans; not only inpatient data, but also physician, hospital outpatient, home health care, SNF, and possibly other data. More specific information and time lines regarding these additional data will be announced by HCFA during 1999. This additional data will enable HCFA to replace the PIP-DCG model with a more powerful “comprehensive” risk adjustment model.

There is agreement both at HCFA and within the managed care industry that a risk adjustment model using diagnoses from both inpatient and outpatient encounters is preferable to an inpatient-only model. When HCFA proceeds with the implementation of full encounter data risk adjustment models, at least two specific methodologies are available; one is the Hierarchical Co-Existing Conditions (HCC) methodology, developed for HCFA by the Boston

University/Health Economics Research/Harvard University Consortium (Pope, et. al., 1997) and the other is the Ambulatory Clinical Group (ACG) model developed by a consortium of researchers at the Johns Hopkins University School of Public Health and Lewin/VHI. HCFA technical staff have already begun the process of refining and evaluating a number of possible comprehensive or “full” risk adjustment models. Other models have also been developed by 3M, Kaiser, and RAND. These continue to be refined.

While comprehensive risk adjustment models differ somewhat, a common element is the grouping of diagnoses from inpatient, outpatient, and physician encounters into categories. This categorization can be based on clinical and/or cost similarities. From this initial grouping, categories are either added or further grouped in a way that maximizes the predictive power of the model. Like the PIP-DCG model, comprehensive risk adjustment approaches also include demographic factors, though the proportion of predicted costs driven by demographic factors decreases dramatically as more detailed diagnostic information is added. For example, in the HCC model, the initial classification system is comprised of more than 100 disease based groups. The HCC groups are additive; in other words, unlike the PIP-DCG model in which an individual is assigned one risk grouping based on his or her highest cost hospitalization, under the HCC model an additional payment amount is added for each disease category. An individual’s predicted prospective resource utilization is based on the sum of all appropriate HCC disease categories, combined with demographic factors. Under the ACG system, individuals are placed into a single, mutually exclusive ACG category on the basis of diagnoses identified during the data collection year. ACG categories themselves are defined by groups of individuals whose

morbidities reflect similar resource needs in the following year. ACG groups are further categorized into approximately 20 rating cells for the purpose of risk adjustment. Like the HCC model, demographic factors are also used to supplement the diagnostic information.

Estimates made by HCFA staff (using claims data for Medicare beneficiaries gathered from the year prior to Medicare managed care enrollment -- so called "new enrollees") show that implementing a full encounter data model would increase the payment impacts estimated using only an inpatient-driven risk adjustment system, i.e. the PIP-DCGs. This limited analysis also found mostly parallel impacts at the plan level between the PIP-DCG and HCC based payments. Also, preliminary analyses by HCFA show that there are strong relationships at a county level between impacts under the PIP-DCG and the HCC models. In other words, most areas that would face average reductions under PIP-DCG would face reductions under the HCC model, and the magnitude of those cuts relative to other plans is fairly consistent. However, these predictions assume that the current enrollment profile of Medicare+Choice plans remains the same, which may not be the case when comprehensive risk adjustment is implemented in 2004.

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APPENDIX 1

Submission of Encounter Data

Based on managed care industry input, HCFA identified three alternatives for the submission of hospital encounter data for discharges during the start-up year:

- Option 1: The plan will have its participating hospital(s) submit UB-92s or Medicare Part A ANSI ASC X12 837 records⁵ using the traditional HMO 'no pay' bill method.
- Option 2: The plan produces/receives from hospitals a complete UB-92/ANSI 837 and submits the data to its designated fiscal intermediary (FI). Once a hospital discharge record has been transmitted to the plan, the plan must add their plan identification number to the UB-92/ANSI 837 record prior to submission to the FI.
- Option 3: The plan submits an abbreviated UB-92 data set to its selected FI.

These alternatives were offered to plans as an attempt to gather the mandated data with as little disruption to plans as possible. Regardless of the option(s) selected for data for the start-up year, plans were required to work with their participating hospitals to determine the extent to which each hospital could provide data. The plan had to determine which method(s) will be used for which hospitals for this period. If necessary, the method was allowed to vary by hospital within a plan, and for different time periods during the start-up year.

Plans were required to select one FI from the list provided by HCFA in early February 1998. Plans were instructed at that time to begin identifying an FI with whom to work, and to contact and select an FI by March 6, 1998; this date was met by the majority of plans. Plans reported their selection to the lead HCFA Regional Office responsible for their organization, along with the location (either plan or directly from the hospital(s)) from which the data would be transmitted to the FI. Encounter data were required for discharges from inpatient hospitals, including facilities reimbursed under the prospective payment system (PPS), long stay hospitals, psychiatric and rehabilitation hospitals, and psychiatric/rehabilitation distinct parts of hospitals. Encounter data were not required for discharges from skilled nursing facilities (SNFs).

Ongoing Data Submissions

Data submission requirements and processes for inpatient hospital diagnoses occurring after July 1, 1998 are somewhat different from the start up year. The main difference is the phasing-out of plans' ability to submit data using either the abbreviated UB-92 (option 3), or to have their participating hospitals submit these data directly to the FI (option 1). Availability of Option 1 was discontinued at the end of the start up year; all data for discharges after July 1, 1998 must be submitted by the plan. The availability of option 3 (submission of an abbreviated UB-92, submitted by plans) was extended as a result of managed care industry feedback.

Regardless of the submission option chosen, and remaining constant from the start up year

⁵The "Medicare Part A ANSI ASC X12 837" format will be abbreviated as the "ANSI 837" format in the remainder of this document.

through ongoing submission, all data were transmitted using a common route to the plan FI. The FI designated by each plan served as the plans' primary contact for information regarding data transmission, editing, and processing of data. HCFA used the Medicare Data Communications Network (MDCN) operated by IBM Global Services (IGS) to support encounter data transmissions and related data traffic. All fiscal intermediaries were connected to the MDCN prior to the encounter data mandate.

Plans were connected through MDCN to their FI for the purpose of transmitting the UB-92s. Plans were given access to the network in one of three ways. Plans which already had IGS connections were given HCFA authorization (via net IDs and application IDs) for two-way traffic over the MDCN. Larger volume plans without current IGS accounts were authorized for Transmission Control Protocol/Internet Protocol (TCP/IP)⁶ enabled frame relay leased line connections. Given the nature of encounter data traffic, HCFA believed 56kb circuits would suffice. Lesser volume plans were provided TCP/IP-based asynchronous dial service to the nearest IGS point of presence (POP). Data exchanges using this type of connection were accomplished using File Transfer Protocol (FTP). (Note that FIs were already required to support TCP/IP and FTP connectivity under HCFA Electronic Data Interchange (EDI) instructions.)

Access to the network was made available via a local call for most plans. Plans outside the local calling area of the nearest IGS POP received 800/888 service. IGS provided these plans with dialer software to facilitate the connectivity. These were important issues in keeping data submission costs as low as possible for plans. In addition, HCFA paid for the installation of leased lines for larger plans (where required) for current plans. HCFA provided the software for medium and smaller current plans that utilize the dial up method, and paid for up to 3 months of line charges for telecommunications between the plan and the FI. The period during which HCFA made these reimbursements lasted from approximately May 31, 1998 through August 31, 1998. By the end of that period, the HCFA sponsored account for a plan was converted to a commercial account for the plan with direct billing by IGS. The expected plan costs for line charges were estimated to be an average of \$7600 per year per plan based on access of 8 hours daily for 22 days per month and 90% of users being local to IGS. These figures were reasonably accurate.

Once the FI received files from the plans (or plan hospitals during the start up year) they were uploaded into the FI's processing system. The most immediate response from the FI back to the plan occurred if the file was not readable. In these cases plans had to resubmit the entire file. This problem did not occur often during the start up year. The FI performed data edits normally applied to Medicare fee-for-service UB-92 data. As part of the data edit process, the FIs sent normal edit reports electronically to the plan for data that did not pass the edit screens (termed "failed records"). The plan resubmitted the corrected records with the next batch data submission.

⁶TCP is responsible for verifying the correct delivery of data from client to server and adds support to detect errors or lost data and to trigger retransmission until the data are correctly and completely received. IP is responsible for moving packets of data from node to node. The IP component provides routing from the enterprise network, to the regional networks, and to the global Internet.

Records passing all edits were then sent from the FI to HCFA's Common Working File (CWF). The CWF is HCFA's main data repository file. For plan encounter data, CWF performed many of the same edits that were done at the FI level, but also performed checks to determine whether beneficiaries could be verified as enrolled in managed care. If records were rejected by the CWF, they were sent back to the plan via the FI. The accompanying CWF response trailer to the FI identified the reason(s) for rejection. If the record was rejected because the beneficiary was not recognized as a managed care enrollee, the plan resubmitted the record with the next batch transmitted to the FI.

One of the most contentious issues related to the collection of plan hospital discharge data centered around HCFA's requirement for "plan attestation." At issue was whether a managed care plan CEO should, or in fact could, attest that the data submitted were accurate, particularly since the mandate from Congress was for a retroactive period, and plans were dependent on hospitals for data collection. HCFA's requirement for plan attestation of data integrity was driven by its intention to pursue penalties under the False Claims Act if it could be proven that a plan knowingly submitted falsified data. Ultimately, HCFA required that hospital encounter data must be submitted over the signature of the Chief Executive Officer (CEO) attesting that the plan submitted the data as reported by the provider (hospital) and that a record for each encounter (hospital discharge) was submitted. For the start-up year, the attestation varied depending upon whether all data for a plan is submitted via Option 1 (in which case, the CEO attests only to the completeness of the data) or whether any data is submitted via Option 2 or Option 3 (in which case, the CEO attests to the completeness of the data and that the data was submitted by the plan as it was reported by the hospital). Attestation as to the validity of the data will be done on a yearly basis. This attestation, at a later point, may be incorporated into the application process for a plan; at that point, a separate attestation will not be required.

As a further method of ensuring data integrity, medical record reviews of a sample of hospital encounters will be audited to ensure the accuracy of diagnostic information. Reviews will be conducted by an independent contractor. The medical record reviews for hospital encounter data may be integrated at a later point into the audit process for the verification of Health Plan Employer Data and Information Set (HEDIS).

APPENDIX 2

“Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment”

Greg Pope, Chuan-Fen Liu, Randall P. Ellis, Arlene S. Ash, et al.

Health Economic Research

January 1999

This report will be made available separately through the National Technical Information Service.

APPENDIX 3

“45 Day Notice”

January 15, 1999

This notice is available separately on the HCFA web site,
www.hcfa.gov/stats/hmorates/aapccpg.htm.

APPENDIX 4

“Actuarial Review of the Health Status Risk Adjustor Methodology”

**Report by the American Academy of Actuaries
Work Group**

**American Academy of Actuaries
Risk Adjustor Work Group**

**ACTUARIAL REVIEW OF THE HEALTH STATUS RISK
ADJUSTOR METHODOLOGY**

Risk Adjustor Work Group

William F. Bluhm, MAAA, FSA, FCA, Chair
Robert C. Benedict, MAAA, FSA
John M. Bertko, MAAA, FSA, FCA
Robert B. Cumming, MAAA, FSA
Patrick J. Dunks, MAAA, FSA
Kathleen E. Ely, MAAA, FSA
Alan D. Ford, MAAA, FSA, EA
P. Anthony Hammond, MAAA, ASA
William R. Lane, MAAA, FSA
Lucinda M. Lewis, MAAA, FSA
David R. Nelson, MAAA, FSA
Donna C. Novak, MAAA, ASA
Leslie F. Peters, MAAA, FSA
Martin E. Staehlin, MAAA, FSA
Jill A. Stockard, MAAA, FSA

The American Academy of Actuaries is the public policy organization for actuaries of all specialties within the United States. In addition to setting qualification and practice standards, a major purpose of the Academy is to act as the public information organization for the profession. The Academy is nonpartisan and assists the public policy process through the presentation of objective analysis. The Academy regularly prepares comments on proposed federal regulations, and works closely with state officials on issues related to insurance. The Academy also develops and upholds actuarial standards of conduct, qualification and practice, and the Code of Professional Conduct for all actuaries practicing in the United States.

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I. Executive Summary

This report presents the analysis by the American Academy of Actuaries' Risk Adjustor Work Group of the health status risk adjustment methodology proposed for implementation by the Health Care Financing Administration (HCFA). By law, a risk adjustment methodology must be used by HCFA for determining payments to Medicare+Choice health plans starting in the year 2000. The Risk Adjustor Work Group was formed in response to a request from HCFA for an actuarial review of their work on a risk adjustment methodology. This review is required by the Balanced Budget Act of 1997 which mandated HCFA's development of a risk adjustment payment system.

*The adoption of a new risk adjustment system for Medicare reimbursements based on health status factors represents a significant change for health plans, contracting providers and health plan members. **While the Academy Work Group believes the conceptual basis of the risk adjustment method proposed by HCFA is "actuarially sound" as defined in our report, we have serious concerns about the method's implementation, operation and impact.***

The new methodology for making health status risk adjustments to Medicare payments appears to meet the requirements of the Balanced Budget Act of 1997, provided the system is implemented carefully. On balance, and with a phase-in, the proposed risk adjustment method appears to be a reasonable first step in what should be a long-term evolutionary process. HCFA is to be commended for the progress to date and for recognizing the limitations of the proposal arising from the available data, timing requirements and areas for future improvements.

While HCFA has done much work in a short time period to develop the new methodology and design implementation strategies, additional work remains to fully define HCFA's risk adjustment method and test application of the method to make sure it achieves the intended results. The Work Group recommends that HCFA further modify the risk adjustment model with the knowledge gained during the first year of operation.

Based on our review of the information and data provided by HCFA, the Work Group has serious concerns about the actual implementation of the new payment system and its impact on the Medicare health plan market. These issues include:

- Decisions to exclude or limit the use of certain types of diagnosis categories from the risk adjustment methodology, such as one-day hospital stays, which may penalize health plans that effectively manage the delivery of health care.*
- Lack of adequate testing of the potential impact of the new methodology on health plans and Medicare+Choice beneficiaries.*
- Administrative feasibility of the implementation of the new system because of timing and data collection issues.*

- *The processing of extraordinary amounts of newly collected data and completing a series of complex calculations introduces an element of uncertainty that cannot be anticipated until health plans and HCFA have full opportunity to understand the implications.*
- *Use of only fee-for-service data as the basis for the development of risk adjustment weights.*

During the review process, HCFA provided the Work Group with preliminary results of the potential payment impact of the risk adjustment methodology on Medicare+Choice plans. However, the Work Group was not able to verify the accuracy of the data collected by HCFA or the calculations used by HCFA to determine the impact on health plans. In addition, HCFA did not provide the Work Group with an assessment of the impact of the risk adjustment methodology on beneficiaries.

There is a substantial risk for the Medicare system if the risk adjustment methodology does not work as intended. The negative consequences could include withdrawal of Medicare+Choice health plans from the market, financial problems or insolvency for health plans and the potential for a reduction in benefits provided to beneficiaries. Because of these concerns, the Work Group believes HCFA's decision to implement the new methodology under a phased-in approach is a sound one and will limit changes from the current payment system while HCFA and the health plans assess the impact of the new methodology.

The Work Group was unable to fully analyze the proposed risk adjustment method due to: (1) incomplete available data and information, and (2) the continuing development of the new risk adjustment methodology by HCFA. The Work Group was not able to undertake a detailed analysis of the mathematical formulas used to develop the risk adjustment methodology, but rather focused its review on the conceptual and theoretical basis of the system. Because HCFA is still working on the proposed methodology and there are a number of unresolved implementation issues, this report is a qualified review of the actuarial soundness of the proposal. The Work Group would like the opportunity to provide further comments on the new system as it is completed.

II. Introduction

The American Academy of Actuaries (Academy) has been asked by the Health Care Financing Administration (HCFA) to evaluate its proposed method for using the health status of Medicare beneficiaries to risk adjust Medicare payment rates. The Academy formed a Risk Adjustor Work Group (Work Group) consisting of health actuaries who are consultants to health plans and health insurers and staff actuaries for health plans or health insurers to review HCFA's proposal. This report presents the Work Group's analysis, conclusions and recommendations.

The Balanced Budget Act of 1997 (BBA) requires HCFA to incorporate health status risk adjustment in the agency's payments to Medicare+Choice health plans.¹ The law also provides that HCFA will report to Congress on its proposed method for risk adjustment. The purpose of this report is to assist HCFA in satisfying Section 1853(a)(3)(A) of the Act, which states that HCFA's Report to Congress shall include, "*an evaluation of such method by an outside, independent actuary of the actuarial soundness of the proposal.*"

HCFA plans to implement the initial health status risk adjustment method on January 1, 2000 and then replace it with a more comprehensive method at a later date. The scope of the Academy's report includes both the initial Principal Inpatient Diagnostic Cost Group (PIP-DCG) method and the possible subsequent modifications to the methodology proposed by HCFA.

The Work Group analyzed the actuarial soundness of HCFA's risk adjustment proposal in terms of (1) established actuarial goals and criteria for risk adjustment, (2) Actuarial Standards of Practice, and (3) the general principles and practices of actuarial science. Actuarial Standards of Practice are guidelines developed by the Actuarial Standards Board to help actuaries in their work. Specific actuarial goals and criteria for risk adjustment are described in the Academy's May 1993 monograph titled, "Health Risk Assessment and Health Risk Adjustment: Crucial Elements in Effective Health Care Reform" (Health Risk Adjustment Monograph).

The Academy understands that this report will be used by both Congress and HCFA and will become part of the public record. The Academy also understands the report may be provided to other interested parties. This report should only be distributed in its complete form.

III. Report Background and Methodology

A. Overview of Risk Adjustment

Health risk adjustment is a means of modifying or redistributing payments received by risk bearing entities within a health insurance system to more equitably compensate those entities for the risks they have assumed relative to one another. A major purpose of a health risk adjustment system is to make the basis of competition among carriers their administrative and medical efficiency rather than the health plans' ability to select healthy people.

The risk adjustment process uses the results of health risk assessment to determine the appropriate magnitude of revenue adjustments. Health risk assessment is a method for objectively determining the relative health risks (or expected relative costs) of individuals or groups of individuals relative to an average. Risk is assigned as a simple numerical value or score reflecting the relative cost of health care resources required to meet the total health care needs of that individual or group. A key goal of the risk adjustment process is to more equitably match financial reimbursement with financial liability within an insurance system.

¹Section 1853 of the Balanced Budget Act of 1997 (PL 105-33).

B. HCFA's Proposal

Currently, HCFA's published local payment rates for Medicare+Choice health plans are adjusted to reflect the risk characteristics of the plans' participants in a particular county as defined by demographic factors: age, gender, status (institutionalized or non-institutionalized, Medicaid or non-Medicaid and Working Aged). Beginning in the year 2000, HCFA is required by the Balanced Budget Act of 1997 to supplement demographic adjustments with a health status risk adjuster.

The PIP-DCG risk adjuster methodology was developed for HCFA by researchers at Health Economics Research, Inc. (HER), Boston University, and Harvard Medical School. The PIP-DCG risk adjuster will be used to assign each Medicare beneficiary a risk score based on diagnosis information from hospital inpatient stays. These risk scores, along with county of residence, age, gender, and other factors, will be used on a prospective basis to determine the Medicare payment rate for each beneficiary in a Medicare+Choice health plan.

As part of HCFA's proposed risk adjustment method, HCFA will be "rescaling" or adjusting the base payment rates. The purpose is to ensure that for each county, the new reimbursement rates utilizing health status risk adjusters should produce the same total payments for the fee-for-service populations as the current approach if every Medicare FFS member in a county were enrolled in a Medicare+Choice organization. However, implementing risk adjusters could increase or decrease total Medicare payments to health plans depending on whether Medicare+Choice organizations currently enroll a higher or lower than average share of the less healthy Medicare beneficiaries.

C. Work Group's Method of Review

The Academy was asked by HCFA to evaluate the "actuarial soundness" of its proposal. Although there is no widely recognized definition of "actuarial soundness," the Work Group analyzed HCFA's proposal according to the standards for risk assessment and risk adjustment outlined in the Academy's Health Risk Adjustment Monograph. These criteria are:

Accuracy: Since payments to health plans will be determined based on the risk adjustment mechanism, accuracy and avoidance of statistical bias is critical.

Practicality and Reasonable Cost: The risk adjustment mechanism should not be so complex that implementation is extremely cumbersome, thereby adding significant cost to the system.

Timeliness and Predictability: Carriers setting premium rates should be able to predict the impact of risk adjustment on their premiums with a fair degree of accuracy and in a timely manner, in order to avoid solvency concerns and disruption to members.

Resistance to Manipulation: The risk adjustment mechanism should aim to make it impossible for specific carriers to benefit financially by "gaming" the mechanism.

In addition, the Academy has assessed the effectiveness of the proposed methods in achieving the *goals of risk adjustment* as outlined in the Health Risk Adjustment Monograph. These goals are:

- *Reducing the effects of either inadvertent or intentional risk selection*, so carriers in a competitive market can compete on the basis of medical and administrative efficiency and the quality of service and care, rather than on the ability to select risk;
- *Compensating carriers fairly and equitably for risks they assume*;
- *Maintaining consumer choice* between multiple health plans based on rates or employee contributions that reflect relative medical and administrative efficiencies; and
- *Protecting the financial soundness of the health care system*.

The Academy's review takes into account all aspects of the proposed methodologies that impact on its "actuarial soundness," including, but not limited to:

- The proposed formulas;
- The availability, quality, and relevance of the data required; and
- The ability to be implemented as intended.

In addition, the Academy has evaluated the appropriateness of the proposed methods in relation to available alternatives (including non-administrative data models such as surveys, enhanced age/gender/status, and the status quo) and in light of the modifications being made to the underlying base rates by county over the same time period.

D. Limits of the Work Group's Analysis

In preparation for this analysis, the Academy's Work Group met with representatives of HCFA to establish the purpose and scope of the evaluation to be provided. During the meeting, HCFA staff provided an overview of their proposed methodology that they indicated was still in draft form.² The agency's staff also stated they would be receptive to the Academy's suggestions for modifications to the methodology that would improve its soundness or effectiveness. Shortly before

² During the meeting with HCFA staff, the Work Group was provided with materials outlining the current Medicare payment system and the proposed PIP-DCG methodology including a technical paper titled, "Risk Adjustment for the Medicare Program: Lessons Learned from Research and Demonstrations" by Leslie M. Greenwald, PhD, Al Esposito, MS, Melvin J. Ingber, PhD and Jesse M. Levy, PhD. All of the authors are with HCFA's Office of Strategic Planning (Research and Evaluation Group).

this review was finalized, HCFA also introduced three modifications to the proposal that the Work Group had reviewed. While the Work Group sees no immediate major implications of those three changes (other than as already discussed in this report), we have not had the opportunity to analyze the changes in depth.

A preliminary draft of this report was provided to HCFA for review and comment on December 8, 1998. The agency responded and submitted additional materials and data to the Work Group along with specific comments concerning some of the issues raised in the report. The Work Group considered HCFA's response and materials as it completed its work on this report.

In performing this review, the Work Group relied upon information and data provided by HCFA. This information included descriptions of the statistical methodologies summarized by Health Economics Research,³ reports and other summary materials, answers to written inquiries submitted by the Academy,⁴ and an initial version of the methodology established by HCFA during the course of this review. In addition, the Academy relied upon descriptions of the methodologies published in the Federal Register.⁵

It is important to note that the analysis and conclusions in this report are dependent on the information supplied to the Work Group by HCFA. As of the date of this report, HCFA has not provided the final version of the PIP-DCG risk adjustment formula. In addition, only preliminary revisions of the comprehensive data methods for the risk adjustment methodology have been discussed. No formal methods have been released. **Changes in the methodology or adjustments to the data and information provided by HCFA to the Academy could dramatically impact the findings of this report.** The development of a risk adjusted payment system by HCFA is still a "work in progress" and **this report reflects a qualified opinion by the Academy on the "actuarial soundness" of HCFA's proposals based on the information available to the Work Group at the time it performed its review.** The limitations on the Work Group's analysis and findings are applied throughout the report.

In addition, the Work Group did not undertake an analysis of the specific mathematical formulas used by HCFA in the development of risk scores and was not able to determine the accuracy of HCFA's application of the risk adjustment methodology to the data collected from Medicare health

³The Work Group reviewed several reports from HER: (a) Diagnostic Cost Group (DCG) and Hierarchical Coexisting Conditions (HCC) Models for Medicare Risk Adjustments (Volumes I and II, April 26, 1996); (b) Revised Diagnostic Cost Group (DCG)/Hierarchical Coexisting Conditions (HCC) Models for Medicare Risk Adjustment (February 6, 1998) and © Updated and Revised Principal Inpatient Diagnostic Cost Group Models (Draft Report, July 17, 1998).

⁴HCFA provided three submissions to the Work Group (dated October 8, 1998, November 3, 1998 and November 19, 1998) in response to requests for additional information. HCFA also submitted additional materials to the Work Group on December 14, 1998, December 21, 1998, December 29, 1998 and January 5, 1999, as part of its response to a draft copy of the report reviewed by HCFA.

⁵Federal Register, Vol. 63, No. 173 (September 8, 1998).

plans. As a result, this report should not be considered a “peer review” of the risk adjustment formula under which the Work Group would have examined the mathematical processes used to develop the health status risk scores. The Work Group’s analysis is limited to the conceptual framework of the risk adjustment methodology developed by HCFA.

IV. PIP-DCG Risk Assessment Model

A. Key Components of Model

Use of Only Inpatient Data

As previously discussed, the initial model developed by HCFA will use inpatient diagnostic data to develop a risk score for each Medicare beneficiary.⁶ This information is based on hospital inpatient stays over one day for certain diagnosis groups. The risk score will be combined with revised demographic factors to develop the payment rates.

A significant component of the PIP-DCG model is the restriction of the risk adjustment method to conditions identified by inpatient hospital claims. This feature has both advantages and disadvantages. As one positive factor, this requirement matches well with the information currently available to the Medicare program. Currently, hospital claim information is more accessible and easier to audit than ambulatory care data and requires a lower amount of additional work by health plans to report to HCFA.

However, there are several drawbacks to a system that uses only inpatient data. First, it is possible that a system relying on inpatient data may penalize plans which more efficiently manage health care. A major feature of managed care has been the measurable reduction in use of inpatient care, the shifting of that care to other, more cost-effective sites of service and the substitution of less invasive therapies to treat a given condition. When the risk assessment system is restricted to inpatient claims, the members enrolled in managed care can appear healthier than their actual risk level because of limits on what is measured.

A possible ramification of the PIP-DCG method is that, by using only inpatient data, the risk adjustment method is less effective than one that also includes ambulatory data because the PIP-DCG formula measures less risk (based on benchmarks such as the R-Squared statistic and predictive ratios). If ambulatory data is added to the inpatient claims information, a better picture of the potential “risk” of each individual Medicare beneficiary is obtained. The PIP-DCG methodology may result in a smaller variation in risk-adjusted payments made to Medicare+Choice health plans than would occur if a more comprehensive method were used. In

⁶Individuals who are newly eligible for Medicare will be assigned a risk score based on HCFA’s analysis of existing Medicare fee-for-service data. HCFA will construct a special set of risk scores for these individuals which estimates their predicted medical expenditures since they will not have any inpatient claims experience under the Medicare system.

the initial phases of the program this may be desirable, to the extent it causes less disruption to plans which participate in Medicare+Choice.

Principal Diagnosis

The PIP-DCG model measures conditions by capturing the principal diagnosis recorded on each inpatient claim. The use of the principal diagnosis for the PIP-DCG model is based on existing coding practices for inpatient claims used by hospitals. Since only the principal diagnosis is generally used, it is possible that not all appropriate information is collected or used. A qualifying condition could be listed as the secondary (or other) diagnosis which could be a contributing factor leading to the need for hospitalization.

For example, a hospital admission for an acute condition caused or exacerbated by hypertension or diabetes may identify that acute condition as the principal diagnosis even though it could be argued the patient would not have been hospitalized had it not been for the underlying chronic condition. There is also the possibility that restricting the data source to principal diagnosis could lead to listing a qualifying event as a “principal diagnosis” on a claim in order to receive “credit” for that more serious inpatient condition.

Alternately, there is a common belief that many secondary conditions currently reported are not as reliable and should not be included in the measurement system. Since the initial stages of the risk assessment system will be using data that was recorded without the presence of direct coding incentives, it may be reasonable to use only principal diagnosis information. However, as the PIP-DCG system is implemented, the restriction to using only principal diagnostic groups should be re-evaluated.

Number and Development of PIP-DCG Groups

Health Economics Research constructed the diagnostic groupings using HCFA’s survey of Medicare FFS data (a sample of 5% of Medicare beneficiaries). The claims and eligibility information for this analysis fell in the two-year interval from January 1, 1995 through December 31, 1996. Beneficiaries who were not alive and enrolled in Medicare for the entire period from March 1, 1995 through December 31, 1995 and enrolled on January 1, 1996 were excluded from the sample. Beneficiaries were removed from the data sample if they would not have been eligible for coverage by a Medicare+Choice program for various reasons.⁷

The 5% sample is itself a bit of a misnomer. There were approximately 37.3 million Medicare beneficiaries on July 1, 1995. A 5% sample should yield around 1.9 million lives. However, after excluding beneficiaries based on length of eligibility or future managed care plan participation requirements, the sample used in setting the PIP-DCG risk adjusters is 1.4 million, which is 25% smaller. Therefore, the 5% sample is really roughly a 3.5% sample.

⁷ For a complete description of the sampling technique, see Chapter 2 of HER’s draft report, “Updated and Revised Principal Inpatient Diagnostic Cost Group Models” (July 17, 1998).

HER used diagnostic codes to form the diagnostic groups (DxGroups) which are used in the PIP-DCG methodology. In order to qualify for a DxGroup used in the PIP-DCG formula, there must have been at least 1,000 individuals with that diagnosis in the Medicare 5% sample. When the PIP-DCG methodology is used starting in 2000, those Medicare beneficiaries who do not fall into one of the DxGroups will be classified into a “base” group and they will be scored only on the demographic risk factors.⁸

There are questions with respect to data credibility and the design of diagnostic groups based on the HCFA 5% sample. For example, is it appropriate to use 1,000 individuals as the “cut-off” for forming DxGroups? How different would the resulting DxGroups look if the sample had been 10% of Medicare beneficiaries, or if a different 5% sample had been selected?

A second sample could be drawn to test the variability of PIP-DCGs. One possible approach would be to use a stratified sample which examines a higher percentage of beneficiaries with claims in the diagnostic categories that make up the PIP-DCG formula. While the overall number of Medicare beneficiaries in the sample might be less than 5%, the survey could sample a greater number of health plan members who fall into one of the claims categories that make up the diagnostic groups and greatly increase the effectiveness of the process. Since the goal of the sample would be to examine the cost of claims and not necessarily claim frequency, a stratified sampling would seem to be a useful tool.

In addition, the requirement to utilize DxGroups with at least 1,000 members may be overly conservative. While this level of robustness certainly contributes to the credibility of each DxGroup, it may result in risk assessment values that are not as widely dispersed as the underlying distribution of health risk. Relaxing the restraint that DxGroups have at least 1,000 members may result in use of more DxGroups, a likely higher maximum value and a more continuous distribution of resulting risk assessment values (i.e., there would be more DxGroups with smaller increments between categories).

Because of this requirement, diagnoses could be paid at radically different levels depending upon the adequacy of the sample size when the risk adjusters are established. For example, under the current PIP-DCG modeling with no discretionary diagnosis exclusions, the highest DxGroup is formed at expenditure level 32 (approximately \$32,000). There were an insufficient number of beneficiaries to form PIP-DCGs until level 23 (approximately \$23,000). The information available to the Work Group did not state how many beneficiaries had PIP DxGroups at levels 24 through 31. Similarly, reversing the exclusion of PIP diagnoses with under 50 people could have the effect of restoring some bona fide conditions to the list of risk adjuster diagnoses.

The Work Group recommends that HCFA reexamine the decision to construct DxGroups using the 1,000 member cut-off once they have started collecting information from Medicare+Choice

⁸ The development of the diagnostic groups is discussed in Chapter 4 of the HER draft report dated July 17, 1998.

plans and have implemented the new risk adjustment payment system. The validity of this size criteria can then be based on more current inpatient data on Medicare beneficiaries.

Exclusion of “Discretionary” Conditions

The base cost group also includes Medicare beneficiaries with diagnoses that were determined by HER to be discretionary, vague, or which only occasionally resulted in inpatient admissions. This exclusion of those “discretionary” conditions has the beneficial effect of reducing potential bias in the formula against Medicare+Choice health plans with well managed care delivery systems by not giving credit for discretionary admissions and by removing the incentives to hospitalize a patient for minor illness. The diagnoses included in this restriction should be reviewed in the future as coding practices change under the PIP-DCG system. If hospitals become more aggressive in their coding in the future, the percentage of claims falling into a PIP-DCG may change and weights would need to be recalibrated, particularly if the PIP-DCG method is used beyond the currently planned three-year period.

Exclusion of 1-Day Hospitalizations

The HER report recommends excluding one-day hospitalizations from the risk assessment system to avoid giving credit for very short stays, under the assumption that including them may result in “gaming” of the system by health plans. Plans could “game” the system by ordering one-day stays for minor medical conditions in order to include beneficiaries in the health status risk adjustment process.

The prohibition against using one-day stays may result in lower risk scores being given to members in plans which efficiently manage the delivery of health care because such plans generally have shorter lengths of hospital stays. The HER report asserts that this exclusion results in only 5% of otherwise qualifying diagnoses being removed from the health status risk adjustment formula. However, this measurement was made using fee-for-service data; the impact on managed care plans may be significantly different.

HER has proposed an alternative method to excluding one-day hospitalizations which assigns varying weights to stays that are one day long versus two or more days. While this alternative does at least partially address the gaming issues, it may cause other problems. First, crediting various values to one-day hospital stays could add to the complexity of administering and understanding the system. Second, if variable DCG weights were constructed for one-day versus longer stays using fee-for-service data, these weights might not reflect the higher intensity and cost of one-day stays in a managed care plan. Third, if the same credibility and robustness requirements were applied to these hospital stays (i.e., DxGroups must contain at least 50 people), this calculation could result in more diagnoses falling into the “base” category due to insufficient people in the category and clinical judgment would be required to “reclassify” those DxGroups.

The underlying concept of excluding one-day admissions does have merit. It can reduce gaming of the system by requiring each hospitalization to be of a certain severity (measured by a length of two days or more) and plans would not have an incentive to hospitalize a patient overnight just to receive “credit,” thus, the majority of PIP-DCG diagnoses are severe enough to have an average length of stay in excess of this two-day minimum. However, there are several disadvantages that should be considered.

First, according to the HER report, excluding one-day stays reduces the predictive power of the health status risk adjustment methodology.⁹ If data from Medicare+Choice organizations is used, there may be more than 5% of otherwise qualifying conditions excluded from the formula. Second, this exclusion may penalize plans which more efficiently manage care, since data generally indicates that these plans have a lower average length of stay. This indicates that a plan which manages care may be paid less than a plan which does not manage care for exactly the same type of patients. Finally, it should be considered if excluding one-day hospitalizations shifts the issue of “gaming” from whether to hospitalize someone at all to a question of whether to keep the patient for an extra day. It would be appropriate to analyze the risk adjustment methodology based on whether it is easier to “game” admissions or to “game” length of stay and any resulting adverse incentives for health plans.

The Work Group suspects that the disadvantages of excluding one-day hospitalizations may outweigh any possible gain. One of HCFA’s goals in designing the risk assessment methodology should be to negate bias against the prudent management of health care costs by Medicare+Choice plans. HCFA may want to consider either using one-day stays as part of the risk adjustment formula or giving a partial credit or other adjustments for those hospitalizations in structuring payments to health plans.

Chemotherapy

HCFA has indicated that beneficiaries who are undergoing chemotherapy will be placed in a diagnosis category based on the patient’s secondary diagnosis (most likely cancer). Since the medical conditions underlying the need for chemotherapy represent high-cost, ongoing conditions that are predictive of future medical expenses, it is appropriate that they be included in the risk assessment model. The Work Group believes including chemotherapy as part of the diagnosis groups will increase the ability of the methodology to predict future health care costs.

Demographic Factors

The health status risk adjustment methodology includes a number of demographic factors that will be used to measure the baseline predicted cost for each person. Medicare+Choice health plan members with PIP-DCG conditions will be assigned the extra cost of the diagnosis in addition to their underlying demographic costs. In general, it is not possible to “game”

⁹ See Chapter 4 of the draft HER report dated July 17, 1998.

demographic factors such as age and gender. A brief discussion of the other demographic factors follows:

- **One Rate Book for Aged and Disabled.** While not a demographic factor per se, it is an important feature of this system because it creates a unified and self-contained methodology that includes all Medicare members (except for beneficiaries with End Stage Renal Disease, which is handled through a separate payment system).
- **Ever Disabled.** Having this add-on factor for Aged members (i.e., beneficiaries who qualify for Medicare because of their age) who were previously covered by Medicare due to disability maintains the internal consistency of the model and appears to appropriately measure the additional cost of these Aged members.
- **Medicaid.** HER indicated in its report that Medicare beneficiaries who were eligible for Medicaid one month or more during the 12-month data collection period typically had higher medical expenses in the future. Medicaid status information is generally available and does not require additional plan reporting so this coverage may be an appropriate factor to add to this model. Before implementation of the PIP-DCG system, it would be desirable to sample and verify Medicaid status, particularly in small enrollment counties where this factor could make a significant impact in the risk assessment values and the resulting payments to health plans.
- **Institutional Status.** The HER analysis indicated that available Medicare data on institutional status of beneficiaries includes two different groups, those individuals in skilled nursing facilities, which have high current medical costs, and individuals in other types of sub-acute long term nursing home care, which generally have lower current costs. However, the HER report indicated HCFA does not collect this information on a routine basis and thus it is difficult to accurately distinguish between the two types of care using currently available Medicare data. Since institutional status information may not be uniformly collected by health plans and is subject to potential gaming, it is appropriate that it not be included as a demographic factor.

There is a concern however, that certain institutional demonstration projects (such as Programs of All-Inclusive Care for the Elderly or “PACE” and Social Health Maintenance Organizations) may have other, more expensive subgroups of institutionalized individuals; individuals who are significantly underpaid by the exclusion of this status, especially if the programs reduce the number of acute admissions which form the start of an institutional stay. HCFA should consider the development of specific health status categories for these individuals.

- **Working Aged.** At the time the draft HER report was provided to the Academy, there was an indication that HCFA was considering use of a factor for those Medicare beneficiaries who are still employed (Working Aged), since a large portion of the medical costs for those plan members may be paid by their employers. However, the use of this demographic factor must be carefully considered, since the employer who is the primary payer for medical services may not report to HCFA that a Medicare beneficiary is covered through an employer health plan.

Exclusion of Indirect Medical Education Costs

The model developed by HER excludes indirect medical education (IME) costs from the Medicare FFS data used to calculate the relative weights used in this system. The IME costs are approximately two-thirds of the total graduate medical education costs currently paid through Medicare (the FFS data does include direct medical education (DME) expenses). While it is technically incorrect to include any graduate medical education costs (since medical education costs will be paid outside of the capitation rate in the future), any distortion is likely to be small. However, it is possible there will be some internal inconsistencies in the model since high-cost conditions captured in the PIP-DCGs may more likely be treated in a tertiary care or teaching hospital.

Factors for Newly Enrolled Medicare Members

In addition to currently eligible Medicare beneficiaries (either in the FFS program or in health plans), the risk adjustment method will have “neutral” factors for new Medicare members without any diagnostic history. HCFA has decided to develop a special set of risk scores for those individuals who are eligible for Medicare for the first time and do not have any prior encounter data in the Medicare system.

HCFA has used FFS data to construct average expenditures for categories of newly eligible members (beneficiaries who become eligible for Medicare because of age or disability or members who were previously eligible for coverage but deferred entry into the Medicare system). Newly eligible members will be assigned an estimated risk score based on HCFA’s estimate of their predicted medical expenditures. The validity of these risk scores is unclear. We therefore suggest HCFA review its risk scores for the newly eligible once current data is available.

Application

In developing risk assessment scores for each person, HCFA intends to examine all fee-for-service and encounter data to produce each person’s score. It is important to combine data from all sources to account for movement between plans and between the fee-for-service and managed care systems. The impact of the new system on individual Medicare+Choice contractors is unclear. HCFA has not completed substantial testing of individual contractors.

B. Predictive Power of the Model

According to HER, approximately 87% of Medicare+Choice health plan members will receive a score based on demographic factors alone. The other 13% will also be assigned a score based on their PIP-DCG diagnosis. A primary question is the extent to which the proposed health status risk adjustment methodology is useful in predicting future medical expenses and therefore is an appropriate formula for Medicare reimbursement to health plans.

Risk Assessment - A “Work in Progress”

The goal of a risk adjustment method is to match the payment to a health plan or provider with the need for health care services of members. The goal of risk assessment for the Medicare population is to appropriately pay health plans for chronically ill members. Defining the “need” for health care services is a less than exact science. Most risk assessment methods which have been developed to date have tended to share certain inherent assumptions. While these assumptions represent the best available current mechanisms for measuring health care needs, they are also generally recognized as being less than perfect.

One assumption is that the “need” for health care services can be measured by prior use of services. Some observers argue that many of the health care services which are performed today are not medically necessary. However, it must also be recognized that there is no general agreement about which services are appropriate and which services are, in fact, unnecessary. To the extent that certain disease categories have a greater or lesser number of “unnecessary” services than other disease categories, current risk assessment methods may overstate or understate the true “need” for services.

Another premise is that people with similar physical conditions will need similar amounts of medical services. The difficulty lies in defining “similar physical conditions.” No current administrative method of diagnostic coding captures all of the aspects of illness which relate to a patient’s “need” for services. Even if such a method were devised, it is not currently administratively feasible to collect all of the specific details in order to completely define any given patient’s medical needs. Risk assessment methods will always put some patients with varying needs for services into identical risk stratification categories. At the same time, no risk assessment mechanism should be expected to completely replicate prior costs.

Concurrent Versus Prospective Risk Assessment

Another important factor in predictive power is whether the risk assessment method is prospective or concurrent. A concurrent method matches the current year’s risk factors with the current year’s health care need. A prospective method uses the current year’s risk factors to predict the following year’s need. Predicting future costs based on current conditions will always be less accurate than predicting the costs which were incurred during the time frame when the risk assessment factors were assigned.

For a variety of reasons, however, prospective approaches for a risk assessment method are still preferred by most observers. Concurrent methods tend to compensate for the treatment of acute conditions. In addition, concurrent methods compensate for accidental conditions which are otherwise unpredictable and do not require risk adjustment. A prospective risk adjustment method, therefore, should not be rejected simply because it does not predict costs as well as a concurrent method.

HCFA has indicated it will use the prospective system in its risk adjustment methodology. This choice is likely to reduce gaming of the system by placing the emphasis on diagnoses with high ongoing costs, which are typically chronic in nature, thus reducing the emphasis on traumatic, acute conditions which may be self-limiting. The disadvantage of a prospective system is that it has significantly lower predictive power than a concurrent system. The advantage of the prospective methodology is that it provides health plans with an incentive to manage care because they stand to gain if future costs are lower than prospective payments. A prospective risk adjustment methodology also provides health plans with a greater ability to predict future payments which improves the solvency of the system.

Measures of Predictive Power

There are several measures of predictive power in general use today, including the R-Squared statistic and the Predictive Ratio. The R-Squared statistic measures the variance between the predicted use of services and the actual use of services on an individual by individual basis and compares the result to the variance for the entire population. The resulting score is expressed as a percentage of variance and the highest (i.e., most predictive) score is 100%. The best prospective risk assessment methodologies currently range in the area of 10% for individual Medicare beneficiaries. Using demographic information alone (similar to the current Medicare AAPCC model) will usually produce an R-Squared score of about 1%. A number of researchers estimate the best possible individual score is around 20% for risk assessment systems.

The Individual R-Squared value is less useful to health plans since the nature of insurance is to spread risks of random fluctuations over larger populations. Identifying actual values for each participant is less important.

Another measure of predictive power is the “predictive ratio.” This indicator measures the ratio of the actual use of services to the predicted use of services for a group of individuals. Predictive ratio scores may range from 0 to many multiples of 1. Typically, risk assessment methods for large random groups will typically generate predictive ratios very near or at 1.00. On the other hand, application of risk assessment to non-random groups consisting of all individuals with certain diagnosis categories such as diabetes or asthma can sometimes achieve scores between .85 and 1.15 if better risk adjustment methods are applied.¹⁰ In general, predictive ratios are more meaningful than R-Squared scores to health plans, particularly if a health plan contracts with specific providers with expertise in certain high cost conditions and therefore attracts more than its share of individuals with these conditions.

Risk Adjustment - Not a Remedy for Inefficiency

If a risk adjustment method has a high degree of predictive power, it will better allocate available funds according to the underlying need. This does not mean, however, that all health plans will have similar financial results. Even if the predictive power of a risk assessment scheme is very

¹⁰ See: “Risk Adjustment For The Medicare Program,” Greenwald, et al.

accurate, more efficient health plans will either be more profitable or will be able to charge lower premiums than less efficient health plans.

How Much Predictive Power is Enough

One test of a risk assessment mechanism is whether a majority of health plans receive sufficient income to cover their costs on an on-going basis. A successful method will encourage health plans to continue contracting to provide Medicare coverage and to expand their marketing to higher risk beneficiaries.

For Medicare beneficiaries, a successful method will minimize disruption in the market and possibly increase the number of health plan choices available. For policy makers and financing organizations, a successful method will provide an indicator that funding is appropriate (i.e., minimizing excess profits/surplus), that enrollment is expanding, and that beneficiaries with higher risk status are not avoided.

C. Implications of Indefinite Use of the PIP-DCG System

The proposed PIP/DCG system is expected to be in place only for a few years at most and then replaced with an enhanced system. The Work Group believes that there are significant negative implications if the proposed PIP-DCG system is used more than a few years. One of these is that health plans which use outpatient alternatives to hospitalization would be financially penalized by a risk adjustment system that uses a formula based only on inpatient diagnostic data. Potentially, this limitation could penalize the more efficient plans enough to make them leave the Medicare market. In addition, it might create an incentive for plans to promote less efficient care modalities in order to increase Medicare payments.

In addition, the proposed system does not increase risk factors when an individual falls into two or more diagnostic groups; rather, the individual is scored only at the highest severity group. This lack of increased risk adjustment for combined conditions may unduly reduce the effectiveness of the risk adjustment system, as health plans with the most severe cases of a given DxGroup will have a greater incidence of multiple conditions.

This restriction could underpay health plans which include providers that typically treat more patients with multiple chronic conditions, provide incentives for those plans to drop those providers from their provider panels, or provide incentives for health plans to market themselves to only the most healthy potential enrollees. On the other hand, any recognition of the higher cost of these chronically ill members is an improvement over the current demographic-only method of capitation rate development.

V. Consideration of Comprehensive Data Models

The currently proposed risk adjustment methodology only uses diagnostic data from inpatient hospitalizations. HCFA has indicated that one future enhancement to the system will be to include comprehensive data, starting with ambulatory diagnostic data.

There are a number of advantages to including ambulatory data:

- Using ambulatory data can capture high risk situations even where hospitalization did not occur. Some high cost treatments, such as chemotherapy, can be performed on an outpatient basis. Even though such patients require a high level of medical services, they are not recognized as high risk by an inpatient-only system. In addition, efficient health plans which have implemented disease management processes to avoid the need for hospitalization would be treated more appropriately under a system which includes ambulatory care.
- Some risk assessment systems using ambulatory data have significantly better ability to predict risk levels. Higher predictive power means more equitable payments to health plans.
- Even if not used for risk adjustment purposes, it would be helpful for health plans to capture this data to measure the efficiency and quality of health care delivery.
- Using only inpatient diagnoses produces a financial advantage to health plans to admit patients even if hospitalization is otherwise questionable. Public policy probably argues that health plans should not be rewarded for choosing more expensive treatment than is medically necessary.

On the other hand, there are several disadvantages:

- Complete ambulatory data is not currently captured by many health plans via an electronic mechanism. Requiring ambulatory data will require the expenditure of significant capital expenses for certain plans. This requirement will add to the overall cost of the system.
- Including ambulatory encounters will significantly increase the amount of data required from health plans. This situation increases the opportunity for error. Auditing an inpatient stay requires a relatively small expenditure relative to the cost of hospitalization. Auditing an ambulatory encounter requires an expenditure which represents a significantly larger percentage of the cost of the services provided.
- Many diagnoses are originally coded by physicians more as possibilities rather than conclusions. Hospital diagnoses are the diagnosis as of discharge, which is much more likely to reflect the best conclusion of the medical staff. Ambulatory diagnoses do not

distinguish between admitting and discharge diagnoses and are, therefore, somewhat less likely to be accurate.

- Ambulatory data will need to be captured from a wide variety of sources and will likely require significantly more time to accumulate. A small fraction of the population is hospitalized in any given year, but the majority of people have some contact with the medical community. The increase in the input data to the risk assessment system would be very significant.
- There is more likelihood of inconsistent coding, because while some physician contracts may include incentives for better coding, other capitation contracts may reduce physician incentives to code thoroughly.

Including ambulatory diagnoses in the risk assessment system should increase its predictive power and therefore the equity of payments. It will reduce bias toward compensating health plans for more intensive treatment than is strictly necessary. On the other hand, including ambulatory diagnoses will increase the cost of any risk assessment system, will decrease the timeliness of the system, and may provide more opportunity for incorrect or inconsistent coding.

In general, the advantages of including ambulatory diagnoses seem to justify their use. A more thorough cost-benefit analysis should be performed. Currently, the Work Group is unaware of any other means of risk assessment which would meet the stated goals of a risk assessment system in a more efficient manner than a proper use of ambulatory diagnostic data.

VI. Implementation Issues

One of the keys to any risk adjustment methodology is the ease or difficulty with which it is implemented by HCFA and the resulting impact on Medicare+Choice health plans and their members. The recent decision by a number of Medicare+Choice organizations to withdraw from the Medicare market underscores the need for developing a system which fits within the operational needs of managed care plans.

A. Timing of Payments

HCFA has indicated that data are likely to be collected from July 1, 1998 through June 30, 1999 for application to capitation rates effective January 1, 2000. This schedule, combined with prospective risk adjustment regression factors, will result in capitation rates that lag behind the theoretical prediction period. For example, for a person hospitalized on July 1, 1998, the regression factors predict that person's cost for the year beginning July 1, 1999. However, the capitation rates using these regression factors will not be paid until January 1, 2000. This lag between the data reporting and application, while lengthy, is significantly shorter than the lag in other systems currently used, such as the Health Insurance Plan of California or the planned

implementation by the Washington State Health Care Authority. Other systems, such as Business Health Care Action Group in Minneapolis, use more frequent quarterly updates.

Another timing issue concerns the determination of year 2000 benefits. The proposed timing of risk adjustment causes some serious problems for Medicare+Choice health plans. By March 1, 1999, these carriers will only know the preliminary estimated risk scores, calculated on a market wide average basis. However, the health plans must also commit to the year 2000 premium rates and benefits by May 1, 1999 when they file the Adjusted Community Rate (ACR) proposal. Health plans can not make such commitments with any degree of certainty while their income in the year 2000 is so uncertain. As a result, carriers may take various measures to limit this risk, including reducing benefits or even leaving the program altogether.

The Work Group suggests that HCFA consider addressing this timing by giving each health plan their own member-level risk scores by March 1, 1999 or earlier, or by allowing health plans to submit rate and benefit revisions after May 1, 1999. HCFA may also consider limiting the amount by which the risk adjustment factor will be used to calculate the reimbursements.

The Work Group recognizes that some of the timing issues are based on legislative requirements set out in the BBA. To the extent that any of the changes suggested by the Work Group in this report require legislative action, HCFA may want to work with Congress to modify the existing law.

B. Recalibration of the PIP-DCG Model

As discussed, HCFA intends to start using additional data in its risk adjustment methodology within the next few years. Therefore, risk adjustments are likely to be based upon updated and more comprehensive data in the near future. However, the proposed time frame for establishing a more comprehensive risk adjustment system may be aggressive. If the PIP-DCG system is used going forward, re-measurement and recalibration of the current PIP-DCG weights should be considered.

The Balanced Budget Act of 1997 enacted several changes in provider payments. These changes are effective at different points in time, but all are effective starting after 1997. Therefore, the relative values of the diagnostic cost groupings based upon future claims will most likely differ from measurements based upon 1995 and 1996 Medicare payment rates. For example, on the fee-for service side, BBA increases payments to primary care physicians and decreases payments to surgeons. Payments to hospitals are being reduced: fiscal year 1998 hospital reimbursements are frozen at 1998 levels and capital and disproportionate share reimbursements are being reduced. Capitation payments to Medicare+Choice plans will exclude graduate medical education costs in the future; however, the direct medical education expense component of these costs are included in the claims data used to develop the risk assessment model. As previously discussed, any distortion that results from including DME may be small.

C. Examination of the Re-Scaling Factor

It is the Work Group's understanding that one of the key factors in the implementation of the PIP-DCG model is the re-scaling factor. This factor is necessary to assure that average payments for the FFS population in a county remain the same, whether the current AAPCC methods or the new PIP-DCG model is used. In other words, risk scores of health plans must be synchronized with a new measure of the average risk of Fee For Service Medicare beneficiaries in a county.

Although the re-scaling factor is not a direct part of the PIP-DCG method (re-scaling would be required with any new method), the Academy cannot determine the effects of the PIP-DCG method on health plans without understanding its implications - which means understanding how the re-scaling factor works. It is likely that health plans will feel it important that the details be disclosed prior to final implementation of the new risk adjustment methodology, so that they can fully assess the impact of the new risk adjustment system.

The credibility of the factors used in small enrollment counties and in counties with relatively few remaining fee-for-service enrollees should be considered. Since this factor is critical in the operation of any formula, it is important to understand exactly what the effect is in small counties, how sensitive the factor is to changes in base years, and what techniques HCFA will use to increase credibility or to minimize the effects of statistical fluctuations. For example, the number of Medicaid recipients in a small county may vary dramatically from year to year, especially with changes in the economy.

HCFA provided the Work Group with a general outline of how the rescaling process will work. We understand that HCFA plans to compute average risk scores for each county using three years of FFS data (1994, 1995 and 1996). However, a single year (1996) will be used in all but the smallest counties to create a restandardized rate book for determining the risk adjusted payments beginning in 2000.

The Work Group cannot adequately estimate the impact of the health status risk adjustment formula on health plans without more detailed information about the method, the calculation and the data underlying the calculations. The Work Group was unable to fully analyze the mathematical formula used to produce the rate book or how the formula would operate with the data collected from health plans. The Work Group suggests that HCFA continue to review the rescaling process and determine its overall impact on the risk adjustment payment system.

D. Phase-In of the Risk Adjustment Methodology

HCFA has indicated it will phase-in the new risk adjustment payment system rather than make the changes all at once. It is anticipated the new payment amounts based on the health status risk scores will be blended in some fashion with payments calculated under the current system. The shift to the new methodology will be made in incremental steps over the next few years.

The Work Group believes this decision to phase-in the risk adjustment methodology will help avoid significant market disruption that might otherwise occur. The potential impact on health plans from the risk adjustment formula could be significant and both HCFA and the plans need time to fully understand the changes. This phase-in approach will also provide HCFA with the opportunity to adequately test the accuracy of data collected from plans and to verify the underlying assumptions used to develop the risk adjustment formula.

VII. Recommendations

A. Sensitivity Testing

Health Economics Research performed a number of tests on the PIP-DCG risk adjuster methodology to determine how well it predicts total expected medical costs. The recommendations made by HER regarding several key components of the model such as the use of inpatient data only, exclusion of one-day stays and the number of PIP-DCG groups to be used, appear to be reasonable based on the FFS data which was reviewed. While Health Economics Research has discussed potential bias against managed care organizations that deliver care more efficiently than fee for service providers, HER did not have managed care data to determine what, if any, bias exists.

HCFA has completed some preliminary testing of the potential impact of the new risk adjustment methodology on Medicare+Choice plans, including managed care organizations. The Work Group believes HCFA should update these tests as additional data is available from plans and the agency and health plans gain more experience with the operation of the risk adjustment mechanism.

The Work Group recommends that HCFA consider the following testing protocols to allow a more thorough analysis of its health status risk adjustor methodology:

Tests Using Managed Care Data

1. Continue to test the impact of the risk adjustment methodology on managed care organization revenue. Managed care organizations could experience significant decreases in revenue due to the implementation of the risk adjustment methodology. The results of the tests should be compared among managed care plans with several different characteristics:
 - a. Medicare enrollment (large, medium or small).
 - b. Total enrollment (large, medium or small).
 - c. Urban versus rural service areas.
 - d. Level of county payment rates (low, medium or high).

2. Test the impact of coding practices.
 - a. Start with a given set of inpatient charts.
 - b. Code once, within legally allowable parameters, with the goal of producing the most revenue under the risk adjustment methodology.
 - c. Code again, within legally allowable parameters, with the goal of producing least revenue under the risk adjustment methodology.
 - d. Compare the results from (b) and (c). Significant differences indicate that the method is subject to gaming.
3. HCFA's data testing needs to address the scenario in which a member enrolls in a new Medicare+Choice plan and the data from the enrollee's previous Medicare+Choice plan was inadequate.
4. Test the sensitivity of re-scaling to choice of underlying data.
 - a. For a sample of counties, perform the re-scaling process calculations with one and more than one year of data.
 - b. Test the sensitivity of re-scaling factors to the quality of Medicaid and institutionalized status fields.
5. Test the sensitivity of working aged adjustments. As the actual development and methodology for the working aged adjustments have not yet been finalized by HCFA, suggestions here are premature.

Tests on FFS Data

1. Test the calculation of PIP scores for small counties using one year and multiple years of FFS data.
2. Review the calculation of PIP scores across similar small counties.
3. Test PIP scores on counties with very large HMO market penetration.

Tests on Risk Assessment Formulas

1. Test variations due to differing combinations of statuses, when combining together the aged and disabled factors.
2. Test variations in the FFS demographic scores using multiple years of institutionalized or Medicaid status information by county.

B. Cost-Benefit Analysis

Consideration should be given to producing a cost-benefit analysis of the PIP-DCG methodology and any subsequent modifications. The proposed system is relatively new and it is likely that there will be difficulties in implementation. It would be very helpful to establish more accurate estimates of the cost of implementing the PIP-DCG methodology and any modifications (such as using ambulatory data) and to determine the benefits to be derived from these systems before final decisions as to implementation are made. The analysis should specifically include the costs incurred by health plans due to changes to the system. To the extent there are significant additional expenses placed on plans, they may choose to drop out of the Medicare system rather than enter into new contracts or continue existing contracts using the new risk adjustment methodology.

C. Actuarial Oversight

HCFA apparently plans to conduct additional analysis of the impact of the PIP-DCG methodology on managed care plans. It is unclear what form that impact analysis will take. In addition, there is a need for continuing monitoring and testing of the system and future modifications. The Academy suggests that additional actuarial review be included as the system and subsequent changes are implemented.

D. Improving The Current Structure

Even if the use of ambulatory diagnoses is not considered as a future enhancement, the current system is cumbersome and could be improved in terms of simplicity, accuracy and predictability.

Simplicity - The current system uses rate books which are based on calculations that have been subject to various minimums, both in absolute amounts and in relative growth, and the rate book system is both cumbersome and inaccurate. One possible change to simplify the system would be to calculate directly the rate book amount for each geographic location to a value which represents the local cost for an individual with a demographic factor of 1 and a health risk assessment factor of 1.

Accuracy - The current system intends to use the 1997 local rate book values as the basis for future years' amounts. Increases to the factors are based on national increases and predetermined legislative minimums. One possible change to improve the accuracy would be to recalculate updates on an annual basis, using local data regarding cost, demographics and risk.

Predictability - The current system recalculates values annually using one full year's worth of data. One possible change to improve predictability would be to calculate amounts quarterly on either a year-to-date or a twelve-months-rolling basis, which would allow health plans to predict what future reimbursement levels will eventually result.

E. Timing of HCFA's Initial Testing and Analysis

The Work Group believes that testing should be done to assess the potential impact of risk adjustment in the market place. These concerns relate both to the potential changes created in the marketplace and to the delivery of care to beneficiaries participating in the Medicare+Choice program.

The introduction of the proposed PIP-DCG risk adjustment mechanism into the Medicare program creates increased uncertainty and risk to Medicare+Choice plans. Testing and analysis is the only way to reduce this risk and uncertainty.

HCFA has completed significant testing based on fee-for-service data. The Work Group believes that further testing must be done if the uncertainty to health plans is to be alleviated. The testing should include two components. First is the sensitivity of the formula to changes in key assumptions. Second is determining the impact of the proposal on managed care organizations. Changes in revenue should be examined to ascertain if large dislocations will occur, which may result in unfortunate consequences to beneficiaries. A reasonable test of the proposal is whether or not a majority of health plans receive sufficient income to cover costs on an ongoing basis, without reducing benefits dramatically

Another concern is the quality and timeliness of hospital encounter data submitted by health plans, which might also be part of the testing process. The Work Group urges HCFA to complete its planned data testing, and to include a comparison of the number of submitted claims with an external standard for the expected number. Risk adjustment will be inaccurate if claims are either held back or denied due to edits, or get caught in a data processing bottleneck.

In order to understand the value of detailed testing when a risk adjustment mechanism is significantly changed, it would be instructive to select recent historical examples of significant change to the risk adjustment mechanisms in current use. The following examples come to mind:

- The use of risk adjustment in the Health Insurance Plan of California (HIPC); and
- The use of risk adjustment in managed Medicaid programs (e.g., Maryland and Oregon).

In planning for a significant change to a current risk adjustment mechanism, actuarial soundness could be analysed in a prospective manner through sufficient testing or in a retrospective manner through an actuarial oversight function (such as through a committee or an independent evaluation).

In the example of the Health Insurance Plan of California (HIPC), a one year simulation was conducted prior to the actual start of the program. The HIPC is an inpatient only model, similar to the initial proposed HCFA (PIP-DCG) approach.

In the Oregon Medicaid program, two methods were tested; the Disability Payment System and the HIPC inpatient only model. Score variations were reviewed and a method of credibility was introduced through the use of corridors on final risk adjustment scores.

In the Maryland Medicaid program, carve-outs for behavioral health, maternity, AIDS and “rare and expensive conditions” are used. Stop-loss insurance is also provided. In addition, an article describing the process in the October 1998 *Journal of Ambulatory Care Management* noted that, “it will also be important to support adequate quantitative and qualitative evaluation including assessments of the actual accuracy of the payment system and its impact on patients and providers.”

In each of the examples mentioned above, there was either extensive detailed initial testing or a follow-on actuarial oversight function (actual or implied). In several other states, implementation of a risk adjustment system without testing led to problems which required changes in the methodology.

VIII. Conclusion

A. Comparison of the PIP-DCG Method With Other Models

It is the Academy’s understanding of the BBA provision that HCFA is mandated to use some form of health status based payment method starting in the year 2000. HCFA’s current intention to implement the PIP-DCG model leads naturally to questions regarding the choice of the PIP-DCG model versus other available payment models.

The following are the Work Group’s comments about various other types of risk adjustment models in the context of HCFA’s choice of the PIP-DCG method. We recognize that there is a substantial body of research regarding various risk adjuster models and that we are providing only an actuarial perspective.

What types of models satisfy the BBA requirements?

Based on our experience, there appear to be at least three main classes of models that meet the BBA requirement for health status-based payment. These are:

- Diagnostic-based models with data gained from administrative sources (typically from claim records or encounter data files);
- Diagnostic information from clinical records, such as medical charts; and
- Survey-based health status information.

A great deal of research has been completed recently in the diagnostic/administrative class of models. PIP-DCGs fall into this category, as well as the other versions of DCGs, Ambulatory

Care Groups, the Disability Payment System, the Global Risk Adjustment Method and several others. It is our understanding that any of these methods would likely satisfy the BBA requirement and most of the models have approximately the same degree of predictive power on a prospective basis.

All of these data-intensive methods assume that reliable data from health plans will be available at little marginal cost. While the diagnostic data needed to produce risk assessment results will have many uses, gathering and transmitting that data in a fully operational implementation will likely prove to be challenging. Part of the challenge is just the management, transmission and audit of the data. A related issue is the need for some health plans to revise significantly their contracts, particularly if they are globally capitating providers for both professional and institutional services, without obtaining the requisite data under current contract terms.

A few researchers have explored the use of more detailed clinical risk adjustment models in a limited setting. While most clinicians would be likely to offer more support for this class of methods, the data-gathering cost is prohibitive. At this point in time, it is our experience as actuaries that clinical information from sources such as medical records and patient charts is nearly impossible to gather, except in the most manpower-intensive manner through actual chart audits, etc. As a result, models in this category are of great theoretical interest but of little practical help for the Medicare+Choice program.

Survey-based models have also been extensively researched. Many researchers report that surveys with sufficient response rates provide predictive power that is in the same range as the diagnostic/administrative class. The experience with self-reported surveys (e.g., the RAND SF-36) indicate that the health status information gathered by surveys is dependable and provides a good base for predicting future costs. There are, however, major drawbacks to use of surveys, particularly with the elderly. These drawbacks include:

- High cost of administering the survey;
- Possible low response rates;
- Likely difficulties that the elderly would have completing the survey by themselves;
- Possibility of gaming of survey results when payment is dependent on survey answers; and
- Concerns about privacy of health information.

Because it appears that HCFA wants to obtain health-related data on every Medicare-eligible person, surveys don't appear practical, since response rates will never be 100% (except in special cases, like the SHMO and PACE demonstrations). In addition, the cost of obtaining the data is known to be significant.

As a result, the only practical class of health-based risk adjusters, at this time, would appear to be the diagnostic/administrative models.

What models are appropriate alternatives to the PIP-DCG model?

Many observers recognize that using only inpatient data in the PIP-DCG risk adjustment model may result in a bias toward the FFS system. The potential problems with using inpatient data and limiting DCGs to hospital stays over one day have been discussed earlier in this report. As discussed, HCFA's PIP-DCG model uses only inpatient data. A number of the other risk adjustment systems that the Work Group is familiar with use either both ambulatory and inpatient data or ambulatory data only. We also note that new methods are constantly emerging, such as research into the use of prescription drug data.

From various research (including that funded by HCFA), "comprehensive data models" (i.e., those that use inpatient and ambulatory data) have superior predictive power to inpatient-only methods. The Hierarchical Condition Categories model as well as various ambulatory cost group models perform at an R-squared value of around 0.09 versus the approximately 0.06 performance of the PIP-DCG model.¹¹

If feasible, a model which uses ambulatory and inpatient data is preferable. However, there are very significant current barriers to implementation of a full data model within Medicare, including:

- HCFA initially collected inpatient data and does not plan to collect ambulatory data from plans until at least October 1, 1999;
- As discussed earlier, many Medicare health plans do not capture ambulatory data for a variety of reasons. Most plans delegate data collection to their medical providers and ambulatory data is either not collected, is available only in very crude form, or is significantly under reported; and
- While there is standardization for the collection of inpatient data by hospitals, there is a great deal of variability in the coding of ambulatory claims. Even if data could be readily gathered from physician organizations, there may be considerable "noise" in the data due to the different coding practices used by medical providers.

As a result of HCFA's actions and the current state of ambulatory data available from physician organizations which contract with health plans, we believe that the PIP-DCG method is the only choice (by default) from the diagnosis/administrative class of models.

Are there other alternative payment models which may not satisfy the BBA provisions but would be an improvement over the current Medicare reimbursement system?

¹¹ See: "Risk Adjustment For The Medicare Program," Greenwald, et al., pp. 10-12.

Although the BBA requires a health status based method, other methods which require less intensive methods may provide improvements over the current system. To the extent that HCFA has any experience or research involving other possible alternatives, we suggest HCFA discuss its findings with the appropriate legislative representatives and staff.

For example, it may be possible to create an “enhanced demographic model” which uses more readily available information, rather than health-status-based data. Enhancements could include a payment adjustment for new entrants into health plans (although it should be based on actual health plan experience, not on prior Medicare FFS claims) or modifying payment for health plan members who die in a payment year. Again, there are other issues that arise with these suggestions (such as possible perverse incentives which may appear to pay more to health plans which have more deaths). However, we believe that HCFA should consider all alternatives to improve the current AAPCC system, rather than be limited to only a narrow class of payment models.

Is there sufficient improvement in payment through the PIP-DCG model (or other health status based model) to justify the change from the current system?

Based on the preliminary report from the Health Economics Research firm, we understand the rationale which is the foundation of the PIP-DCG model. We have requested information from HCFA which would illustrate the changes in payment which would occur in a variety of circumstances. We were told any testing could not be completed until data from health plans was collected and processed, which has not yet occurred.

While this response is understandable, it fails to recognize that the health plans themselves will be required to submit Adjusted Community Rate “bids” to HCFA by May 1, 1999, shortly after the projected March 1, 1999 date when they receive information. Two months is not sufficient time reasonably to analyze such data and prepare corresponding bids. We therefore suggest that HCFA consider speeding up the testing and disclosure process, or that it delay implementation until the results are known to HCFA itself and other stakeholders (health plans, policy makers, beneficiaries and taxpayers).

At this point, the Academy cannot comment fully on the effectiveness of the PIP-DCG payment mechanism. There appears to be potential for the perception of significant problems by health plans, which can only be remedied by further information.

B. How Well Does the PIP-DCG Method Satisfy Risk Adjustment Goals?

The goals of risk adjustment are identified by the American Academy of Actuaries’ Health Risk Adjustment Monograph and were previously outlined in Section III of this report. In addition, risk adjustment systems ought to be easily administered and should not provide perverse incentives to health plans or providers. The PIP-DCG methodology developed by HCFA can be analyzed in relation to those criteria as follows:

Reducing the Effects of Risk Selection

Risk selection is a process used to enroll larger numbers of relatively low cost individuals and fewer relatively high cost individuals. High cost individuals are avoided because their cost may exceed premiums, while healthy individuals are sought because their costs will be less than the average.

Without risk adjusters, health plan revenue is based on average costs. To reduce the effects of risk selection, the health risk assessment mechanism must estimate the cost of the individual and adjust the health plan's compensation to at least partially reflect the expected difference in cost due to health status. If the additional compensation for high cost individuals is not high enough, a plan will lose money on the high cost individual and will still have an incentive to avoid covering him or her. If additional compensation is too high, the health plan will be overpaid for the risk and may seek out such individuals for whom payment exceeds future costs.

The PIP-DCG mechanism uses hospitalizations in a year to predict an individual's cost in the following year. Thus, incentives are created for health plans to identify individuals for which they will receive PIP-DCG based payments lower than expected costs and, in turn, avoid enrolling them. In particular, the proposed PIP-DCG risk adjustment mechanism will create incentives for health plans to avoid enrolling Medicare beneficiaries with:

- Chronic medical conditions, but no inpatient admissions in the previous year that would result in increased payments under the PIP-DCG mechanism;
- High cost admissions in the previous year that do not trigger increased payments under the PIP-DCG mechanism, but where significant follow-up health care costs are expected; or
- Medical conditions which are more likely than average to cause high costs from end-of-life hospitalizations, but no increase in payments under the PIP-DCG mechanism should the Medicare beneficiary die before the following year (this is an unavoidable consequence of a prospective system based on inpatient data).

Despite these concerns, we note that incentives exist in the present reimbursement mechanism to avoid enrolling any unhealthy Medicare beneficiaries (whose expected costs are greater than payments). While the PIP-DCG methodology will include some undesirable incentives for health plans, it does reduce some of the incentives that exist under the current payment mechanism.

The use of demographic-only factors for adjustment of new participants may allow for some incentive to select. However, since these individuals are typically healthier and since health plans know that a member may stay with them for life, the one year lack of adjustment is likely a relatively minor incentive.

Adjustments based on last year's hospital diagnoses may result in some mismatch between health care cost and health plan compensation. The additional premium received through a prospective risk adjustment system is not for the high cost of the initial hospitalization, but rather is for the anticipated higher cost in the following year. In non-chronic cases or in cases where most of the cost is associated with the initial high-cost hospitalization, the future premium will not be adjusted for most of the high cost. In end-of-life hospitalizations, no insurer will receive the increased premium in the subsequent year. These mismatches may result in some continued incentive for selection.

Compensating Health Plans Fairly and Equitably for the Risks That They Assume

Fair and equitable compensation implies that the actual average health care cost is within a predictable range of the anticipated average health care cost. If a plan experiences average health care costs within this range for each age-gender, institutional, ever-disabled, Medicaid risk category, it is fairly compensated. If a higher or lower than average number of high-cost individuals are enrolled (due to risk maldistribution), the plan will not be fairly compensated unless the PIP-DCG adjustment accurately adjusts for the discrepancy. The Work Group has specific concerns about the treatment of short hospital stays, the accuracy of the Medicaid status indicator and the accuracy of the working aged status information.

If a health plan enrolls an unusually high number of individuals in a category with high cost hospitalizations, it may not be fairly compensated for the additional risk, since there is no additional premium adjustment in the year of hospitalization. However, the plan will be compensated in the year after hospitalization for projected ongoing costs.

For an individual the PIP-DCG accounts for 6% of the following year cost variability on an individual basis, which may not be sufficient to compensate for the additional cost due to potential selection abnormalities. For non-random groups of health plan enrollees, however, the PIP-DCG method represents a significant improvement to age and gender based payments. Predictive ratios for non-random groups are much closer to 1.0, meaning that the amount of over or underpayment is much reduced.¹²

Maintaining Consumer Choice

One of the goals of the Medicare+Choice program is to increase the choice given to seniors for their Medicare coverage. The health status risk adjusters may encourage health plans to offer more choices, without the fear of being selected against if they offer programs that may attract less healthy individuals. To the extent health status risk adjusters compensated plans fairly, this may result in more choices for seniors.

It should be noted, however, that carrier participation is very sensitive to the level of funding. For example, last year over 40 Medicare+Choice health plans either withdrew entirely from the

¹² See: "Risk Adjustment For The Medicare Program," Greenwald, *et al.*, pp. 10-12.

Medicare market or reduced service. These withdrawals impacted 440,000 beneficiaries who were forced to switch to another Medicare+Choice plan or a traditional FFS Medicare program.¹³ A reduction in Medicare+Choice funding might also harm consumer choices by forcing a reduction in benefits. Without HCFA's risk adjustment method being more fully defined and tested, neither HCFA nor the Work Group can predict the impact of risk adjustment on consumer choice.

Protecting the Financial Soundness of the Health Care System

Financial soundness is maintained when costs do not consistently exceed income. Health plan costs primarily consist of health care expenses and administrative expenses. The proposed PIP-DCG methodology does not have a direct impact on administrative efficiency or costs, which in a poorly run health plan can threaten the financial soundness of the organization. Health status risk adjusters will help match the financial risk of a plan's health care expenses with income and thus could improve the financial soundness of the health care system.

Without additional testing, it is difficult to determine the effect of implementing the risk adjustment method on the current Medicare program. Since payment adjustments are not made in the year of initial hospitalization, there will be a lag in increasing plan premiums that could impact a small or financially challenged health plan.

In addition, many observers feel there is a positive impact or "spillover effect" on the health costs incurred by fee-for-service plans in those markets with a high degree of penetration by managed care plans. This effect is believed to result from the improved operational efficiencies of medical providers in their managed care contracts which are then transferred to their FFS patients. It is possible that if fewer Medicare+Choice plans are in the market, then there will be less of this "spillover" on Medicare fee-for-service plans.

Administrative Feasibility

Many other programs such as state small group reform programs have had barriers to using a PIP-DCG mechanism because of the lack of data and administrative difficulties. This may be less of a barrier to Medicare due to the central nature of the program that allows for data on individuals to be consolidated, even if beneficiaries change plans. The program's success will depend on the accuracy and completeness of the data provided across all plans. Medicare performs extensive auditing of information on payers that increases the quality of payer data. Medicare risk programs have not had as detailed reporting requirements and will have to provide data to a centralized organization so that each individual can be classified using their hospitalization diagnosis data. The advantage of the PIP-DCG mechanism is that the information needed is part of the standardized hospital record and, therefore, generally available.

¹³ "Quick-Fix Push May Derail Long-Term Medicare Plan," Wall Street Journal, January 5, 1999.

Resistance to Gaming Behavior by Insurers and Minimizing Perverse Health Plan or Provider Incentives

When reimbursement is based on claim coding, there is always a chance of “gaming” behavior through “upcoding.” When there is discretion concerning the diagnosis used on an admission, the code with the higher reimbursement may be likely to be selected in order to increase the reimbursement. The PIP-DCG methodology would be less susceptible to upcoding because hospital reimbursement is not directly impacted by the risk assessment score derived from the coding and the insurer is usually removed from the actual coding. This statement is less true when the provider essentially “is” the plan, such as in the case of a provider-sponsored organization or a staff-model HMO.

Since future health plan capitation is increased when there is a qualifying hospitalization, there will be an incentive to hospitalize patients rather than use outpatient settings. Once a patient has been hospitalized during a year there is no further incentive to hospitalize or to over-utilize services, since there is no further increase in future premiums.

One-day admissions were not included in the original study. If this component is chosen as a permanent part of the method and plans understand that if they routinely keep patients more than one day for a given diagnosis, this admission will be scored as part of the PIP-DCG payment methodology, there will be an incentive to increase some stays.

C. Meeting the Needs of the Medicare System

As noted in this report, the proposed risk adjustment methodology may tend to penalize health plans which efficiently manage the delivery of health care because of the use of inpatient data and the design of the DxGroups which make up the formula. As a result, HCFA probably wants to take steps to minimize this bias wherever practical, assuming the bias does not have a public policy basis. The Work Group recommends the implementation of a risk adjustment system based on more comprehensive data as soon as administratively feasible. The Work Group recognizes the critical limits on the current collection of Medicare data and strongly recommends that HCFA test both any new risk adjustment methods and the ability to collect comprehensive data prior to implementation. This testing should include an independent verification of mathematical calculations which make up the risk adjustment formula.

The Work Group also suggests that HCFA periodically audit the quality of data it is using to develop risk scores, and conduct tests to verify the accuracy of the assumptions which underlay the risk adjustment methodology, as the program operates over the next several years. It is important for HCFA to develop a mechanism which allows the agency to continually monitor how well the proposed methodology is meeting the provisions of BBA as well as the goals of a risk adjustment system as discussed in this report.

The Work Group acknowledges the time and effort that HCFA and its contractors have expended in preparing to implement health status-based risk adjustment for the Medicare+Choice program.

The PIP-DCG risk adjustment method is a practical interim step towards better payment to Medicare+Choice contractors and is an improvement over the current demographic factor-based payment method (i.e., the AAPCC methodology), if implemented cautiously.

In addition, the PIP-DCG method appears to represent the only practical health status risk adjustment alternative available for implementation on January 1, 2000 as required by the Balanced Budget Act. The Work Group believes that more sophisticated payments methods are a step in the right direction to successful implementation of Medicare+Choice and its goal of better managing Medicare expenditures and providing choice for Medicare beneficiaries.