Medicare Advantage Risk Adjustment and Risk Adjustment Data Validation Audits

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January 4, 2012

CRS Report for Congress ———
Prepared for Members and Committees of Congress

Summary

According to the American Academy of Actuaries, "[h]ealth risk adjustment is the process of adjusting payments to organizations (usually health insurance plans) based on differences in the risk characteristics of people enrolled in each plan." By adjusting payments to compensate organizations for the relatively higher medical costs associated with an ill individual, plans should, all other things being equal, be indifferent between enrolling the sicker person or the relatively healthier one.

Medicare Advantage (MA) is an alternative way for Medicare beneficiaries to receive covered benefits. Under MA, private health plans are paid a per-person amount to provide all Medicare-covered benefits (except hospice) to beneficiaries who enroll in their plan. The Centers for Medicare & Medicaid Services (CMS) risk adjusts the payments to MA plans. The size of the adjustment depends on the demographic and health history of each plan enrollee. The payment adjustment takes into account the severity of a beneficiary's illness, the accumulated effect of multiple diseases, as well as interactive effects—instances where having two or more specified diseases or characteristics result in expected health care expenditures that are larger than the simple sum of the effects. The payments are not adjusted for short-term illnesses because they are assumed to be poor predictors of future health spending.

MA plans provide information to CMS to justify the risk-adjusted payments; CMS therefore audits the plans to ensure that the risk-adjusted payments that the plans are claiming are in fact supported by the medical record. Based on the audit findings, plans may have to pay back money when the medical record does not provide evidence for the risk-adjusted payment they had received. Alternatively, the audit may reveal additional illnesses that had not previously been taken into account. Previously, MA plans were only required to pay back money (or receive money) based on the findings from the audited enrollee records. CMS has proposed extrapolating the audit findings to apply to all enrollees in the audited plan.

Some concerns have been raised about risk adjustment under Medicare Advantage and the MA plan audits. First, risk adjustment compensates plans for the average predicted cost of any particular diagnosis. To the extent that MA plans could enroll beneficiaries with below-average expenditures relative to the average for their disease, those plans would be over-compensated by risk adjustment. Second, according to the American Academy of Actuaries, the Medicare fee-for-service data used in the MA risk adjustment model were not audited for accuracy and may contain errors. The audits under MA, however, would apply the risk adjustment factors to data that were validated. The inconsistency of using audited data in one circumstance and non-audited data in another, and CMS's proposed method of extrapolating audit findings to apply to not just audited cases but to the entire plan, could create uncertainty and possibly create systematic underpayments to plans. Third, some plans have expressed concern that recoveries from the audits may place them at substantial financial risk.

This report describes how CMS pays providers under Medicare Advantage and how these payments are risk adjusted. In addition, it describes how risk scores for individual Medicare Advantage enrollees are initially generated and change over time, and it discusses how CMS audits risk-adjusted MA payments. It concludes with a short discussion of several concerns raised with risk adjustment and the audit process.

Contents

Figures

Tables

Appendixes

Contacts

Risk Adjustment Generally

"Risk adjustment is the process of adjusting payments to organizations (usually health insurance plans) based on differences in the risk characteristics of people enrolled in each plan."[1] In the simplest case, assume that on average the costs of providing a package of health care benefits to women are $100 more than the cost of providing the same set of benefits to men. In this hypothetical situation, if a payer, such as Medicare, paid the same amount to insurers for covering both men and women, insurers would have a strong financial incentive to enroll men and avoid enrolling women. One mechanism for *leveling the playing field*, could be to *risk adjust* the payment to insurers by paying them $100 more for women than for men. Conversely, a risk-adjusted payment for men would be $100 less than that for women to reflect their relatively lower level of expected health expenditures. In either of these situations, all other things being the same, insurers should be indifferent between enrolling men or women into their plan.

Health care costs vary by more than just gender, and sophisticated risk adjustment models are designed to take into account additional factors that can include age, geography, health status, tobacco use, family size, and other factors. But even the most sophisticated risk adjustment models do not explain a substantial proportion of the differences in expected health care spending.

Immediately below, this report describes how the Centers for Medicare & Medicaid Services (CMS) pays private health plans under Medicare Advantage (MA or Medicare Part C) and how these payments are risk adjusted. Subsequent sections describe how risk scores for MA enrollees are initially generated and change over time. The report concludes with a discussion of how CMS audits risk-adjusted MA payments and some potential issues associated with risk adjustment and the audits.[2]

How CMS Pays Plans Under Medicare Advantage

Medicare Advantage provides private plan options, such as managed care, for Medicare beneficiaries who are enrolled in both Medicare Parts A and B.[3] By contract with CMS, a health plan agrees to provide all required Medicare benefits (except hospice) to a group of Medicare beneficiaries enrolled in the plan in return for a capitated monthly payment adjusted for the demographics and health status of the beneficiaries who actually enroll in the plan.[4] The same

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[1] American Academy of Actuaries, *Issue Brief, Risk Assessment and Risk Adjustment*, Washington, DC, May 2010, http://www.actuary.org/pdf/health/Risk_Adjustment_Issue_Brief_Final_5-26-10.pdf. One can also risk adjust in other contexts. For instance, one might want to risk adjust quality measures if one has evidence to suggest that patient responses to quality surveys or measured patient outcomes are affected by the patient's health status or demographics. Section 3007 of ACA, "Value-Based Payment Modifier Under the Physician Fee Schedule", provides "The Secretary shall establish appropriate measures of the quality of care furnished by a physician or group of physicians to individuals enrolled under this part, such as measures that reflect health outcomes. Such measures shall be risk adjusted as determined appropriate by the Secretary." This report does not address risk adjustment of quality measures.

[2] While this report focuses on risk adjustment in Medicare Advantage, the Patient Protection and Affordable Care Act (ACA, P.L. 111-148, as amended) incorporates risk adjustment into the payment of insurance companies in the Health Insurance Exchanges.

[3] For a general description of the Medicare program, see CRS Report R40425, *Medicare Primer*.

[4] Prior to 2000, the risk adjustment of Medicare private plan payments was based only on demographic data. Risk adjustment under Part C evolved over time to include health status data collected from a variety of health care settings. (continued...)

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monthly payment is made regardless of how many or few services a beneficiary actually uses. The plan is at-risk if costs, in the aggregate, exceed program payments; conversely, the plan can retain savings if costs are less than payments. Payments to MA plans are based on a comparison of each plan's estimated cost of providing Medicare covered benefits (a bid) relative to the maximum amount the federal government will pay for providing those benefits in the plan's service area (a benchmark).

Bids reflect each plan's estimate of how much it requires to cover an average, or standard, beneficiary. "The bid includes plan administrative costs and profit. CMS also sets a benchmark, or bidding target, and if a plan's standard bid is above the benchmark, the plan receives a base rate equal to the benchmark; if the plan's bid is below the benchmark, the plan receives a base rate equal to its bid."[5] In addition, CMS adjusts the payment to private plans, in part, on the characteristics of the Medicare beneficiaries actually enrolled in each plan. For instance, a plan may, on average, enroll healthier or sicker Medicare beneficiaries than the average or standard beneficiary. Part of CMS's payment to plans, as described below, reflects the age, gender, and other characteristics of plan enrollees.

Risk Adjustment Under Medicare Advantage

The current MA risk adjustment methodology relies on demographic, health history, and other factors to adjust payments to plans.[6] These factors are identified in a base year, and used to adjust payments to plans in the following year. In other words, since MA payments are based on a prospective payment system, CMS is attempting to estimate next year's health care expenditures as a function of beneficiary demographic, health, and other factors identifiable in the current year. This section describes how CMS determines the risk adjustment to be applied to MA plan payments.

(...continued)

Appendix A provides a brief description of the history of risk adjustment under Medicare Advantage, and Medicare+Choice—the predecessor to the MA program. **Appendix A** summarizes the degree to which each model is able to explain differences in beneficiary expenditures.

[5] MedPAC, *Medicare Advantage Program Payment System: Payment Basics*, October 2008, http://www.medpac.gov/documents/MedPAC_Payment_Basics_08_MA.pdf. Plans that bid below the benchmark also receive a percentage of the difference between the bid and the benchmark which they must use to provide some combination of (1) extra benefits not covered under Medicare, (2) reduced cost sharing, or (3) reduced Part B or D premiums. For more information, see also CRS Report R41196, *Medicare Provisions in the Patient Protection and Affordable Care Act (PPACA): Summary and Timeline*.

[6] While there are different models for Medicare subpopulations such as the disabled, those with end-stage renal disease, the institutionalized, dual-eligibles (individuals eligible for both Medicare and Medicaid), and new Medicare enrollees, this report primarily focuses on the non-institutionalized, non-disabled, non-ESRD Medicare beneficiaries. Also, it is important to note that risk adjustment may not account for all of the differences in health expenditures. As discussed in **Appendix A**, the current risk adjustment model explains an estimated 11% of the differences in Medicare beneficiary health care spending—while this is not a large percentage of the variance, this alone is an inadequate reason to dismiss the methodology.

Incorporating Demographic and Other Non-health Factors into Payments

It is well established that health care expenditures vary by age (increasing with age), gender, Medicaid eligibility, and disability; incorporating these variables into payments is fairly straightforward.[7] Also taken into account is how a beneficiary *originally* became eligible for Medicare—either due to age or permanent disability. CMS has these data from administrative sources and while there can be error in these administrative data, they tend to be accurate and somewhat stable over time.[8]

Incorporating Health Status into Payments

Incorporating health status into payments is somewhat more complicated.[9] The process begins with a diagnosis using the International Classification of Disease, Ninth Revision, Clinical Modification—an ICD-9-CM code.[10] ICD-9-CM codes are used to denote signs, symptoms, injuries, diseases, and conditions. Physicians have been required by law to submit ICD-9-CM diagnosis codes for Medicare reimbursement since the passage of the Medicare Catastrophic Coverage Act of 1988. Currently, there are more than 13,000 ICD-9-CM codes.[11] The ICD-9-CM codes are first mapped into diagnostic groups and then into condition categories (see **Figure 1**). Ultimately, as discussed below, the condition categories have a hierarchy imposed on them.

Hierarchies

The codes are hierarchical such that only the most significant manifestation of a disease is coded for payment purposes. For example:

> [All] ICD-9-CM Ischemic Heart Disease codes are organized into the Coronary Artery Disease hierarchy, consisting of four CCs [condition categories] arranged in descending order of clinical severity and cost, from CC 81 *Acute Myocardial Infarction* to CC 84 *Coronary Atherosclerosis/Other Chronic Ischemic Heart Disease*. A person with an ICD-9-CM code in CC 81 is excluded from being coded in CCs 82, 83, or 84 even if codes that group into those categories were also present. Similarly, a person with ICD-9-CM codes that group into both CC 82 *Unstable Angina and Other Acute Ischemic Heart Disease* and CC 83 *Angina Pectoris/Old Myocardial Infarction* is coded for CC 82 and not CC 83.[12]

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[7] Klea D. Bertakis, Rahman Azari, and L. Jay Helms, et al., "Gender Differences in the Utilization of Health Care Services ," *The Journal of Family Practice*, vol. 49, no. 2 (July 2000).

[8] Again, as a reminder, there are different models for some subpopulations.

[9] This section draws extensively from Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International, Final Report - Prepared for the Centers for Medicare & Medicaid Services, Research Triangle Park, NC, March 2011, https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/ Evaluation_Risk_Adj_Model_2011.pdf.

[10] ICD-9-CM codes will be replaced with ICD-10 in 2013. CMS has begun preparing for the transition. An analysis of the effect of the transition on risk adjustment can be found in the impact analysis at https://www.cms.gov/ICD10/ 04_CMSImplementationPlanning.asp.

[11] Electronic access to a list of ICD-9-CM codes can be found at http://icd9cm.chrisendres.com/.

[12] Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International, Final Report - Prepared for the Centers for Medicare & Medicaid Services, Research Triangle Park, NC, March 2011, p 11.

Hierarchical coding ensures that the most costly form of the disease dictates the basis for reimbursement. While there are 189 hierarchical condition codes (HCCs), only 70 HCCs are incorporated into the current CMS model. These 70 HCC codes are chronic codes that empirically have been shown to best predict the following year's Medicare Part A and Part B expenditures. Beginning in 2012, 87 HCC codes will be incorporated into the model (see **Table B-1** for these 87 HCC codes and their relative factors).
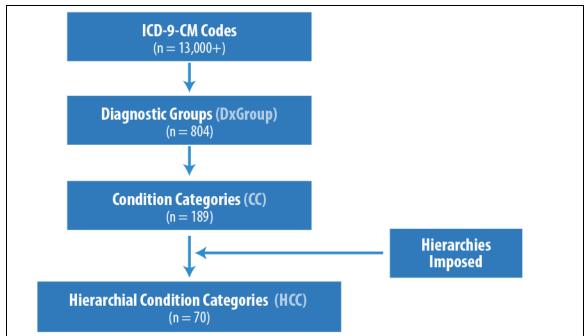
Figure 1. Aggregation of ICD-9-CM Codes into Hierarchical Condition Categories

Source: Based on Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," Health Care Financing Review, vol. 25, no. 4 (Summer 2004), pp. 119-141.

Note: ICD-9-CM is International Classification of Diseases, Ninth Revision, Clinical Modification.

Figure 2 depicts an example of how ICD-9-CM codes are converted into HCC codes. More specifically, **Figure 2** depicts the ICD-9-CM codes of a hypothetical 76-year-old female with a variety of diagnosed conditions, including acute myocardial infarction, angina pectoris, chronic bronchitis/emphysema, renal failure, chronic renal failure, chest pain, and an ankle sprain.

As can be seen in **Figure 2**, not all diagnoses result in an HCC. For instance, this woman's HCC code for acute myocardial infarction (81), near the top right of the figure, implies that she is not coded with HCC 83 even though she has also been diagnosed with some form of unspecified angina pectoris since both codes are in the same disease category and the acute myocardial infarction (HCC 81) is higher in the hierarchy. Similarly, as can be seen at the bottom of **Figure 2**, some conditions (chest pain and ankle sprain) map to one of the 189 HCCs but are excluded from the CMS model since they are not chronic. In addition, short term illnesses, even if expensive, are not captured. As noted above, these models are seeking to explain next year's expenditures and many of these conditions are either fleeting or not good predictors of future expenditures.
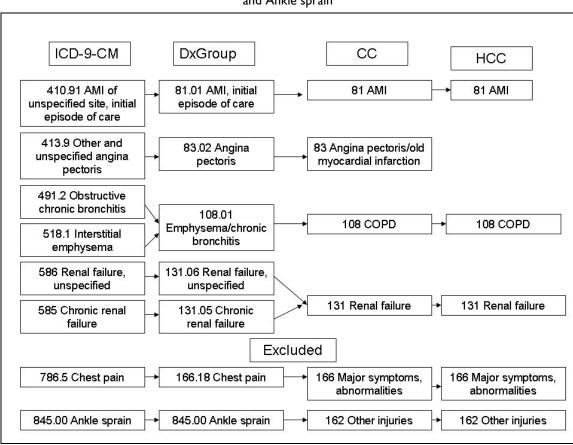
Figure 2. Process of Generating HCC Codes from ICD-9-CM Codes

Clinical Vignette of a 76-Year-Old Female with AMI, Angina Pectoris, COPD, Renal Failure, Chest Pain, and Ankle sprain

Source: Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," *Health Care Financing Review*, vol. 25, no. 4 (Summer 2004), pp. 119-41.

Notes: ICD-9-CM is International Classification of Disease, Ninth Revision, Clinical Modification. DxGroup is Diagnostic Group. CC is condition category. HCC is Hierarchical Condition Category. AMI is acute myocardial infarction. COPD is chronic obstructive pulmonary disease.

Additive Model

While only the highest code in a related disease category is used, codes across unrelated disease categories are used such that the model is additive. Therefore, using the earlier example of a 76-year-old female from **Figure 2**, **Table 1** depicts the risk factors estimated for each condition. This beneficiary's hypothetical total risk score (1.583) is the sum of the individual risk factors, taking into account the disease hierarchy. The risk score would be multiplied by the MA plan's base rate to determine the risk-adjusted base payment.[13] In this example, a monthly base rate of approximately $621.67 would result in a total estimated annual payment of $11,810, or

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[13] CMS pays for the risk adjustment of any additional plan premium charged to the beneficiary. See Medicare Payment Advisory Commission, *Medicare Advantage Program Payment System*, Payment Basics, Washington, DC, October 2011, http://www.medpac.gov/documents/MedPAC_Payment_Basics_11_MA.pdf.

[approximately $621.67 x 12 months x 1.583 risk score = $11,810 yearly risk-adjusted base payment].

Table 1. Hypothetical Example of CMS-HCC Expenditure Predictions and Risk Score

76-year-old female with AMI, Angina Pectoris, COPD, Renal Failure, Chest Pain and Ankle Sprain

Risk Marker	Incremental expenditure prediction	Relative risk factor
Female, age 75-79	$3,409	0.457
Acute myocardial infarction (AMI) (HCC 81)	$2,681	0.359
Angina pectoris (HCC 83)	$0	
Chronic obstructive pulmonary disease (COPD) (HCC 108)	$2,975	0.399
Renal failure (HCC 131)	$2,745	0.368
Chest pain (HCC 166)	$0	
Ankle sprain	$0	
Total	$11,810	1.583

Source: Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International, Final Report - Prepared for the Centers for Medicare & Medicaid Services, Research Triangle Park, NC, March 2011, https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/ Evaluation_Risk_Adj_Model_2011.pdf. p. 15.

Notes: HCC 83 has an incremental prediction but the amount is not added because HCC 81 is within the same hierarchy and is the more severe manifestation of cardiovascular disease. Chest pain and ankle sprain are excluded from the payment model. The expenditure prediction is estimated using 2005 data and is presented here purely for illustration.

Interaction Terms

Empirical study has also shown that the presence of two or more conditions sometimes can result in greater costs than just their additive effects.[14] These are referred to as interaction effects. For instance, the health care costs for an individual with both diabetes and congestive heart failure are higher than one would predict from just adding the costs of diabetes and the costs of congestive heart failure. In addition, empirical investigation has shown that there are interaction effects between certain diseases and disability such that the health care costs for an individual with a disability and diabetes are higher than one would predict from just adding the additional costs associated with being disabled to the costs of having diabetes. CMS has incorporated both types of interactions into the CMS-HCC model (see **Appendix B, Table B-1**).

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[14] Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International, Final Report - Prepared for the Centers for Medicare & Medicaid Services, Research Triangle Park, NC, March 2011, https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/ Evaluation_Risk_Adj_Model_2011.pdf. p. 12.

How CMS Estimates the Relative Risk Factors

The previous section explained how payments to MA plans are adjusted to account for the relatively higher or lower cost of enrolling Medicare beneficiaries with certain demographic characteristics or diagnoses. The size of the adjustments is determined by a mathematical model briefly described below.

The CMS-HCC model is a linear regression model with expenditures predicted by diagnoses (CMS-HCCs) and demographic variables. Variables that represent certain interactions are also included—such as the interactions between certain diseases and between certain diseases and permanent disability. The expenditure data are based on actual claims data for original Medicare Parts A and B. The CMS-HCC model has been refined over the years and the relative risk factors for each health care or demographic variable used as the basis of payment (i.e., coefficients) are periodically recalculated using more current Parts A and B claims data.[15]

The results derived from the model can be standardized such that an individual with a risk score of 1 equates to a Medicare fee-for-service beneficiary with average costs, while individuals with risk scores of less than 1 equate to Medicare beneficiaries with below average costs and individuals with risk scores of more than 1 equate to Medicare beneficiaries with above average costs. Moreover, the risk scores can be further standardized such that a risk score of 1.2 reflects an individual with 20% higher costs than an average Medicare beneficiary, for example, or that an individual with a risk score of .8 reflects a beneficiary with 20% lower costs. Therefore, CMS can use these risk scores to adjust payments to plans such that the payments are individualized to reflect health status and demographics and reflective of the likely costs that a plan on-average should incur in treating a similarly situated Medicare beneficiary (see **Table 1**). Again, the goal is not to accurately predict any particular individual's expenditures for the following year but predict how expenditures on average vary.

Risk Scores for Medicare Advantage Enrollees

The above discussion describes how CMS estimates adjustments to payments for each Medicare beneficiary enrolled in a Medicare Advantage plan. This section describes how risk scores are attributed to MA enrollees for purposes of payment.

New Enrollees

"For new enrollees [who are new to Medicare Advantage and new to the Medicare program in general],[16] who did not have 12 months of Part B eligibility in the preceding calendar year, rates are based on age, sex, Medicaid status, and original reason for Medicare entitlement (disability or age), not on diagnoses", since CMS does not have historical diagnostic data for these enrollees.[17]

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[15] Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," Health Care Financing Review, vol. 25, no. 4 (Summer 2004), pp. 119-141.

[16] New enrollees who enter the program because of disability or ESRD are risk adjusted for those conditions.

[17] James M. Verdier, Medicare Advantage Rate Setting and Risk Adjustment: A Primer for States Considering Contracting with Medicare Advantage Special Needs Plans to Cover Medicaid Benefits, Center for Health Care Strategies, Inc., October 2006, http://www.chcs.org/usr_doc/Medicare_Advantage_State_Primer.pdf.

Non-new Enrollees

Non-new enrollees would include those beneficiaries who are switching MA plans, continuing in the same MA plan, or otherwise have at least 12 months of Part B eligibility in the preceding calendar year. CMS collects information from Medicare Advantage plans (previously using the RAPS (risk adjustment processing system) and now the Encounter Data Processing System (EDPS)), that allows CMS to periodically update the risk score of each beneficiary enrolled in MA. Historically, under RAPS, about 80% of the diagnostic information was provided by physician claims.[18] CMS is in the process of moving to encounter level data that includes dates of service and ICD-9-CM codes, thus allowing CMS to retain diagnostic information for updating risk scores and payments directly from plan data. In addition to physician supplied information, data from inpatient hospital or outpatient hospital facilities are acceptable.

Risk scores can be adjusted twice each year on January 1st and July 1st. **Table 2** shows a typical schedule for data submission and payment updates. The data that form the basis of the risk-adjusted payment are always from a prior 12-month period; no diagnosis data reported in the service year are used to adjust payments during the service year.

Table 2. Typical Risk Adjustment Implementation Calendar

Payment Year	Dates of Service for Risk Adjustment Data	Initial Data Submission Deadlinea	First Payment Date	Final Data Submission Deadline (Reconciliation)b
2011	July 1, 2009 through June 30, 2010	September 3, 2010	January 1, 2011	January 31, 2011 for data from 2009 dates of service; January 31, 2012 for data from 2010 dates of service
2011	January 1, 2010 through December 31, 2010	March 4, 2011	July 1, 2011	January 31, 2012

Source: Based on https://www.cms.gov/PrescriptionDrugCovContra/Downloads/CallLetter.pdf, p.91.

a. March and September dates reflect the first Friday of the respective month.

b. All risk adjustment data for a given payment year (CY) must be submitted by January 31st of the subsequent year. For instance, for dates of service in 2010, plans had until March 4, 2011 to submit claims information to support risk scores for payments beginning in July 1, 2011.

Sources of Error

There are only a few sources of error that can enter into the calculation of risk adjusted Medicare Advantage payments: error with respect to age, gender, disability status, Medicaid eligibility, or disease. As noted above, the demographic data, disability status, and Medicaid eligibility generally comes from administrative files. The health status information comes from plans submitting diagnoses to CMS. Therefore, error in the health status information provided to CMS

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[18] http://www.codingnetwork.com/coding-audits-compliance/hcc-audits/.

by a plan to justify a risk-adjusted payment are the only data that plans are responsible for and that are auditable.[19]

Risk Adjustment Data Validation (RADV) Audits

Since there can be error in the information that plans provide to CMS to justify risk-adjusted payments as well as error in the updating process, CMS audits Medicare Advantage plans to ensure that the risk-adjusted payments plans are claiming and being paid for, are in fact supported by the medical record (referred to as RADV audits). While audits have been conducted for several years, prior to 2011 CMS only sought to recover the error in payments associated with sampled enrollees. In February 2011, the President's FY2011 budget proposed to extrapolate the RADV error rate to the entire plan contract for the year, resulting in estimated savings of $2.27 billion over the five-year budget window.[20] In December 2010, CMS released for comment its proposed methodology for auditing the data submitted by Medicare Advantage plans and extrapolating a contract level error in payments.[21] Going forward, as CMS seeks to potentially recover larger dollar amounts from plans, the plans are likely to push back more aggressively.[22] These audits, and the potential recoveries, are likely to be problematic for some Part C plans.[23]

Audits are conducted at the contract level and several plans can be under a single contract.[24] Having selected a contract to audit, CMS engages in a three-step process: sampling, medical record review, and error rate calculation/payment adjustment (see **Figure 3**). CMS uses samples, rather than an audit of all eligible enrollees, so as to reduce the burden on plans to provide data. CMS has determined that 201 enrollees is a sufficient sample size. Each of these steps is discussed below.

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[19] The health status information must include a legible signature by a physician or practitioner with proper credentials to submit such information to CMS; as such, the signature and credentialing information are also subject to the audit.

[20] The five-year budget window in the FY2011 budget was 2011 to 2015. The Department of Health and Human Services, *2011 Budget In Brief,* available at http://dhhs.gov/asfr/ob/docbudget/2011budgetinbrief.pdf, p. 57.

[21] Centers for Medicare & Medicaid Services, *Medicare Advantage Risk Adjustment Data Validation (RADV)*, Notice of Payment Error Calculation Methodology for Part C Organizations Selected for Contract-Level RADV Audits - Request for Comments, December 20, 2010, https://www.cms.gov/HealthPlansGenInfo/Downloads/RADVSamplingPaymentErrorDescription.pdf. Referred to as CMS Request for Comments 2010.

[22] For example, one Medicare Advantage provider has stated, "We believe that the proposed methodology is actuarially unsound and in violation of the Social Security Act. We intend to defend that position vigorously." See http://www.secinfo.com/d14D5a.q8djv.q.htm.

[23] For instance, several insurers have noted these audits in their quarterly SEC filings as potentially having a "material adverse effect on revenues derived from the Medicare Advantage program and, therefore, on results of operations, financial position, and cash flows." See, for example, http://www.secinfo.com/d14D5a.q8djv.q.htm.

[24] For example, Aetna, an organization that participates in the MA program, may have a contract with CMS to serve a particular market. Under that contract, Aetna could offer more than one plan—a gold, a silver, and a bronze plan. Aetna may have multiple contracts with CMS to offer plans in different markets throughout the country. However, it is very common in health care literature to refer to the MA *organization* as an MA *plan*. To be clear, with respect to RADV audits, the sample is drawn from the eligible enrollees in a *contract;* a single organization may have several of its contracts audited. If a contract is audited, eligible enrollees from any of its constituent plans could be sampled. For instance, in the audit of the 2007 plan year, 2 Aetna and 6 Humana contracts were audited. See ahttp://www.secinfo.com/d14D5a.q8djv.q.htm and http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MTAxOTU3fENoaWxkSUQ9LTF8VHlwZT0z&t=1.

Sampling

The enrollee sample is drawn from the cohort of eligible Medicare beneficiaries who were enrolled in the contract in January of the payment year. In addition, the enrollees also had to be

1. Continuously enrolled in the same MA contract for all 12 months of the data collection year.

2. Non-End Stage Renal Disease (non-ESRD) status in or prior to the payment year.

3. Non-hospice between January of the data collection year and January of the payment year, with less than 12 months of hospice during the payment year.

4. In Medicare Part B coverage for all 12 months during the data collection period (i.e., defined as full risk enrollees for risk-adjusted payment).

5. Diagnosed with at lease one risk adjustment diagnosis (ICD-9-CM code) submitted during the data collection period that led to at least one CMS-HCC assignment. These HCCs were present for risk-adjusted payments, based on plan-submitted risk adjustment data, and are referred to as the validation HCCs for the sampled enrollees.[25]

Eligible enrollees are divided into three equal groups based on the total number of eligible enrollees. Since the goal is to sample 201 eligible enrollees, the first group consists of 67 eligible enrollees randomly drawn from the one-third of enrollees with the highest risk scores. The second group consists of 67 enrollees randomly drawn from the one-third group of eligible enrollees with the lowest risk scores. The final group consists of 67 enrollees randomly drawn from the one-third remaining eligible enrollees.

Sampling weights are constructed so each sample of eligible enrollees represents the group from which they were drawn. For example:

> …if a contract has 3,000 enrollees, the enrollees would be ranked by risk score, then divided into three equal groups of 1,000 enrollees each (to represent high, medium, and low enrollees). An equal number of enrollees will be selected from each group. The weight for each enrollee will equal 14.925 (i.e., 1,000/67). The enrollee sampling weights are used as multipliers to scale-up (or extrapolate) the sample payment error findings to the population which it represents. [26]
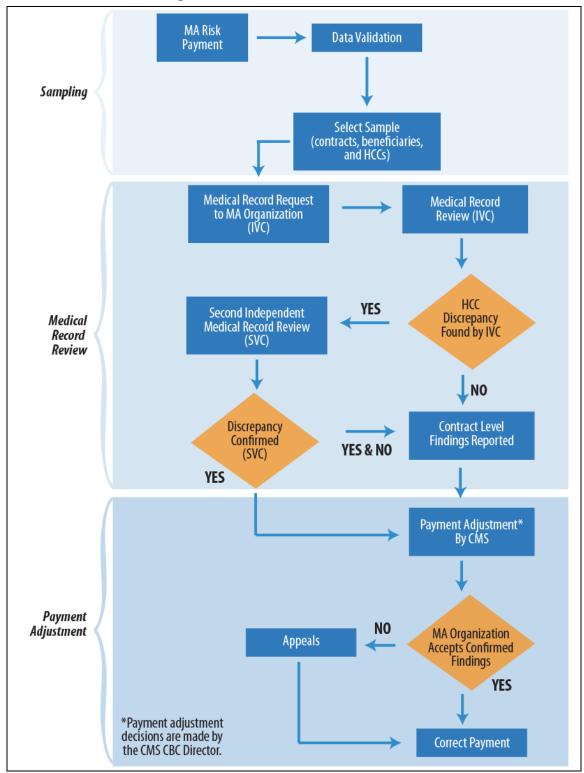
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[25] Ibid.

[26] Ibid.

Figure 3. CMS Data Validation Process

Notes: IVC = initial validation contractor; SVC = secondary validation contractor; CBC = Center for Beneficiary Choice.

Medical Record Review

Having drawn the sample of eligible enrollees to be audited, the MA plan is informed of the enrollees being audited and their HCC codes. The plan is directed to reproduce and deliver to the CMS contractor the one best medical record that substantiates each HCC code the plan was paid for. The term 'one best' means the plans decide whether to submit a hospital inpatient, hospital outpatient, or physician medical record when more than one type of record is available. The record must be from an acceptable provider type or physician specialty, the dates of service must be from within the data collection period, and the record must be signed by the provider or attested to.[27] Plans have 12 weeks to assemble and deliver the medical records for the sampled 201 enrollees.

The medical records, once received by the CMS contractor, are reviewed to establish whether a particular diagnosis which gave rise to a risk-adjusted payment can be substantiated. If the record confirms the underlying diagnosis, the payment was considered justified. If the medical record does not confirm the underlying diagnosis, the payments based on the diagnosis were considered in error. If the plan disagrees with the findings of the initial CMS contractor, it may appeal to have CMS examine the previously submitted one best medical record and attestation.[28] This final decision is binding unless the plan requests a review by the CMS Administrator.

CMS notes that "the payment error for each enrollee will be either positive—representing a net overpayment, or negative—representing a net underpayment."[29] Since the review is based on the "one-best medical record" supporting the audited HCC, any evidence of underpayment would have to be found in that same 'one best medical record,' because underpayments, in general, cannot be supported in the audit by a plan submitting *additional* medical records.[30]

Payment Error Calculation

The risk scores for each sampled enrollee are corrected based on the HCCs that are supported by the RADV medical record review and payments are calculated for each sampled enrollee using the corrected risk scores. Enrollee-level payment errors are defined as the difference between the original payment and the corrected payment. The payment error can be either positive—representing a net overpayment, or negative—representing a net underpayment. A payment error

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[27] "Analysis of data originating from medical records submitted by MA organizations that have undergone RADV audit indicate that a substantial percentage of medical record-related payment error determinations are due to missing signatures or credentials on medical records." Centers for Medicare & Medicaid Services, "Policy and Technical Changes to the Medicare Advantage and Medicare Prescription Drug Benefit," 75 *Federal Register* 19742, April 15, 2010. By allowing plans to submit attestations of provider signatures and credentials when originally submitting the one best medical record, this type of payment error can be avoided. Attestations can only be used to address signature or credential-related discrepancies for physician or outpatient medical records. 42 CFR Section 422.311(c)(1).

[28] 42 CFR Section 422.311(c)(2).

[29] Centers for Medicare & Medicaid Services, *Medicare Advantage Risk Adjustment Data Validation (RADV)*, Notice of Payment Error Calculation Methodology for Part C Organizations Selected for Contract-Level RADV Audits - Request for Comments, December 20, 2010, https://www.cms.gov/HealthPlansGenInfo/Downloads/ RADVSamplingPaymentErrorDescription.pdf. Referred to as CMS Request for Comments 2010.

[30] "The RADV process addresses under-coding through the application of rules for crediting a sampled enrollee with additional HCCs that are identified incidentally, during medical record review." Centers for Medicare & Medicaid Services, " Policy and Technical Changes to the Medicare Advantage and Medicare Prescription Drug Benefit," 75 *Federal Register* p. 19746, April 15, 2010.

is calculated for each sampled enrollee based on the number of months the person was enrolled in the MA selected contract (and was not ESRD or hospice) during the payment year.

To derive the estimated payment error for each MA *contract*—as opposed to the error calculated for the sample—the total payment error for each sampled enrollee will be multiplied by the enrollee's sampling weight (computed during the sampling phase and described above). The weighted enrollee payment errors will be summed across all enrollees in the sample to determine an estimated payment error for the MA contract. The payment recovery amount for each audited MA contract will be determined by the lower bound of the 99% confidence interval around the payment error estimate.[31]

Figure 4 depicts the payment error calculation. As described above, 201 eligible enrollees per contract will selected for review. A total error in payment will be established for each enrollee based on all of the errors identified during the audit. The impact of each enrollee will then be extrapolated to the contract by weighting the enrollee relative to the plan and adjusting for the time that the enrollee was in the plan. The error for each of the 201 sampled enrollees, both overpayments and underpayments, will then be summed. In the hypothetical example in **Figure 4**, the estimated plan level error, across all enrollees is $1,187.50. A 99% confidence interval for this estimate is then calculated for the estimated plan error—that is, there is a 99% certainty that the actual error in payment will fall within the estimated confidence interval. In the purely hypothetical example generated in **Figure 4**, the confidence interval is from $1,037.50 to $1,337.50. This means that with a certainty of greater than 99%, the error in payment to this hypothetical plan is at least $1,037.50 and CMS would require that the plan reimburse the government $1,037.50.

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[31] The estimated error in payments is derived from the sample of eligible enrollees and is used to estimate the error at the plan level. Since the estimate is based on a sample, there is a confidence interval around the estimate that varies with the size of the sample and the degree of precision that one desires. In the case of RADV, CMS has sought to both reduce the cost and burden of the audits by limiting the sample size to 201 enrollees. In addition, to be conservative, it has adopted a 99% confidence interval—the higher the confidence one requires, the larger the interval size. Finally, and again to be conservative, CMS intends to recover at the lower bound of the confidence interval.

Figure 4. Hypothetical Example of Payment Error Calculation

Enrollee	Error	Weight	Weighted Error	Months	
Enrollee 1	$12.00	4.75	$57.00	12	
Enrollee 2	$0.00	4.75	$0.00	12	
Enrollee 3	-$2.00	4.75	-$9.50	12	
Enrollee 4	$14.00	4.75	$66.50	5	*Estimated Plan Error* $1,187.50
Enrollee 5	$0.00	4.75	$0.00	12	
Sampled Enrollee 6 through Enrollee 200 are not shown.					
Enrollee 201	$5.00	4.75	$23.75	12	

$1,187.50 { $1,337.50 / 99% Confidence interval / $1,037.50 } ← CMS Recovery

Source: Congressional Research Service.

Notes: The "Error" is the difference between the original payment to the plan and the corrected payment based on audit findings. The "Weight" is constructed so each sample of eligible enrollees represents the audited contract. The "Weighted Error" is equal to the error multiplied by the weight. The weighed errors are again weighted by the number of months the person was enrolled in the MA selected contract (and was not ESRD or hospice) during the payment year (rather than the data collection year during which the person had to be enrolled for 12 months). The estimated plan error is the sum of the "Weighted Error" amounts weighted by months (or $1,187.50 in this example).

Concerns with Risk Adjustment and the Audit Process

Concerns with Medicare Risk Adjustment Generally

Recent academic study of risk adjustment and some preliminary research by the Medicare Payment Advisory Commission (MedPAC) have raised some concern with risk adjustment under Medicare Advantage.[32] As seen in **Figure 5**, there is a distribution of actual costs associated with

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[32] See Jason Brown, Mark Duggan, and Ilyana Kuziemko, et al., *How Does Risk Selection Respond to Risk Adjustment:* (continued...)

any set of beneficiaries with the same HCC code or set of codes. Medicare reimburses a plan based on the average associated cost of treating such beneficiaries (Point A). Brown et al. (p. 33) suggest that plans may "decrease their efforts to screen enrollees along dimensions included in the model, while increasing their efforts along dimensions excluded from the model." To the extent that plans can do this, they can disproportionately enroll beneficiaries who on average are below average cost (across HCCs) into their plan and experience below average expenses while being reimbursed at rates established for average beneficiaries; beneficiaries with below average costs are represented by Point B in **Figure 5**. MedPAC is similarly concerned that some Medicare Advantage plans, specifically special needs plans and PACE plans,[33] may disproportionately enroll high cost individuals but be reimbursed for average cost enrollees (Point C). While MedPAC suggests exploring improvements to the CMS risk adjustment model, Brown et al. are more skeptical of the prospects of improving the risk adjustment model.
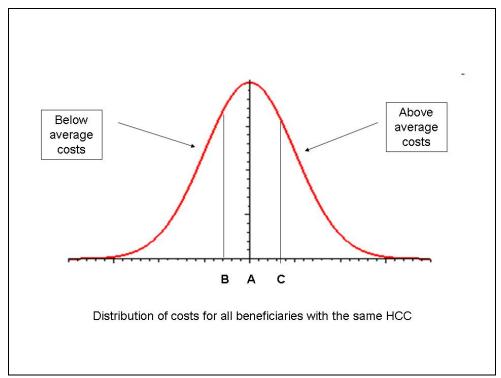
Figure 5. Hypothetical Distribution of Costs for All Beneficiaries with the Same HCC

Source: Congressional Research Service.

(...continued)

Evidence from the Medicare Advantage Program, National Bureau of Economic Research, Working Paper 16977, http://www.nber.org/papers/w16977 and MedPAC, "Risk Adjustment in Medicare Advantage," Presentation by Dan Zabinski, Washington, DC, September 16, 2011. http://www.medpac.gov/transcripts/RiskAdj_Sept_2011.pdf

[33] A Specialized Plan for Special Needs Individuals (SNPs) is any MA coordinated care plan that exclusively enrolls or enrolls a disproportionate percentage of special needs individuals. Special needs individuals are any MA eligible individuals who are either institutionalized as defined by the Secretary, eligible for both Medicare and Medicaid, or have a severe or disabling chronic condition and would benefit from enrollment in a specialized MA plan. Programs of All-Inclusive Care for the Elderly (PACE) are fully capitated managed care programs that provide a comprehensive array of acute and long-term care services to frail elderly persons living in the community.

Concerns with CMS Audit Process

A number of stakeholders have also expressed concerns regarding the audit process. The American Academy of Actuaries (AAA) responded to a CMS Request for Comments on CMS's proposed RADV sampling and error calculation methodology. While the crux of the AAA's position is presented below in full,[34] their position can be summarized as concern that:

- the Medicare fee-for-service data used to estimate risk adjustments were never validated and therefore may also contain errors, and

- the methodology was designed to estimate payment errors not adjust premiums and the resulting premiums may not reflect the risk profiles of actual enrollees.

> Our primary concern with the proposed audit process is that it creates an inconsistency between how the risk adjustment factors were developed and how they now would be applied. An underlying principle of risk adjustment systems is that there needs to be consistency in the way the model was developed and how it is used. The CMS-HCC risk adjustment factors were developed with FFS data that, to the best of our knowledge, were not validated or audited for accuracy. The proposed audit process, however, effectively would apply those factors only to MA data that are validated. In other words, the data used in the RADV audit to determine a plan's payment error are fundamentally and materially different from the data used to develop the risk adjustment model.

> If, as a result of the RADV audit, for example, certain lower-cost enrollees no longer are considered diabetic but would have been considered diabetic in the FFS data used to develop the risk scores, then the payment for diabetic members in the payment year could be inadequate. In this example, the risk score factor associated with diabetes would be understated relative to the factor that would have resulted from using only substantiated diagnoses, because the lower-cost patients would have lowered the average spending amounts among those identified as diabetics in the FFS data. When that factor is applied to similarly non-validated data, the total payments for those with diabetes would be adequate. When that same factor is applied only to those with substantiated data, however, the total payments could be too low.

> This type of data inconsistency not only creates uncertainty, it also may create systematic underpayment, undermining the purpose of the risk adjustment system and potentially resulting in payment inequities. In addition, the uncertainty related to a plan's ultimate post-audit risk score could make it difficult for actuaries to estimate the plan's risk score and certify the plan bid.

> Extrapolating RADV payment-error calculations to adjust premium payments to MA plans represents a significant change in the risk adjustment methodology. The Health Practice Council is concerned that the resulting modified payment methodology may not appropriately reflect the relative risk profile of enrollees in the affected MA plans.

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[34] Letter from Thomas F. Wildsmith, Vice President, Health Practice Council, American Academy of Actuaries, to Ms. Cheri Rice, Acting Director, Medicare Plan Payment Group, January 21, 2011, http://www.actuary.org/pdf/health/ RADV_comment_letter_012111_final.pdf.

Conclusion

Risk adjustment is intended to compensate MA plans for the higher (or lower) cost of enrolling sicker (or healthier) Medicare beneficiaries, yet, as described in this report, plans that disproportionately enroll sicker (or to the extent possible, healthier) beneficiaries may be systematically under (or over) compensated. Others have raised concerns about using Medicare fee-for-services data—which have not been audited for accuracy—to generate the risk adjustment coefficients for Medicare Advantage plans. Some plans have expressed concern that recoveries from RADV audits may place them at substantial financial risk. It remains to be seen how the Secretary will account for methodological concerns as she implements risk adjustment.

Appendix A. History of Part C Risk Adjustment

Payments to private plans under Medicare are risk adjusted to account for the variation in the cost of providing health care among Medicare beneficiaries. Several different models have been used to calculate risk adjustment, each successive model gaining in complexity and explanatory power. This appendix briefly describes the risk adjustment models that are not otherwise discussed in the text of this report.[35]

Below, **Table A-1** shows the risk adjustment models that have been used to adjust Medicare private plan payments, the year each model was in use, and the percentage of variation in individual expenditures predicted by each model (R^2). The R^2 is one measure of how well a model explains why a specified outcome varies—in this case beneficiary expenditures. The range of spending by individual Medicare beneficiaries can be from $0 per year for a very healthy beneficiary who did not use any medical care, items, or medications, to hundreds of thousands of dollars, or more, for a very ill beneficiary. The models attempt to predict beneficiary spending based on beneficiary characteristics. Sicker beneficiaries may have higher expenditures—but how much more? The R^2 quantifies that measure for the model as a whole—from 0 (which means the model does not explain any of the variation) to 1, which means the model perfectly predicts expenditures. Looking at the first model listed in **Table A-1**, the Average Adjusted Per Capita Cost (AAPCC) model has an R^2 of 0.0077, which means that the model explains 0.77% of the variation in beneficiary expenditures. Each subsequent model used by CMS has increased the percent of variation in beneficiary expenditures explained. The most recent (proposed) model is able to explain approximately 12.5% of the variation in expenditures.

Table A-1. Medicare Managed Care (Part C) Historic Risk Adjustment Models

Risk Adjustment Model	Payment Years	Percentage of Variation in Individual Expenditures Predicted (R^2)
Adjusted Average Per Capita Cost (AAPCC)	Pre-2000	0.0077
PIP-DCG	2000-2003	0.0550
CMS-HCC	2004-2008	0.0997
Version 12 CMS-HCC (2005 recalibration)	2009-current	0.1091
Version 21 CMS-HCC (2007 recalibration; 2009 clinical revision)	Proposed	0.1246

Source: Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International , RTI Project Number 0209853.006, Research Triangle Park, NC, March 2011, p. 6, https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/Evaluation_Risk_Adj_Model_2011.pdf.

Notes: The first three models were estimated using both community and institutional beneficiaries in the same model and used data from 1999-2000 for calibration. The later two models were estimated using only community beneficiaries, with a separate model for the institutionalized; they used more recent data for calibration, as shown in the table. The AAPCC risk adjusted on demographic information only. The Principal In-Patient Diagnostic Cost Group (PIP-DCG) added data on inpatient diagnoses to slightly different demographic information. The CMS-HCC model added data from ambulatory settings into the model.

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[35] This section draws extensively from Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," Health Care Financing Review, vol. 25, no. 4 (Summer 2004), pp. 119-141. See also Gail Pardue McGrath and Solomon Mussey, *Advanced notice of Methodological Changes for Calendar Year (CY) 2004 Medicare+Choice (M+C) Payment Rates*, Centers for Medicare and Medicaid Services, March 28, 2003, https://www.cms.gov/MedicareAdvtgSpecRateStats/Downloads/Advance2004.pdf.

Adjusted Average Per Capita Cost (AAPCC)

Prior to payment year 2000, private plan payments under the Medicare+Choice (M+C) and TEFRA risk programs—both predecessors to the Medicare Advantage program—were risk adjusted to account for the effect of certain demographic characteristics. The demographic variables in the AAPCC model were: age, sex, Medicaid enrollment, institutionalized status for nursing home residents, and working aged status representing those Medicare beneficiaries 65 years of age and over with employer sponsored insurance as their primary source of coverage. Taken together, these demographic data explain less than 1% of the variation in Medicare beneficiary expenditures (See **Table A-1**). This model did not account for the costs associated with beneficiary health. Payments to individual plans were not adjusted for enrolling very ill beneficiaries. However, in the aggregate, private plan enrollees were healthier than enrollees in original Medicare leading to higher payments than if beneficiary health had been taken into account.[36]

Principal In-Patient Diagnostic Cost Group (PIP-DCG)

The Balanced Budget Act of 1997 required CMS to implement a risk adjustment methodology that took into account beneficiary health status by no later than January 1, 2000.[37] From payment year 2000 through 2003, CMS used the Principal Inpatient Diagnostic Cost Group (PIP-DCG) model. In addition to demographic variables, this model took into account, "the worst principal inpatient diagnosis (principal reason for inpatient stay) associated with any hospital admission."[38] Though, as shown in **Table A-1**, the PIP-DCG model explained more of the variation in Medicare expenditures than the AAPCC (demographic only) model, it had several limitations. First, illnesses that resulted in higher expenditures but did not result in a hospital admission were not counted in the model. Second, any attempt to reduce hospital admissions through, for example, better management of chronic disease, could potentially result in lower risk-adjusted payments.

Though the PIP-DCG model was to be phased-in, subsequent legislation held the phase-in schedule at 90% demographic-only method/10% PIP-DCG method through 2003, in part to "soften the financial impact of risk adjustment on M+C organizations."[39]

CMS–Hierarchical Condition Category (CMS-HCC)

Starting in 2004, Medicare plan payments were adjusted by the CMS-HCC model—a model that includes information from hospital inpatient and outpatient settings, physicians visits, and visits with clinically trained non-physicians such as psychologists and podiatrists.[40] The CMS-HCC takes into account the severity of a beneficiary's illness (and only compensating for the most

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[36] Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," Health Care Financing Review, vol. 25, no. 4 (Summer 2004), pp. 119-141. p. 119.

[37] Social Security Act Section 1853(a)(3)(C)(i).

[38] Ibid. p. 120.

[39] Gail Pardue McGrath and Solomon Mussey, *Advanced notice of Methodological Changes for Calendar Year (CY) 2004 Medicare+Choice (M+C) Payment Rates*, Centers for Medicare and Medicaid Services, March 28, 2003, https://www.cms.gov/MedicareAdvtgSpecRateStats/Downloads/Advance2004.pdf. p. 4.

[40] Gregory C. Pope, John Kautter, and Randall P. Ellis, et al., "Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model," *Health Care Financing Review*, vol. 25, no. 4 (Summer 2004), pp. 124.

severe manifestation reported), the accumulated effect of multiple (unrelated) diseases, as well as interactive effects—instances where having two or more specified diseases or characteristics result in expected health care expenditures that are larger than the simple sum of the effects. The CMS-HCC model explains nearly 10% of the variation in beneficiary expenditures and is described in detail in the "Risk Adjustment Under Medicare Advantage" section of this report. Updates to the CMS-HCC retain the basic structure of the model.

Version 12 CMS-HCC

Each year the model is updated to account for changes in the ICD-9-CM diagnosis codes. In addition, Version 12 was recalibrated with more recent diagnosis and expenditure data. The update increased the percentage of the variation in Medicare expenditures which were explained by the model from just under 10% to nearly 11%.[41]

Version 21 CMS-HCC

Version 21 includes updates to the ICD-9CM diagnosis codes, and recalibration with more recent diagnosis and expenditure data. In addition, version 21, "underwent a major clinical revision in 2009 to adjust for changes in disease patterns, treatment methods, and coding practices, as well as compositional changes within the Medicare population."[42] These updates again increased the predictive power of the model to approximately 12.5%. Version 21 is slated to be implemented in 2012 for PACE plans.[43]

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[41] Gregory C. Pope, John Kautter, and Melvin J. Ingber, et al., *Evaluation of the CMS-HCC Risk Adjustment Model*, RTI International, Final Report - Prepared for the Centers for Medicare & Medicaid Services, Research Triangle Park, NC, March 2011, https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/ Evaluation_Risk_Adj_Model_2011.pdf. p. 7.

[42] Ibid. p. 7.

[43] Ibid. p. 8.

Appendix B. CMS-HCC Risk Adjustment Model

Table B-1. Preliminary Community and Institutional Relative Factors for the CMS-HCC Risk Adjustment Model

Variable	Disease Group	Community Factor	Institutional Factor
Female			
0-34 Years		0.198	0.783
35-44 Years		0.212	0.723
45-54 Years		0.274	0.700
55-59 Years		0.359	0.805
60-64 Years		0.416	0.773
65-69 Years		0.283	1.004
70-74 Years		0.346	0.947
75-79 Years		0.428	0.874
80-84 Years		0.517	0.792
85-89 Years		0.632	0.699
90-94 Years		0.755	0.594
95 Years or Over		0.775	0.465
Male			
0-34 Years		0.079	0.994
35-44 Years		0.119	0.658
45-54 Years		0.165	0.687
55-59 Years		0.292	0.814
60-64 Years		0.332	0.877
65-69 Years		0.309	1.148
70-74 Years		0.378	1.195
75-79 Years		0.464	1.168
80-84 Years		0.565	1.104
85-89 Years		0.647	1.046
90-94 Years		0.776	0.928
95 Years or Over		0.963	0.842
Medicaid and Originally Disabled Interactions with Age and Sex			
Medicaid-Female-Aged		0.213	
Medicaid-Female-Disabled		0.104	
Medicaid-Male-Aged		0.210	
Medicaid-Male-Disabled		0.113	

Variable	Disease Group	Community Factor	Institutional Factor
Originally Disabled-Female		0.244	
Originally Disabled-Male		0.171	
Medicaid and Originally Disabled			
Medicaid			0.126
Originally Disabled			0.026
Disease Coefficients	**Description Label**	**Community Factor**	**Institutional Factor**
HCC1	HIV/AIDS	0.492	1.374
HCC2	Septicemia, Sepsis, Systemic Inflammatory Response Syndrome/Shock	0.520	0.471
HCC6	Opportunistic Infections	0.557	0.541
HCC8	Metastatic Cancer and Acute Leukemia	2.425	0.928
HCC9	Lung and Other Severe Cancers	1.006	0.610
HCC10	Lymphoma and Other Cancers	0.695	0.363
HCC11	Colorectal, Bladder, and Other Cancers	0.330	0.255
HCC12	Breast, Prostate, and Other Cancers and Tumors	0.180	0.165
HCC17	Diabetes with Acute Complications	0.344	0.434
HCC18	Diabetes with Chronic Complications	0.344	0.434
HCC19	Diabetes without Complication	0.124	0.187
HCC21	Protein-Calorie Malnutrition	0.653	0.343
HCC22	Morbid Obesity	0.342	0.353
HCC23	Other Significant Endocrine and Metabolic Disorders	0.240	0.248
HCC27	End-Stage Liver Disease	1.003	0.637
HCC28	Cirrhosis of Liver	0.425	0.343
HCC29	Chronic Hepatitis	0.313	0.343
HCC33	Intestinal Obstruction/Perforation	0.337	0.302
HCC34	Chronic Pancreatitis	0.257	0.175
HCC35	Inflammatory Bowel Disease	0.279	0.250
HCC39	Bone/Joint/Muscle Infections/Necrosis	0.423	0.386
HCC40	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	0.376	0.222
HCC46	Severe Hematological Disorders	1.078	0.638
HCC47	Disorders of Immunity	0.306	0.436

Variable	Disease Group	Community Factor	Institutional Factor
HCC48	Coagulation Defects and Other Specified Hematological Disorders	0.258	0.197
HCC51	Dementia With Complications	0.616	—
HCC52	Dementia Without Complication	0.343	—
HCC54	Drug/Alcohol Psychosis	0.358	0.051
HCC55	Drug/Alcohol Dependence	0.358	0.051
HCC57	Schizophrenia	0.471	0.274
HCC58	Major Depressive, Bipolar, and Paranoid Disorders	0.318	0.274
HCC70	Quadriplegia	1.075	0.497
HCC71	Paraplegia	0.868	0.497
HCC72	Spinal Cord Disorders/Injuries	0.441	0.191
HCC73	Amyotrophic Lateral Sclerosis and Other Motor Neuron Disease	1.016	0.294
HCC74	Cerebral Palsy	0.036	—
HCC75	Polyneuropathy	0.281	0.256
HCC76	Muscular Dystrophy	0.460	0.247
HCC77	Multiple Sclerosis	0.482	—
HCC78	Parkinson's and Huntington's Diseases	0.555	0.110
HCC79	Seizure Disorders and Convulsions	0.252	0.173
HCC80	Coma, Brain Compression/Anoxic Damage	0.533	0.103
HCC82	Respirator Dependence/Tracheostomy Status	1.732	1.567
HCC83	Respiratory Arrest	0.769	0.611
HCC84	Cardio-Respiratory Failure and Shock	0.326	0.346
HCC85	Congestive Heart Failure	0.361	0.226
HCC86	Acute Myocardial Infarction	0.283	0.394
HCC87	Unstable Angina and Other Acute Ischemic Heart Disease	0.283	0.394
HCC88	Angina Pectoris	0.210	0.366
HCC96	Specified Heart Arrhythmias	0.276	0.227
HCC99	Cerebral Hemorrhage	0.371	0.175
HCC100	Ischemic or Unspecified Stroke	0.333	0.175
HCC103	Hemiplegia/Hemiparesis	0.481	0.063
HCC104	Monoplegia, Other Paralytic Syndromes	0.212	0.063
HCC106	Atherosclerosis of the Extremities with Ulceration or Gangrene	1.313	0.773
HCC107	Vascular Disease with Complications	0.417	0.257

Variable	Disease Group	Community Factor	Institutional Factor
HCC108	Vascular Disease	0.288	0.146
HCC110	Cystic Fibrosis	0.388	0.323
HCC111	Chronic Obstructive Pulmonary Disease	0.388	0.323
HCC112	Fibrosis of Lung and Other Chronic Lung Disorders	0.294	0.252
HCC114	Aspiration and Specified Bacterial Pneumonias	0.691	0.239
HCC115	Pneumococcal Pneumonia, Empyema, Lung Abscess	0.212	0.194
HCC122	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	0.223	0.366
HCC124	Exudative Macular Degeneration	0.248	0.178
HCC134	Dialysis Status	0.617	0.538
HCC135	Acute Renal Failure	0.617	0.538
HCC136	Chronic Kidney Disease, Stage 5	0.227	0.304
HCC137	Chronic Kidney Disease, Severe (Stage 4)	0.227	0.304
HCC138	Chronic Kidney Disease, Moderate (Stage 3)	0.227	0.304
HCC139	Chronic Kidney Disease, Mild or Unspecified (Stages 1-2 or Unspecified)	0.227	0.304
HCC140	Unspecified Renal Failure	0.227	0.304
HCC141	Nephritis	0.075	0.235
HCC157	Pressure Ulcer of Skin with Necrosis Through to Muscle, Tendon, or Bone	1.071	0.284
HCC158	Pressure Ulcer of Skin with Full Thickness Skin Loss	1.071	0.284
HCC159	Pressure Ulcer of Skin with Partial Thickness Skin Loss	1.071	0.284
HCC160	Pressure Pre-Ulcer Skin Changes or Unspecified Stage	1.071	0.284
HCC161	Chronic Ulcer of Skin, Except Pressure	0.473	0.226
HCC162	Severe Skin Burn or Condition	0.458	—
HCC166	Severe Head Injury	0.533	0.103
HCC167	Major Head Injury	0.141	—
HCC169	Vertebral Fractures without Spinal Cord Injury	0.441	0.179
HCC170	Hip Fracture/Dislocation	0.363	—
HCC173	Traumatic Amputations and Complications	0.379	0.067
HCC176	Complications of Specified Implanted Device or Graft	0.555	0.369
HCC186	Major Organ Transplant or Replacement Status	1.032	1.120
HCC188	Artificial Openings for Feeding or Elimination	0.609	0.658

Variable	Disease Group	Community Factor	Institutional Factor
HCC189	Amputation Status, Lower Limb/Amputation Complications	0.804	0.384
Disease Interactions			
SEPSIS_CARD_RESP_FAIL	Sepsis and Cardiorespiratory Failure	0.634	
CANCER_IMMUNE	Cancer and Immune Disorders	1.101	
DIABETES_CHF	Diabetes and Congestive Heart Failure	0.237	0.143
CHF_COPD	Congestive Heart Failure and Chronic Obstructive Pulmonary Disease	0.255	0.159
CHF_RENAL	Congestive Heart Failure and Renal Disease	0.201	
COPD_CARD_RESP_FAIL	Chronic Obstructive Pulmonary Disease and Cardiorespiratory Failure	0.420	
CRFAIL_COPD	Cardiorespiratory Failure and Chronic Obstructive Pulmonary Disease		0.524
SEPSIS_PRESSURE_ULCER	Sepsis and Pressure Ulcer		0.538
SEPSIS_ARTIF_OPENINGS	Sepsis and Artificial Openings for Feeding or Elimination		0.453
ARTIF_OPENINGS_ PRESSURE_ULCER	Artificial Openings for Feeding or Elimination and Pressure Ulcer		0.361
COPD_ASP_SPEC_ BACT_PNEUM	Chronic Obstructive Pulmonary Disease and Aspiration and Specified Bacterial Pneumonias		0.249
ASP_SPEC_BACT_PNEUM_ PRES_ULCER	Aspiration and Specified Bacterial Pneumonias and Pressure Ulcer		0.325
SEPSIS_ASP_SPEC_ BACT_PNEUM	Sepsis and Aspiration and Specified Bacterial Pneumonias		0.387
SCHIZOPHRENIA_COPD	Schizophrenia and Chronic Obstructive Pulmonary Disease		0.187
SCHIZOPHRENIA_CHF	Schizophrenia and Congestive Heart Failure		0.220
SCHIZOPHRENIA_SEIZURES	Schizophrenia and Seizure Disorders and Convulsions		0.303
Disabled/Disease Interactions			
DISABLED_HCC6	Disabled, Opportunistic Infections	0.564	
DISABLED_HCC34	Disabled, Chronic Pancreatitis	0.757	
DISABLED_HCC46	Disabled, Severe Hematological Disorders	0.818	
DISABLED_HCC54	Disabled, Drug/Alcohol Psychosis	0.432	
DISABLED_HCC55	Disabled, Drug/Alcohol Dependence	0.147	
DISABLED_HCC110	Disabled, Cystic Fibrosis	2.397	
DISABLED_HCC176	Disabled, Complications of Specified Implanted Device or Graft	0.495	
DISABLED_HCC85	Disabled, Congestive Heart Failure		0.320

Variable	Disease Group	Community Factor	Institutional Factor
DISABLED_PRESSURE_ULCER	Disabled, Pressure Ulcer		0.421
DISABLED_HCC161	Disabled, Chronic Ulcer of the Skin, Except Pressure Ulcer		0.337
DISABLED_HCC39	Disabled, Bone/Joint Muscle Infections/Necrosis		0.624
DISABLED_HCC77	Disabled, Multiple Sclerosis		0.344
DISABLED_HCC6	Disabled, Opportunistic Infections		0.914

Source: Advance Notice of Methodological Changes for Calendar Year (CY) 2011 for Medicare Advantage (MA) Capitation Rates, Part C and Part D Payment Policies and 2011 Call Letter. https://www.cms.gov/PrescriptionDrugCovContra/Downloads/2011CombinedCallLetter.pdf

Notes: 1. The relative risk scores in this table were calculated by dividing the parameter estimates by the Part C national average predicted expenditures (CMS Part C Denominator). The Part C Denominator value used is $8,034.71.

2. The relative factor for HCC 160 is based on pressure ulcer, any stage, for all anatomical sites codes. The relative factor for HCC 160 is also assigned to HCCs 157, 158, and 159 in the constrained regression because the ICD9 codes for the stages of pressure ulcers are not implemented until FY09.

3. In the "disease interactions," the variables are defined as follows: Artificial Openings for Feeding or Elimination = HCC 188; Aspiration and Specified Bacterial Pneumonias = HCC 114; Bone/Joint/Muscle Infections/Necrosis = HCC 39; Cancer = HCCs 8-12; Cardiorespiratory Failure = HCCs 82-84; Chronic Obstructive Pulmonary Disease = HCCs 110-111; Chronic Ulcer of Skin, except Pressure = HCC 161; Congestive Heart Failure = HCC 85; Diabetes = HCCs 17, 18, 19; Immune Disorders = HCC 47; Multiple Sclerosis = HCC 77; Opportunistic Infections = HCC 6; Pressure Ulcer = HCCs 157-160; Renal Disease = HCCs 134-141; Schizophrenia = HCC 57; Seizure Disorders and Convulsions = HCC 79; Sepsis = HCC 2.

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Acknowledgments