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Risk Adjustment: The Details and Why They Matter

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Where there is financial risk, there is a desire for an actuary to manage it. That is why Geisinger Health Plan (GHP[1]) recently formed a Risk and Revenue department and charged me with overseeing it. This team is a blend of actuarial analysts and certified professional coders working together to understand the complexities of risk adjustment.

This team is an example of how actuaries can apply analytical skills and business knowledge to solve problems. As more organizations recognize risk, their tendency will be to turn to actuaries to help them navigate it. This is where it gets exciting for actuaries. The Centers for Medicare & Medicaid Services Hierarchical Condition Category (CMS-HCC) risk adjustment model is one such opportunity.

Risk adjustment uses algorithms to predict health care costs based on the relative actuarial risk of enrollees. This article focuses on the CMS-HCC Part C risk adjustment model.[2,3] The model is provided by CMS to the public through software that includes an SAS program. The SAS program calls on several SAS macros to create HCC score variables using coefficients from nine different regression models. We will discuss eight of these models throughout the article. Once we have explored all the models and their intricacies, I think you will quickly discover the essential role of the actuary in risk adjustment.

WHAT IS RISK ADJUSTMENT?

Risk adjustment is a methodology for payment used by government agencies to adjust health plan premium payments based on expected health care costs. Some of the payment methodology currently in use was mandated by the Balanced Budget Act of 1997, the Medicare Prescription Drug, Improvement and Modernization Act of 2003, and the Patient Protection and Affordable Care Act of 2010.

Risk adjustment is a win-win situation for health plans. If implemented strategically, it pays for disease burden, not quantity of services. It is a true way to manage a member's care. The goal is to ensure members are managed properly to predict the best future outcomes in care and health. Statistical models are created to calculate the risk scores, which predict individual beneficiaries' health care expenditures relative to the average beneficiary. The purpose is to discourage plans from constructing business models designed to avoid risk (e.g., higher rates for sicker patients and lower rates for healthy people). The result of this complex model is the "risk score" that adjusts payments up or down pending risk.

WHAT ARE RISK ADJUSTMENT MODELS?

Medicare Advantage (MA) plans include three models: CMS-HCC (Part C—Medicare Advantage), CMS-ESRD, and CMS-RxHCC (Part D—pharmacy).[4] In Pennsylvania, the Medicaid managed-care product uses the Department of Human Services (DHS) CDPS+Rx model (Chronic Illness and Disability Payment System and Medicaid Rx, developed by the University of California, San Diego with modified weights). The newest model for commercial exchange is the Department of Health and Human Services (HHS) HCC model. These models have different risk adjustment factor weights, formulas and application. For Medicare Advantage, risk adjustment is used to calibrate premium revenue. For both the commercial exchange and Medicaid lines of business, the risk adjustment program redistributes premium revenue. The redistribution creates a zero-sum game, which means we are in direct competition for the share of the pool of risk-eligible dollars. Since the CMS-HCC model has been around the longest, this article centers on explaining all the intricacies in this model.

What are the Model Intricacies?

In 2004, CMS created the Hierarchical Condition Category (HCC) risk adjustment program for MA plans and had it fully phased in by 2007. Payments to MA plans are adjusted based on the health status and demographics of their enrollees using diagnoses. The payment calculation takes the CMS-approved geographic location base rate (state/county bid amount) times the health status (HCC factors) times the demographic factors.

The CMS-HCC Part C model provides the HCC factors and demographic factors used to calculate risk scores to adjust capitated payments for aged and disabled beneficiaries enrolled in MA plans. Risk scores are based on the demographics and diagnoses a member has coded through ICD-10 codes information from encounters that link to an HCC. The model measures the disease burden and includes HCCs that are correlated to diagnosis codes. The scores are created by adding the coefficients associated with each beneficiary's demographic and disease factors.

The CMS-HCC Part C model is prospective, meaning diagnoses from the previous year and demographic information are used to predict costs for next year. The model calibration is built

on Medicare fee-for-service experience (not MA); therefore, other adjustments are needed to calibrate based on the MA population.

How is the Data Submitted to CMS?

CMS's Risk Adjustment Processing System (RAPS) allows health plans to submit diagnosis data to CMS using six data elements.[5] For payment year 2016, the transition away from RAPS and toward the Encounter Data Processing System (EDPS) began. CMS's EDPS requires full claim information (837p and 837i format) to be sent. As the transition continues through 2020, CMS will use a blend of data from RAPS and EDPS in its calculations (Table 1). CMS has indicated the weighting will be as reflected in this schedule. Risk scores for 2016 weight the risk eligible diagnosis codes from RAPS at 90 percent and EDPS at 10 percent.

Table 1
Encounter Data Blending Schedule

Payment Year	RAPS	EDPS
2014	100%	0%
2015	100%	100%
2016	90%	10%
2017	75%	25%
2018	85%	15%
2019	25%	75%
2020	0%	100%

What is an HCC?

The CMS software SAS program first cross-references diagnoses to Condition Categories (CCs). Then the program imposes hierarchies on the CCs based on previously defined Hierarchical Condition Categories (HCCs). Each HCC encompasses medical conditions that map to a corresponding group of ICD-10 diagnosis codes with a single relative factor assigned to it. Notably, not every diagnosis code becomes an HCC. In addition, each diagnosis code can map to only one HCC. The number of diagnoses mapping to an HCC can vary from one to many thousands.

The diagnoses themselves are obtained by medical claims data and/or medical record review. The medical claims come from inpatient, outpatient and physician services, but not all claims are eligible. Laboratory, home health, durable medical equipment, ambulance, radiology, pharmacy and a few other types are regularly excluded. If an enrollee doesn't have any claims, zeros are assigned to all HCCs. Once the HCCs are identified, the program computes predicted risk scores from nine regression models:

- Community—Non-dual aged
- Community—Non-dual disabled
- Community—Full benefit dual aged
- Community—Full benefit dual disabled
- Community—Partial benefit dual aged
- Community—Partial benefit dual disabled
- Institutional
- New enrollee
- C-SNP new enrollee (not discussed)

In the 2016 and 2017 payment years, only the 2014 model (v22) will be used. The v22 model has a total of 79 HCCs (Table 2 contains a subset for illustration). Separate factors are created to reflect the unique cost patterns of beneficiaries in the community and those residing in long-term care institutional facilities. There are also separate factors based on a beneficiaries Medicaid eligibility status (Non-Dual, Full Dual, or Partial Dual). CMS's model allows for patients to have more than one HCC assigned to them. Each HCC must be captured annually. CMS's guidance is to code all documented conditions that coexist at the time of the visit. It must be a face-to-face encounter between a credentialed provider and a patient.

What is the Meaning of the Word *Hierarchical*?

In the model (Table 3), *hierarchy* indicates the overriding that occurs for similar categories by more severe variations of the same health condition. An example of this is a beneficiary who has diabetes without complications (HCC19) and then progresses to diabetes with acute complications (HCC17). The costs of HCC19 are covered under HCC17 and therefore only HCC17 will be included in the risk score.

How are Disease Interactions Handled?

Disease interaction adjustments must be made when a hierarchy of severe conditions coexist. This is handled by applying additional factors to the risk score composition. An example of a disease interaction is chronic obstructive pulmonary disease (COPD) and congestive heart failure (CHF) (Table 4). A beneficial with COPD and CHF who aged into Medicare and is non-dual and not institutionalized would get 0.19 added to the overall HCC factor. The disease interaction factors account for the expected higher health care costs based on the enrollees' increased risk.

WHAT IS A RISK SCORE?

Risk scores have many components that build on one another in an additive model. The following are the elements of a risk score:

- Demographic factors: age and gender
- Original reason for entitlement code (OREC)
- Disability indicator
- Community, institutional, and new enrollee segments

Table 2
Example HCCs and Factors

		Risk Model Type						
		Community						
		Non-Dual		Full Dual		Partial Dual		
Variable	HCC Description	Aged	Disabled	Aged	Disabled	Aged	Disabled	Institutional
HCC1	HIV/AIDS	0.312	0.288	0.585	0.500	0.550	0.232	1.747
HCC2	Septicemia, sepsis	0.455	0.532	0.596	0.811	0.409	0.417	0.346
HCC8	Metastatic cancer & acute leukemia	2.625	2.644	2.542	2.767	2.442	2.582	1.143
HCC9	Lung & other severe cancers	0.970	0.927	0.973	1.025	0.955	0.879	0.727

Data from Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html*

Table 3
Disease Hierarchies for the 2014 CMS-HCC Model

If HCC	HCC Label	… Then Drop HCC(s) in This Column
8	Metastatic cancer & acute leukemia	9, 10, 11, 12
9	Lung & other severe cancers	10, 11, 12
17	Diabetes with acute complications	18, 19
18	Diabetes with chronic complications	19

Data from Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html*

Table 4
Disease Interactions

	Risk Model Type, Community					
	Non-Dual		Full Dual		Partial Dual	
Description	Aged	Disabled	Aged	Disabled	Aged	Disabled
Immune disorders • cancer	0.893	0.675	0.815	0.652	0.776	0.808
Congestive heart failure • diabetes	0.154	0.096	0.205	0.160	0.178	0.139
Congestive heart failure • chronic obstructive pulmonary disease	0.190	0.174	0.240	0.217	0.186	0.181
Congestive heart failure • renal	0.270	0.493	0.271	0.711	0.299	0.609

Data from Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html*

- Medicaid eligibility: non-dual, full benefit dual, or partial benefit dual
- Disease hierarchy (HCCs)
- Disease and disabled interactions

When generating a risk score, the demographic factors are considered first, starting with age and gender. Age factors (Table 5) are created in five-year age bands for people 55 and older and defined by gender. Another demographic factor is the original reason entitlement code (OREC), which results in the inclusion of a factor in the risk score for beneficiaries 65 years of age or older who were originally entitled to Medicare due to disability. Other demographic factors are disability indicator for a less than 65-year-old, Medicaid status, and institutional status (i.e., whether living in an institution or in the community) (Table 6). For payment year 2017, the Medicaid dual status was further defined as non-dual, full-dual, and partial dual with separate factors for the Community model. Different factors exist for community versus a long-term institutional beneficiary within each HCC and demographic. If a beneficiary has less than 12 months of Part B experience (within the defined data collection period), there is a new enrollee risk adjustment factor type (RAFT code) and a set of factors that don't receive any HCC additives.

Table 5
Example of Female Age Factors

	Risk Model Type						
	Community						
	Non-Dual		Full Dual		Partial Dual		
Female Age (Years)	Aged	Disabled	Aged	Disabled	Aged	Disabled	Institutional
0–34		0.244		0.318		0.344	1.031
35–44		0.303		0.306		0.383	0.999
45–54		0.322		0.338		0.374	1.007
55–59		0.350		0.388		0.371	0.986
60–64		0.411		0.449		0.395	1.028
65–69	0.312		0.425		0.341		1.200
70–74	0.374		0.511		0.406		1.092
75–79	0.448		0.611		0.484		0.995
80–84	0.537		0.739		0.552		0.860
85–89	0.664		0.917		0.678		0.749
90–94	0.797		1.037		0.817		0.626
95+	0.816		1.094		0.913		0.456

Data from Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html*

Table 6
Example of Other Demographic Factors

	Risk Model Type			
	Community			
	Non-Dual	Full Dual	Partial Dual	
Variable	Aged	Aged	Aged	Institutional
Medicaid	N/A	N/A	N/A	0.062
Originally disabled, female	0.244	0.172	0.126	N/A
Originally disabled, male	0.152	0.192	0.105	N/A

Data from Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html*

A beneficiary who is categorized as having end-stage renal disease (ESRD) runs through a separate ESRD model that has new enrollee, dialysis, transplant, post-transplant and hospice (which trumps ESRD) components. The ESRD model is outside the scope of this article.

All HCCs and demographics are used to create a final risk score.

What is the Meaning of a Risk Score?

A risk score of one means the beneficiary has the average expected annual Medicare costs. A risk score greater than one means the beneficiary is likely to incur costs higher than average. Less than one indicates expected costs are less than average.

The risk score is further adjusted by applying a coding intensity adjustment factor (MA coding pattern). This takes the difference between the scores that a group of beneficiaries would have if they enrolled in MA compared to their scores in FFS Medicare. This is intended to neutralize differences in coding patterns between FFS Medicare and MA. Per CMS, the MA plan risk scores increase faster than FFS Medicare risk scores. This adjustment is necessary since the risk adjustment model is calibrated using FFS Medicare experience.

The last factor in the risk score is the FFS normalization factor, which changes annually and is intended to "normalize" MA beneficiary risk to be equal to FFS Medicare. This factor adjusts for the growth of risk scores year after year. This accounts for the difference in the model's calibration year versus the claims experience period to account for trend. The coding intensity and normalization factors are displayed in Table 7 across payment years.

How do I Calculate a Risk Score?

For payment year (PY) 2017,

Portion of risk score from RAPS & FFS =
[(raw risk score* from RAPS + FFS diagnosis) /
(PY 2017 normalization factor)] ×
(1 – PY 2017 coding intensity factor) × 0.75

+

Portion of risk score from EDPS & FFS =
[(raw risk score* from ED + FFS diagnosis) /
(PY 2017 normalization factor)] ×
(1 – PY 2017 coding intensity factor) × 0.25

*raw risk score = demographic + disease relative factors

Why are Risk Adjustment Analytics Needed?

Historical and industry experience are used to create models that draw from a variety of sources:

- Pharmacy and medical data
- Historical HCCs along with clinical judgment on persistency
- Significant score changes
- Frequency of HCC prevalence
- Data quality and chart reviews
- Billing systems that are accurate and on par with billing standards
- Addressing billing constraints
- Revenue cycle opportunities
- Natural language processing
- Exclusion criteria

These models assist in the creation of target chart reviews based on opportunities from a prospective, concurrent and retrospective basis to achieve the highest level of coding accuracy. A

Table 7
Coding Intensity Adjustment and Normalization Factors

	Payment Year				
	2013	2014	2015	2016	2017
Date of service year	2012	2013	2014	2015	2016
HCC model	2013 (v12)	2013 (v12) 25%, 2014 (v22) 75%	2013 (v12) 67%, 2014 (v22) 33%	Blended ICD9/10 2014 (v22)	2017 (v22)
Model denominator year	2011	2011/2012	2011/2012	2011/2012	2015
EDPS & RAPS blend	N/A	N/A	Combined	10% EDPS, 90% RAPS	25% EDPS, 75% RAPS
Coding intensity factor	3.41%	4.91%	5.16%	5.41%	5.66%
Normalization Factors					
HCC	1.028	2013 Model = 1.041, 2014 Model = 1.026	2013 Model = 0.992, 2014 Model = 0.978	0.992	0.998

Table 8
Sample 2017 Payment Schedule

Risk Score Run	Claims Date of Service (Month/Year)	Submission Deadline (Month/Year)	Payment Period (Month/Year)
Initial	July 2015 to June 2016	Sep-16	January 2017 to July 2017
Mid-year	January 2016 to December 2016	Mar-17	January 2017 to December 2017
Final	January 2016 to December 2016	Jan-18	January 2017 to December 2017

health plan is afforded the opportunity to retrospectively review medical records for diagnoses that need to be added or deleted in the list of active codes. Coders have been focused primarily on retrospective medical chart reviews. Analytics can be used to determine strategies around technology, resources, operations, education and other factors to move toward prospective accuracy in disease burden.

Analytics are used for forecasting Medicare Advantage organizations' (MAOs) future payments relating to the current payment year due to the three phases (initial, midyear and final) of the payment calculation/reconciliation by CMS. Medicare Advantage enrollees receive an initial risk score every January that is updated with two additional reviews during the year that allow updated data and additional run-out from the historical experience period. Table 8 gives an example of timing for the 2017 payment year.

WHY DOES THIS ALL MATTER?

Actuaries have the opportunity to support CMS in the pursuit of higher quality and preparing for the future. The health care industry is moving toward value-based care, and many of the value-based care arrangements have some form of diagnosis-based risk adjustment program. Actuaries working in risk adjustment can help educate the physician community about the importance of disease burden accuracy. They can establish trust with community providers by demonstrating knowledge and strong analytics to support the coders' outcomes of correct coding initiatives. It is important to create the best provider experience while creating less provider abrasion. Building these key relationships will help the provider community document better at the point of care and be successful in the new world of value-based care.

It takes a team of true collaborators to build relationships, not only between analysts, coders, and physicians but also spread throughout health care in many areas (provider network management, quality and accreditation, medical management, claims, clinical informatics, case and disease management, clinical enterprises, etc.). Our mission is driven by a team that is not afraid to work with others and instead welcomes the help.

CONCLUSION

An actuary has the required skill set to understand all the intricacies and complexities built into the risk adjustment programs. The models vary with different weighting, factors, categories, hierarchies, interactions, model period, experience period, application period, duration of enrollment, institutionalized status and so on. The CMS-HCC Part C model outlined in this article alone had at least 13 different types of factors (90 RAPS/10 EDPS, CC, hierarchy (HCC), interaction, new enrollee, community or institutionalized, demographic, OREC, disabled, Medicaid, model blend, coding intensity, and normalization) to consider. An actuary is very familiar with these types of complicated models. Health actuaries began with pricing models that incorporated factors for age and gender; the models have expanded well beyond those initial factors. It is an exciting time to be a health actuary, as the health care industry and risk adjustment processes are continuously under public scrutiny and dynamic change. As a health actuary, you never know where your future will take you. Maybe yours will lead to risk adjustment as mine did. ■

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ENDNOTES

1 Geisinger Health Plan (GHP) may refer collectively to Geisinger Health Plan, Geisinger Quality Options, Inc., and Geisinger Indemnity Insurance Company unless otherwise noted.

2 Risk Adjustment, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html* (accessed December 11, 2017).

3 Centers for Medicare & Medicaid Services, *https://www.cms.gov/* (accessed December 11, 2017).

4 Medicare, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Medicare.html* (accessed December 11, 2017).

5 Medicare Advantage Rates and Statistics, Centers for Medicare & Medicaid Services, *https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/index.html* (accessed December 11, 2017).