Documentation and Coding Practices for Risk Adjustment and Hierarchical Condition Categories

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Risk adjustment is a statistical process that considers the underlying health status and health spending of patients when examining their healthcare outcomes or healthcare costs. There are several types of risk adjustment models that are used to risk-adjust healthcare data. Examples include:

- The Centers for Medicare and Medicaid Services (CMS) Value-Based Purchasing Programs (logistic regression model maintained by the National Healthcare Safety Network/Centers for Disease Control and Prevention)
- US News Rankings (3M-APR-DRGs)
- Health plan prescription rates (RxHCC)
- Medicare Advantage contract rates (CMS-HCC)
- Affordable Care Act Health Plan Premiums (HHS-HCC)

The purpose of this Practice Brief is to provide risk adjustment documentation and coding best practices for the CMS-Hierarchical Condition Category (HCC) and the Department of Health and Human Services (HHS)-HCC models. Although each model has different applications, both models rely on ICD-10-CM codes to risk adjust patients based on their health conditions. Important HCC risk adjustment documentation and coding topics are discussed from both the payers' and the providers' perspectives. When followed, these practices will ensure accurate reporting of conditions that impact risk adjustment. This Practice Brief focuses on the way in which clinical documentation and ICD-10-CM coding impacts these HCC models; it does not address the application of the model for reimbursement.

This is the full, unabridged version of this Practice Brief. An abridged version appeared in the June 2018 issue of *Journal of AHIMA*.

HCC Model Overview

HCC models are designed to predict the health spending for a specific patient population. In these models, the risk is equal to the level of expected healthcare spending. Healthcare plans and healthcare facilities utilize the models. Although the models are similar in purpose and structure, they each have unique characteristics to address the different patient populations for which they are utilized. Table 1 shows some of the characteristics for each model.

Table 1: Characteristics of the CMS and HHS Models

CMS-HCC Characteristics	HHS-HCC Characteristics
Primarily used for Medicare Advantage (Part C) reimbursement	Primary use is commercial payer managed care plans (Health Exchange plans under the Affordable Care Act)

Intended for patients over 65 and/or disabled patients	Intended for patients of all ages
Risk-adjusted attributes include age, gender, demographics, medical conditions, and institutional status	Risk-adjusted attributes include age, gender, demographics, medical conditions, and financial status
Data capture included in regular Medicare processes	Requires additional data capture for demographics
Predicts future medical spending	Predicts future medical and drug spending
Prospective: Uses diagnostic information from a base year to predict costs for the following year	Concurrent: Uses data from the current benefit year to predict costs for that same year
Includes a special needs plan for individuals with severe or disabling chronic conditions	Includes an adult model (age 21+), child model (age 2-20), and infant model (age 0-1)
Provides frailty adjustment to predict expenditures for the community-residing frail elderly	Contributing elements vary by age (e.g., child model does not include disease severity interactions and categories in the infant model are defined by birth maturity)

The HCC models use patient data to predict the estimated future costs for individual patients. The CMS-HCC model is prospective, meaning data is collected in the base year to determine expected costs for the following year (the "prediction" year). For example, data from 2018 (base year) will be used to predict expenses in 2019 (prediction year). The HHS-HCC model is concurrent, meaning the model predicts future expenditures associated with the current year's health events.

The HCC model was developed by examining how demographic characteristics and health diagnoses relate to health expenditures for the population under study. Though the specific demographic and health data elements vary between models, each uses the data to determine a risk adjustment factor (RAF). RAF is a relative measure used to predict the expenditure level of the patient. The RAF for the average patient is 1.0. Healthy patients have a below-average RAF (less than 1.0) while sicker patients have an above-average RAF (greater than 1.0). There are no negative RAFs. In this manner, the RAF is used as a mechanism to differentiate expected resource consumption for the healthy person, who rarely sees a physician, versus the person with multiple co-morbidities who requires complex management.

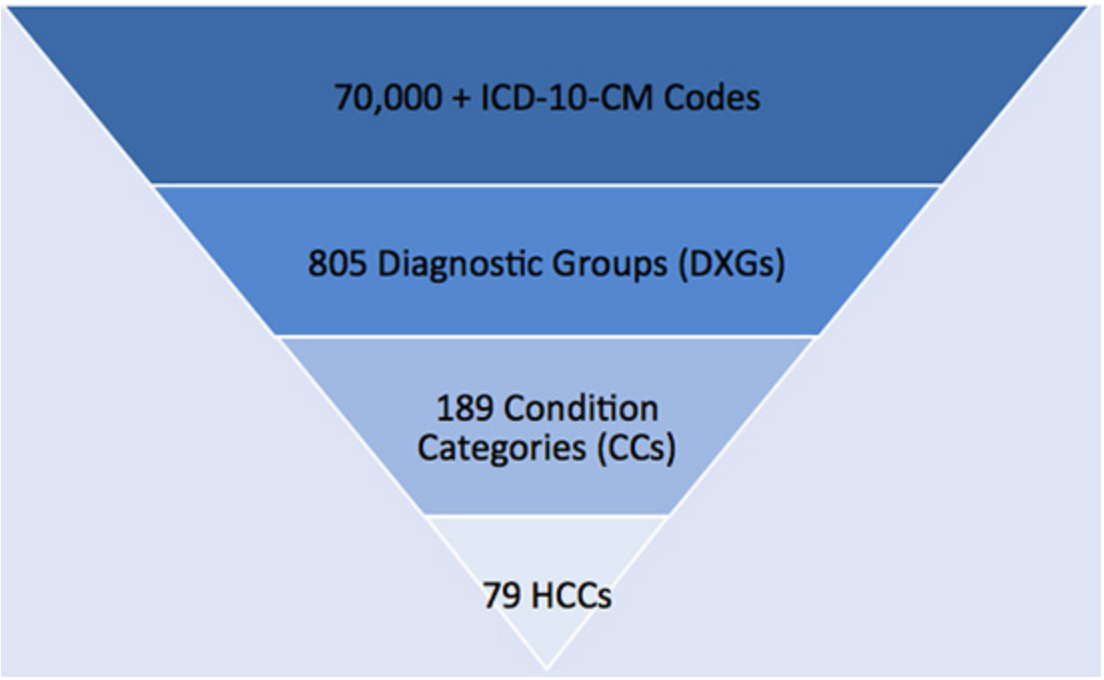
HCC Model Structure

HCC models use two primary sources of data to determine a patient's RAF: demographic characteristic and health status. Demographic data includes the patient's age, gender, and other factors specific to the population. The second primary data source—health status—is based on ICD-10-CM diagnosis codes.

While demographic data is straightforward, the collection and validation of patient diagnoses is complex. To identify the conditions that predict future healthcare costs, HCC models first organize diseases and conditions into body systems or disease processes, called diagnostic groups. Conditions in each diagnostic group are further organized into condition categories. ICD-

10-CM diagnosis codes are ranked into categories that represent conditions with similar cost patterns. Figure 1 illustrates this process for the CMS-HCC model.

Figure 1: CMS-HCC Model Structure



The CMS-HCC model focuses on long-term conditions such as diabetes, chronic obstructive pulmonary disease (COPD), and congestive heart failure (CHF) that impact the likelihood of future healthcare costs. The CMS-HCC model does not include acute illnesses and injuries that are not reliably predictive of ongoing healthcare costs. In contrast, the HHS-HCC model accounts for both chronic and acute conditions. Examples of acute conditions include maternity care, low birth weight babies, and organ transplants. Table 2 provides examples of condition categories in the CMS-HCC and HHS-HCC models.

Table 2: Sample Categories

CMS-HCC	Description	HHS-HCC	Description
HCC 84	Cardio-respiratory failure and shock	CC 127	Cardio-respiratory failure and shock, including respiratory distress syndromes
HCC 85	Congestive heart failure	CC 128	Heart assistive device/artificial heart
HCC 86	Acute myocardial infarction	CC 129	Heart transplant
HCC 87	Unstable angina and other acute ischemic heart disease	CC 130	Congestive heart failure

HCC 88	Angina pectoris	CC 131	Acute myocardial infarction
HCC 96	Specified heart arrhythmias	CC 132	Unstable angina and other acute ischemic heart disease
		CC 135	Heart infection/inflammation, except rheumatic
		CC 137	Hypoplastic left heart syndrome and other severe congenital heart disorders
		CC 138	Major congenital heart/circulatory disorders
		CC 139	Atrial and ventricular septal defects, patent ductus arteriosus, and other congenital heart/circulatory disorders
		CC 142	Specified heart arrhythmias

Each HCC has an associated value called the relative factor, like the relative weights that are used in DRG classification systems. Table 3 provides a sample of CMS-HCCs with the associated relative factor.

Table 3: CMS-HCC Examples

HCC	Description	*Relative factor
HCC 8	Metastatic cancer and acute leukemia	2.484
HCC 9	Lung and other severe cancers	0.973
HCC 10	Lymphoma and other cancers	0.672
HCC 17	Diabetes with acute complications	0.368
HCC 18	Diabetes with chronic complications	0.368
HCC 19	Diabetes without complication	0.118

HCC 85	Congestive heart failure	0.368
HCC 100	Ischemic or unspecified stroke	0.317

*CMS-HCC model v22

These relative factors contribute to the patient's RAF. An individual may have zero, one, or multiple HCCs that impact the RAF score that is calculated each calendar year. More details about the CMS-HCC structure can be found in Appendix C.

Yearly Reporting Requirement

A major component of the HCC models is that the individual HCCs are only valid for one year. Regardless of the HCC's fundamental chronicity, on January 1 the patient's HCC listing is blank. For example, a patient with diabetes with complications would need to have a face-to-face encounter with a provider where diabetes is discussed and documented for the appropriate HCC to be reported in the new base year. This doesn't mean that the HCC model assumes that the diabetes is cured. Rather, this requirement encourages traditional managed care concepts such as continuity of care, disease management, and case management. With such an emphasis on yearly code capture, provider education becomes a higher priority early in the year to prevent the loss of HCC diagnoses. Providers should be educated to understand that while chronic conditions continually impact the patient's health status, they are not implied under the HCC models. Risk adjustment coding professionals should identify the documentation gaps and guide providers on how to eliminate the gaps. Another strategy employed by Medicare Advantage Organizations to assist with recapturing valid patient conditions each year is to manage and monitor annual wellness programs. Providers and risk adjustment professionals work together to ensure quality and thorough documentation of patient conditions to support both risk adjustment and quality reporting initiatives.

As evident throughout this description of HCC models structure and reporting, the models rely on a patient's reported ICD-10-CM diagnosis codes to establish the patient's health status annually. Therefore, thorough clinical documentation and complete and accurate diagnosis coding are critical to compliant HCC reporting.

Risk Adjustment Documentation and Coding Practices

There are three steps involved in capturing and reporting HCCs:

- Validation of medical record eligibility
- Assignment of appropriate ICD-10-CM codes
- Submission of ICD-10-CM codes to CMS or HHS for reporting

Validation of medical record eligibility includes patient identification in the record, ensuring the provider is an eligible provider, and verifying that the record has been authenticated. For a provider to be eligible, the provider must be a qualified clinician who is present for the face-to-face encounter. Qualified clinicians include medical doctors (MD), nurse practitioners (NP), and physician assistants (PA). However, not all clinicians are considered eligible providers under HCC models. Non-eligible clinicians include registered nurses (RN) and medical assistants (MA). Furthermore, the collection of a specimen by a pathologist meets the face-to-face requirement, whereas a radiologist reading an imaging study is not considered a face-to-face encounter. To support an HCC, the corresponding diagnosis must be documented in a healthcare encounter that meets these eligibility requirements.

There are two important aspects of HCC coding:

1. Analyzing health record documentation to identify reportable conditions
2. Accurately assigning ICD-10-CM codes to these conditions

ICD-10-CM coding for HCC reporting is different from traditional ICD-10-CM coding because the intent is to report all conditions that affect the individual's health status concurrently across the continuum of care. Similar to traditional coding

practices—used for reimbursement, statistics, and research—all the conditions for a particular episode of care (inpatient admission, clinic visit, same-day surgery, etc.) are reported. In HCC coding, the risk adjustment coding professional codes all conditions for the episode of care like traditional coding. However, continuous review of the health record documentation throughout the year is necessary to ensure all conditions have been considered and abstracted by the end of the year.

To support an HCC, clinical documentation in the patient's health record must support the presence of the condition and indicate the qualified provider's assessment and/or plan for management of the condition. Organizations employ different strategies for reviewing clinical documentation. Some organizations use the "MEAT" approach:

- **M**onitoring
- **E**valuation
- **A**ssessment
- **T**reatment

Details about the MEAT approach are provided in Appendix D. Others use "TAMPER™":

- **T**reatment
- **A**ssessment
- **M**onitor/Medicare
- **P**lan
- **E**valuate
- Referral

These acronyms are useful to help risk adjustment coding professionals identify reportable conditions.

Risk adjustment coding professionals utilize the entire health record for ICD-10-CM coding. Many chronic conditions are HCCs. Specifically, during an inpatient admission these chronic conditions may be understated because the primary focus is to treat the acute condition(s). A common scenario would be a hip replacement encounter where the primary focus is on the fracture and recovery from surgery. Likewise, a clinic visit note for a patient presenting with an acute respiratory infection may or may not include the patient's chronic respiratory condition in the assessment section of the note. For both payers and providers, it is recommended that risk adjustment coding professionals closely examine all sections of the progress notes and employ strategies to determine if the documentation for chronic conditions meets the requirements for HCC reporting. As an example, risk adjustment coding professionals will closely review the Past Medical History (PMH), Active Problems, and/or Chronic Problems sections of provider documentation.

Specificity of the clinical documentation is critical because risk adjustment coding professionals must be able to determine if a condition is current and active. It is best practice for the risk adjustment team to educate providers about high-quality documentation that is required to support HCC reporting.

Some examples of provider documentation best practices include:

- Document all cause-and-effect relationships.
- Clearly link complications or manifestations of a disease process.
- Include all current diagnoses as part of the current medical decision-making process and document them in the note for every visit.
- Only document diagnoses as "history of" or "past medical history (PMH)" when they no longer exist and are resolved. Some examples include a history of a myocardial infarction (MI) or history of a cerebrovascular accident (CVA).

In addition to analyzing the quality of clinical documentation, organizations should define internal policies for risk adjustment coding professionals. Internal policies and procedures work to ensure compliance with HCC requirements and encourage consistency across the risk adjustment team.

Organizational policies might address the following risk adjustment coding principles:

- Chronic diseases should continue to be coded and reported on an ongoing basis if the patient receives treatment and care for the condition.

- All diagnoses that receive care and management during the encounter should be reported.
- Conditions that are no longer active and/or not being treated should not be reported. This includes problem list diagnoses that have been resolved.
- Report history of and status codes when pertinent and/or influential where there is an impact on current care or treatment.
- Documentation can be found in any section of the patient record for a face-to-face encounter. For instance, a diagnosis does not have to be in the assessment portion of a SOAP (subjective, objective, assessment, and plan) note to be eligible for abstraction and reporting.

Internal coding policies should be consistent with the ICD-10-CM Official Guidelines for Coding and Reporting and the American Hospital Association's (AHA's) *Coding Clinic for ICD-10-CM/PCS* advice. Organizations should require that risk adjustment coding professionals follow these guidelines. The guidelines provide direction for many of the coding issues that risk adjustment coding professionals struggle with. Table 4 provides examples of specific ICD-10-CM Official Coding Guidelines that are helpful in risk adjustment coding.

Table 4: Application of Official Guidelines to Risk Adjustment Coding

Coding Topic	Importance for Risk Adjustment	Official Guidelines
Etiology/Manifestation	Code both the etiology and the manifestation of certain conditions to capture all HCCs. Example: Cardiomyopathy due to amyloidosis. Report with two codes; both are HCCs.	Reference: A.13 "Certain conditions have both an underlying etiology and… manifestations due to the underlying etiology… there is a 'use additional code' note at the etiology code, and a 'code first' note at the manifestation code."
Excludes notes	Ensure that Excludes notes are followed. Example: The Excludes1 note for code I77.0, Arteriovenous fistula, acquired, indicates that this code is not reported for a patient with an arteriovenous shunt for dialysis. Reporting code I77.0 for an ESRD patient on dialysis is incorrect and would add an inappropriate HCC to the patient's health status.	Reference: A.12.a "An Excludes1 note indicates that the code excluded should never be used at the same time as the code above the Excludes1 note."
Malignancies	Ensure that history of malignancy coding guidelines are followed. Cancer that has been eradicated and is no longer under treatment is not an HCC, but malignancy currently receiving active treatment is an HCC.	Reference: I.C.2.a. and d. and m. "…the primary malignancy code should be used until treatment is completed."

Injury/Poisonings 7th Character	Ensure the correct 7th character is accurately assigned. An initial encounter for fracture care is an HCC, however subsequent encounters for routine healing are not HCCs.	Reference: I.C.19.c.1 Subsequent care character is used "…for encounters after the patient has completed active treatment of the fracture…."
Code Specificity	Coding specificity can impact HCCs. Example: Major depressive disorder unspecified is not an HCC, but major depressive disorder specified as mild, single episode is an HCC.	Reference: I.B.18 Code each condition to the highest degree of specificity supported in the health record.

Though the same ICD-10-CM Official Guidelines for Coding and Reporting and AHA's *Coding Clinic for ICD-10-CM/PCS* advice apply for both risk adjustment coding and traditional coding, coding management strategies do vary. It can be a challenge to effectively manage and monitor both. A best practice in all organizations—both payers and providers—is to promote thorough diagnosis coding for every encounter. This includes both acute conditions that support medical necessity for current treatment and chronic conditions impacting care that support accurate HCC reporting.

Another best practice for payers and providers is to ensure that all ICD-10-CM codes for the encounter are captured in the electronic health record (EHR) and are correctly passed to the practice management platform and submitted on a claim. While the electronic claim forms may accommodate 12 diagnoses for the professional 837P and 25 for the institutional 837I, some EHRs cannot capture that many per encounter. Coding professionals should ensure that the codes captured are in appropriate order, identifying the principal diagnosis (or first-listed diagnosis for physician services). Organizations should work with the EHR vendor, the clearinghouse, IT support, and the health plan to ensure the maximum reporting opportunities are available and to avoid missing eligible HCC diagnoses. This will ultimately ensure that all relevant and valid HCCs are submitted to CMS.

Accurate risk adjustment coding requires additional skills beyond traditional coding. Risk adjustment coding training should explicitly address the following topics:

- Overview of the HCC/risk adjustment factor (RAF) methodology.
- Review of criteria to identify reportable conditions (e.g., MEAT or TAMPER™).
- A refresher of the ICD-10-CM Official Guidelines for Coding and Reporting with a focus on risk adjustment coding and where correct coding is most impactful in the applicable HCC model.
- Education for the appropriate interpretation and use of AHA Coding Clinic advice.
- Familiarity with clinical indicators (e.g., testing, treatment, medications) for chronic conditions to recognize the current nature and/or presentation of the condition.
- Practice analyzing clinical documentation to recognize when documentation meets criteria for assignment of chronic secondary diagnosis codes.
- Review of audit requirements to ensure understanding of the monitoring processes employed by CMS for validation of code abstractions.

An excellent resource for risk adjustment coding training is the CMS 2008 Risk Adjustment Data Technical Assistance for Medicare Advantage Organizations Participant Guide. This guide outlines everything from methodology to risk score verification.

Risk Adjustment Coding Analysis

In addition to high quality documentation and accurate diagnosis coding, effective management of the HCC program is critical to success. One provider management best practice is to use data analytics to support your program. Data analytics is a key

component of a successful HCC risk adjustment program. There are several sources of data that can be utilized by a healthcare provider organization and/or health plan. One source is disease registries. Disease registries can be used to identify aberrant coding patterns. Analyzing the disease registry data can help identify under- and over-coding areas. For example, patients may be entered in a diabetes registry based on prescribed medications (e.g., Glucagon or insulin use) and laboratory tests (e.g., HbA1c). Diabetes coding, for presumed diabetic patients included in the diabetes registry, should be analyzed at least annually to identify any coding patterns suggestive of gaps in HCC reporting. Once aberrant coding patterns are identified via data mining, chart review should be performed. The purpose of the chart review is to determine if there is a gap in either coding, clinical documentation, or patient care that should be addressed. Some examples of disease registries that correlate with HCC conditions include:

- Arthritis
- Atrial fibrillation
- Congestive heart failure (CHF)
- Chronic kidney disease (CKD)
- Chronic obstructive pulmonary disease (COPD)
- Depression
- Morbid obesity

Managers should explore which disease registries are maintained in their organization or state, identify the data sources used to derive registry information, and consider how those registries might be utilized to monitor compliance in their HCC program.

Another source of data is the CMS Chronic Conditions Prevalence Data (found at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main.html). This data set can be used to research disease prevalence by demographic elements. Like disease registries, payers can use data mining to help identify gaps in documentation and diagnosis capture. Reporting below the prevalence rate could mean under-coding while reporting higher than the prevalence could mean over-coding.

A third data source is a facility's claims data, analyzed in conjunction with clinical data. By creating algorithms, payers and providers may identify opportunities for HCC capture. Using rheumatoid arthritis as an example, medication data can be used to identify patients with active prescriptions for methotrexate. Laboratory data can identify patients that have a Rheumatoid Factor test with a positive result. This data can then be compared with diagnosis codes in the claims data. Patients with positive medication and laboratory data but without rheumatoid arthritis diagnoses can be targeted for further review.

Another approach to examine reporting patterns is using claims data to identify anomalies. For instance, a patient with HIV might be expected to receive multiple healthcare services. Therefore, if a patient has HIV reported only once in the calendar year, then the risk adjustment coding professional may initiate a health record review to confirm the presence of this HCC. Similarly, it would be unusual for a patient to have multiple strokes in a brief period. If the code for CVA is reported for multiple office visits, then the risk adjustment coding professional should examine health record documentation to determine if a diagnosis code for stroke residuals or sequelae is more accurate.

These data-driven methods are extremely useful to focus resources on detecting and correcting aberrant coding patterns that result in incomplete or inaccurate HCC reporting. It is best practice for both payers and providers to identify and address areas of concern, before the end-of-year final submission, to ensure compliance with HCC standards.

Risk Adjustment Auditing and Monitoring

The final area of focus in risk adjustment coding is a robust audit and monitoring program. High quality data and coding accuracy promote compliance.

Given the complexity of documentation and coding for accurate HCC capture, it is best practice for both healthcare provider organizations and payers to conduct regular monitoring for correct coding. Risk adjustment coding leaders should monitor for the following common coding errors:

- Reporting only the primary or principal diagnosis
- Coding rule-out, possible, or probable diagnosis codes from outpatient records

- Coding resolved or historical conditions as current (e.g., MI or CVA)

Coding leaders should review these problem areas with risk adjustment coding professionals. Not only are leaders ensuring opportunities for additional HCCs are leveraged, but they are also ensuring opportunities to correct erroneously reported HCCs are identified. The balance is essential to ensure overall coding compliance. A common opportunity would be related to malignancies where the coding leadership would ensure that documentation clearly supported active or historical status to avoid inappropriately capturing a HCC that could lead to an inflated RAF.

CMS has a formal audit program to monitor health plan compliance with HCC reporting regulations. The Risk Adjustment Data Validation (RADV) audits are designed to ensure that a health plan received appropriate risk adjustment based on their patients' health status. Table 5 provides characteristics for three types of RADV audits.

Table 5: Characteristics of RADV Audits

CMS-RADV National Sample	CMS-RADV Targeted Sample	HHS-RADV
Annual participation for most plans	Random sample of plans to participate	All plans participate each year
Small sample size	Up to 201-member sample per plan contract	200-member sample per plan contract
Calculate error rate with no fiscal impact	Error rate is calculated and extrapolated across the contract population	Results applied to risk adjustment fund transfers
Can occur several years after the benefit year	Can occur years after the benefit year	Occurs each year auditing the previous benefit year

The goal of RADV audits is to ensure that the health status submitted by the plan is supported by health record documentation and meets reporting guidelines. Expert coding professionals are utilized to validate reported HCCs with submitted health record documentation. The reviewer will determine if the HCC is supported or unsupported. Unsupported HCCs are removed from the patient's RAF. If the audit identifies a new HCC, it is added to the patient's RAF and helps offset relative factors associated with unsupported HCCs that have been removed. The results from the RADV audit should be analyzed by coding management to identify patterns of incorrect coding or health record documentation insufficiencies. These lessons should be communicated to leadership, providers, and coding staff. Revised guidance and procedures should be incorporated into the HCC management plan. Significant areas of concern found in the RADV audits should become part of the organization's internal HCC audit and monitoring program.

A best practice strategy for risk mitigation from both the payer and provider perspective is to conduct an internal mock RADV audit. There are two approaches that may be utilized to execute a mock RADV. The first is to mimic the CMS process as closely as possible by selecting a random sample of patients for a full-scope retrospective chart audit. The second approach is to select a targeted random sample. The targeted patient population may be patients that have a specific HCC or set of HCCs, demographic characteristic, or previously identified areas of concern. Organizations that have never participated in a targeted CMS-RADV audit should consider the first option to achieve a baseline measurement. Organizations that have participated in a targeted CMS-RADV may choose to select the second option. Ideally, conducting each on alternate years, or based upon opportunities identified in the results, will be most beneficial. The most ideal time of year to conduct a mock RADV would be in the third quarter of the year. This ensures that the audit results can be utilized during the fourth quarter before the calendar

year documentation deadline and/or the HCC deadline. The mock RADV data can be used to close gaps and rectify identified opportunities in the base year. This helps ensure a complete and accurate RAF for the benefit (prediction) year.

Risk Adjustment Coding a Joint Effort

Risk adjustment coding requires health plan management, provider group management, physicians, non-physician providers, and highly skilled coding professionals to work together to capture the health status of their patient membership. Each player is critical for success under the risk adjustment programs. Health plan management and provider group management must provide leadership that supports the risk adjustment coding department to execute initiatives to improve health record documentation and risk adjustment coding. Physicians and eligible non-physician providers must ensure their documentation complies with HCC reporting requirements and demonstrates that conditions are evaluated, monitored, assessed, and/or treated during face-to-face encounters. Risk adjustment coding professionals must follow best practice guidelines to ensure accurate coding and reporting of HCCs on a yearly basis. By working together, the health plan and provider organizations can ensure compliance and optimal financial results under HCC risk adjustment models.

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Acknowledgments

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Appendices

Appendix A: Ten Principles of Risk Adjustment

Principle	Description
1. Clinically meaningful diagnostic categories	Each diagnostic category is a set of ICD-10-CM codes that relate to a reasonably well-specified, clinically meaningful disease or medical condition that defines the category.
2. Diagnostic categories should predict medical (and/or drug) expenditures	Diagnoses in the same HCC should be reasonably homogeneous with respect to their effect on both current year costs (for concurrent risk adjustment) or next year's cost (for prospective risk adjustment).
3. Adequate sample size of diagnostic categories	Diagnostic categories that will affect payments should have adequate sample sizes to permit accurate and stable estimates of expenditures.
4. Hierarchies apply only within related disease processes	Costs are additive across hierarchies and disease groups, but not within hierarchies. Thus, in creating an individual's clinical profile, hierarchies should be used to characterize the person's illness level within each disease process, while the effects of unrelated disease processes accumulate.
5. Encourage diagnosis code specificity	Vague diagnostic codes should be grouped with less severe and lower-paying diagnostic categories to provide incentives for more specific diagnostic coding.

6. Repeated use of diagnoses is not rewarded	The model should not measure greater disease burden simply because more diagnosis codes are present. Predicted costs are not increased by the number of times a particular code appears or the presence of additional, closely related codes indicative of the same condition.
7. Repeated use of diagnoses is not penalized	Providers should not be penalized for recording additional diagnoses. This requires that no HCC should carry a negative payment weight and higher-ranked diseases in the hierarchy should have at least as large a payment weight as lower-ranked disease.
8. Consistency in ranking diagnostic categories	If diagnostic category A is higher-ranked than category B in a disease hierarchy, and category B is higher-ranked than category C, then category A should be higher-ranked than category C.
9. All ICD-10-CM codes included	Because each diagnostic code potentially contains relevant clinical information, the model should categorize all ICD-10-CM codes.
10. Exclude discretionary diagnostic categories	Diagnoses that are subject to discretionary coding variation, inappropriate coding, or that are not credible as cost predictors should not increase cost predictions.

Source: Centers for Medicare and Medicaid Services. "March 31, 2016, HHS-Operated Risk Adjustment Methodology Meeting Discussion Paper." March 24, 2016. www.cms.gov/CCIIO/Resources/Forms-Reports-and-Other-Resources/Downloads/RA-March-31-White-Paper-032416.pdf.

Appendix B: Summary of Characteristics of the CMS-HCC Models

Characteristics	**Description**
Selected significant disease (SSD) model	Model considers serious manifestation of a condition rather than all levels of severity of a condition. Includes most body systems and conditions.
Models are additive	Individual risk scores are calculated by adding the coefficients associated with each patient's demographic and disease factors.
Prospective model	Uses diagnostic information from a base year to predict costs for the following year.
Site neutral	Models do not distinguish payment based on a site of care.
Diagnostic sources	Models recognize diagnoses from hospital inpatient, hospital outpatient, and physician settings.

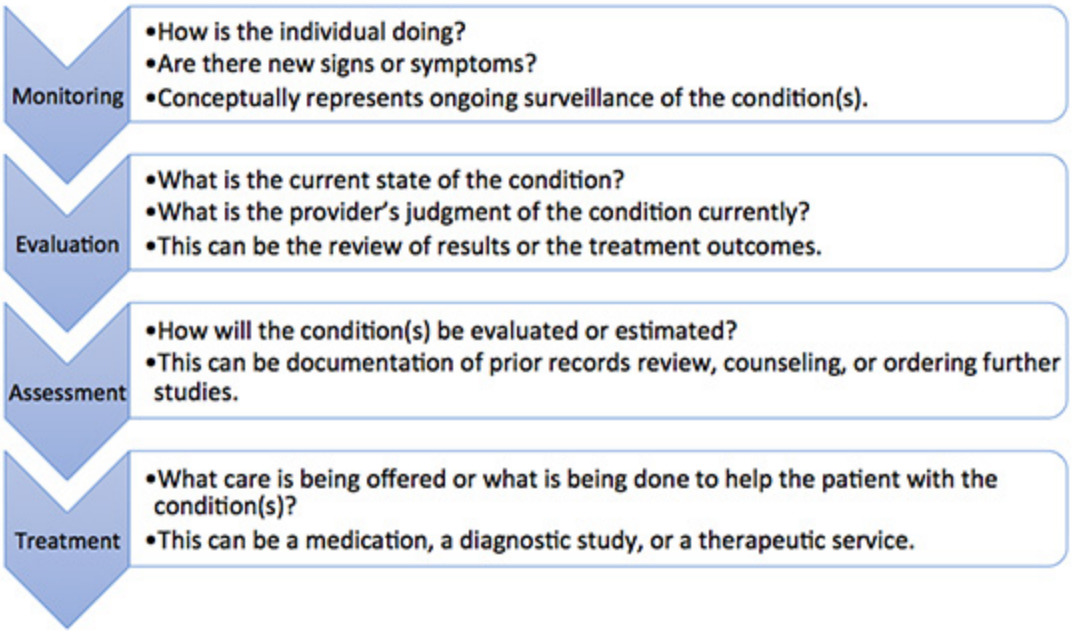
Multiple chronic diseases considered	Risk adjusted payment is based on assignment of diagnoses to disease groups, also known as Condition Categories (CCs). Model is most heavily influenced by Medicare costs associated with chronic disease.
Hierarchies	Condition Categories are placed into hierarchies, reflecting the severity and cost dominance. Beneficiaries get credit for the disease with the highest severity or the one that subsumes the costs of other diseases. Hierarchies allow for payment based on the most serious conditions when less serious conditions also exist.
Disease and disabled interactions	Interactions allow for higher risk scores for certain conditions when the presence of another disease or demographic status (e.g., disabled status) is indicative of higher costs. Disease interactions are additive factors and increase payment accuracy.
Demographic variables	Models include five demographic factors: age, sex, disabled status, original reason for entitlement, Medicaid or low-income status. These factors are typically measured as of the data collection period.

Source: Centers for Medicare and Medicaid Services. Medicare Managed Care Manual. Chapter 7 – Risk Adjustment, 70 – Risk Adjustment Models – Overview. www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Internet-Only-Manuals-IOMs-Items/CMS019326.html.

Appendix C: Details for CMS-HCC Model Structure

Structure Concept	**Details**
Hierarchical	In the HCC models, HCC conditions are hierarchical, meaning diagnoses that are clinically related are ranked by severity in a hierarchy. For example, there is a hierarchy for diabetes (see Table 3). Only one of the three diabetes HCCs may be reported for a patient per year.
Additive Across Hierarchies	When a hierarchy is not applicable, the HCCs accumulate for a patient. For example, a male with heart disease, stroke, and cancer would be assigned three separate HCCs, and his RAF would include the sum of the relative factors for all three categories (e.g., HCCs 85, 100 and 10; see Table 3). Thus, HCC models are additive across hierarchies and disease groups, but not within hierarchies.
Disease Interactions	The CMS-HCC model also incorporates additional relative factors for disease interactions. Certain combinations of diseases have been determined to increase the cost of care. For example, a patient with diabetes and CHF has higher expected costs than a patient that has only diabetes or a patient that has only CHF. Disease interactions result in higher risk scores when the disease pairs are present. The model includes disease-disease interactions as well as disability-disease interactions. For example, in the CMS-HCC model v22, the disease interaction of diabetes and CHF adds a relative factor of 0.182.

Appendix D: MEAT approach details



Article citation:
Watson, Monica M. "Documentation and Coding Practices for Risk Adjustment and Hierarchical Condition Categories." *Journal of AHIMA* 89, no.6 (June 2018): extended online version.