Global and Professional Direct Contracting and Kidney Care Choices Models

PY2022 Risk Adjustment

Prepared for:
Centers for Medicare & Medicaid Services (CMS)
Center for Medicare & Medicaid Innovation
Seamless Care Models Group
7500 Security Boulevard, N2-13-16
Baltimore, MD 21244-1850

Prepared by:
RTI International

Reference Documents

Title
Global and Professional Direct Contracting Model: Financial Operating Guide: Overview
Global and Professional Direct Contracting Model: Financial Companion to Operating Guide Overview: Standard DCE
Global and Professional Direct Contracting Model: Financial Companion to Operating Guide Overview: New Entrant DCE
Global and Professional Direct Contracting Model: Financial Companion to Operating Guide Overview: High Needs Population DCE
Global and Professional Direct Contracting Model: Financial Operating Policies: Capitation and Advanced Payment Mechanisms
Global and Professional Direct Contracting Model: Financial Companion to Capitation and Advanced Payment Mechanisms
Global and Professional Direct Contracting and Kidney Care Choices Models: DC/KCC Rate Book Development
Global and Professional Direct Contracting Model: Financial Reconciliation Overview
Kidney Care Choices Model: Financial Operating Guide: Overview

Table of Contents

I. Executive Summary

Global and Professional Direct Contracting (GPDC) and the Comprehensive Kidney Care Contracting (CKCC) Options of the Kidney Care Choices (KCC) Model advance risk-sharing arrangements and build on the financial and benchmarking methodologies used in the Centers for Medicare & Medicaid Services' (CMS's) Accountable Care Organization portfolio. Risk adjustment is a pivotal determinant in these financial arrangements in ensuring that payments are fair and accurate and that they reflect the true health status of the population being served. A risk adjustment goal is to promote payment accuracy, with a special focus on high-needs populations with high costs. A further goal is to direct provider resources away from coding intensity activities by reducing coding incentives and opportunities for increased payments resulting from higher risk scores which do not reflect disease burden.

In GPDC, risk adjustment is used to adjust expenditures for beneficiary health risk and establish Performance Year (PY) Benchmarks. GPDC applies the CMS-Hierarchical Condition Categories (HCC) prospective risk adjustment model used in the Medicare Advantage program and a new Center for Medicare & Medicaid Innovation (CMMI)-HCC concurrent risk adjustment model. Risk scores for beneficiaries aligned to Standard and New Entrant Direct Contracting Entities (DCEs) are calculated using the CMS-HCC prospective risk adjustment model, the End-Stage Renal Disease (ESRD) prospective risk adjustment model, and the demographic-based New Enrollees risk adjustment model. These three risk adjustment models have been used for years in Medicare, and the impact of these risk adjustment models on payment will be predictably stable and is well understood.

Risk scores for beneficiaries aligned to High Needs Population DCEs are calculated using the new CMMI-HCC concurrent risk adjustment model[1] and the ESRD prospective risk adjustment model. The new CMMI-HCC concurrent risk adjustment model is similar to the CMS-HCC prospective model. The key difference is that it uses demographic indicators and diagnoses from a given year to predict expenditures in that same year. This is expected to provide a more stable financial position for High Needs Population DCEs serving small, complex, chronically sick and seriously ill populations with highly variable, high-expenditure needs. The Innovation Center is testing whether this concurrent risk model is better able to predict costs for a high-needs population, particularly because this new risk adjustment model is expected to better capture a rapid deterioration in health *in the current year*, such as through the occurrence of acute episodes that are difficult to predict or prevent (e.g., heart attack).

The Innovation Center encourages participants to improve their care management and coordination, which will likely result in the participants engaging in more complete coding of chronic conditions. Nonetheless, risk adjustment in GPDC is subject to limits in risk score growth over the performance period. For Standard and New Entrant DCEs, an annual retrospective Coding Intensity Factor (CIF) is used in combination with the application of a symmetric 3% cap to limit risk score growth. The normalized risk scores are subject to the cap first, and then to the retrospective CIF. Risk scores for voluntarily aligned beneficiaries will initially be excluded from this calculation (i.e., voluntarily aligned beneficiaries that are newly aligned will be excluded from this calculation, however, voluntarily aligned beneficiaries that are continuously aligned in the following model performance year will be included in this calculation). Similarly, High Needs Population DCEs are subject to the retrospectively applied CIF; however, initially they will not be subject to the cap. A cap may be applied to the High Needs Population

[1] Expenditures for New Enrollees, for their months of Model eligibility, have been incorporated into the calibration of the CMMI-HCC concurrent risk adjustment model, making a separate new enrollee model unnecessary.

DCEs starting in PY2024 and onward if their level of coding growth observed is greater than the capped coding growth observed for the Standard and New Entrant DCEs.

The CKCC Options of the KCC Model use the CMS-HCC prospective risk adjustment model for all aligned beneficiaries with late-stage Chronic Kidney Disease and the CMS-HCC ESRD risk adjustment model for all aligned beneficiaries with ESRD to risk adjust expenditures and establish the PY Benchmarks. For Kidney Contracting Entities (KCEs), a KCE-level symmetric cap on risk score growth is applied. The risk scores are normalized first, and then the cap is applied.

The combined approach of applying the CMS-HCC prospective risk adjustment model and the CMMI-HCC concurrent risk adjustment model with these coding intensity adjustments is intended to improve payment accuracy for vulnerable subpopulations while mitigating the incentive for organizations to redirect valuable resources toward coding optimization activities and risk score growth.

II. Introduction

Global and Professional Direct Contracting (GPDC) and the Comprehensive Kidney Care Contracting (CKCC) Options of the Kidney Care Choices (KCC) Model advance risk-sharing arrangements and build on the financial and benchmarking methodologies used in the Centers for Medicare & Medicaid Services' (CMS's) Accountable Care Organization (ACO) portfolio. In these models, CMS's risk adjustment goals are to promote payment accuracy with a focus on organizations that manage complex, chronically sick and seriously ill patients. Consequently, refinements to existing risk adjustment methodologies have been made to promote fair and accurate payment for these populations alongside a coding intensity policy which limits risk score growth. This will help to ensure that GPDC and CKCC participants are paid accurately and fairly relative to the true health status of the patient population being served and that Model savings are not put at risk.

GPDC is applying the CMS-Hierarchical Condition Categories (HCC) prospective risk adjustment model used in Medicare Advantage (MA) and a new Center for Medicare & Medicaid Innovation (CMMI)-HCC concurrent risk adjustment model. The new CMMI-HCC concurrent risk adjustment model is based on the CMS-HCC prospective risk adjustment model. Risk scores for Standard and New Entrant Direct Contracting Entities (DCEs) are calculated using the CMS-HCC prospective risk adjustment model, while risk scores for the High Needs Population DCEs are calculated using the CMMI-HCC concurrent risk adjustment model. The CMS-HCC End-Stage Renal Disease (ESRD) risk adjustment model is also used for all aligned ESRD beneficiaries in the three DCE types. The New Enrollees risk adjustment model is used for new enrollees aligned to the Standard and New Entrant DCEs only.[2] The CMS-HCC ESRD risk adjustment model and the New Enrollees risk adjustment models are the same risk adjustment models as those used in MA.

For all three DCE types, a retrospective Coding Intensity Factor (CIF) is applied to aligned beneficiary risk scores to limit risk score growth relative to the baseline period. In addition, a DCE-level cap is applied to the growth in risk scores for the Standard and New Entrant DCE types to further diminish the incentive for coding intensity that does not reflect true health status burden. A cap may also be applied to High Needs Population DCEs, starting in PY2024 onward, if the level of coding growth observed among these DCEs is greater than the capped coding growth observed for the Standard and New Entrant DCEs. The

[2] Expenditures for New Enrollees in the High Needs Population DCE type, for their months of Model eligibility, have been incorporated into the calibration of the CMMI-HCC concurrent risk adjustment model, making a separate New Enrollees model unnecessary.

combined approach of applying the CMS-HCC prospective risk adjustment model and the CMMI-HCC concurrent risk adjustment model with these coding intensity adjustments is intended to improve payment accuracy for vulnerable subpopulations while mitigating the incentive for organizations to redirect valuable resources toward coding optimization activities and risk score growth.

The CKCC Options of the KCC Model uses the CMS-HCC prospective risk adjustment model for all aligned beneficiaries with late-stage Chronic Kidney Disease (CKD) and the CMS-HCC ESRD risk adjustment model for all aligned beneficiaries with ESRD to risk adjust expenditures and establish the PY Benchmarks. These are the most recent risk adjustment models developed for the MA program. A cap is applied to the growth in risk scores starting in PY2022; however, unlike GPDC, there is no retrospective CIF applied to risk scores.

The purpose of this paper is to provide Model participants with detailed information on the different risk adjustment models and the application of risk adjustment to the three DCE types and Kidney Contracting Entities (KCEs). First, background information, including the history and general purpose of risk adjustment, is discussed. Second, the unique applications of risk adjustment to (1) Standard and New Entrant DCEs, (2) High Needs Population DCEs, and (3) CKCC, are addressed. Next, a discussion on how risk scores are monitored and audited, and how they are reported for operational purposes to all participants during the performance period, is provided. Finally, the appendices provide the relative risk factors and hierarchy information for the newly designed CMMI-HCC concurrent risk adjustment model.

III. Background

In GPDC and the CKCC options of the KCC Model, CMS is building on a platform of extensive experience with the CMS-HCC risk adjustment model and its application to risk adjust payments in MA. This same risk adjustment model has also been used in the Shared Savings Program and a number of Innovation Center models, including the Next Generation ACO (NGACO) Model, Comprehensive ESRD Care Model, and Comprehensive Primary Care Model. Further, CMS is using a variant of the CMS-HCC model in the concurrent models for the Affordable Care Act exchanges. Within this context, this section of the paper explains the history and general concepts of risk adjustment, coding intensity, and normalization.

i. Concept and History of the CMS-HCC Prospective Risk Adjustment Model

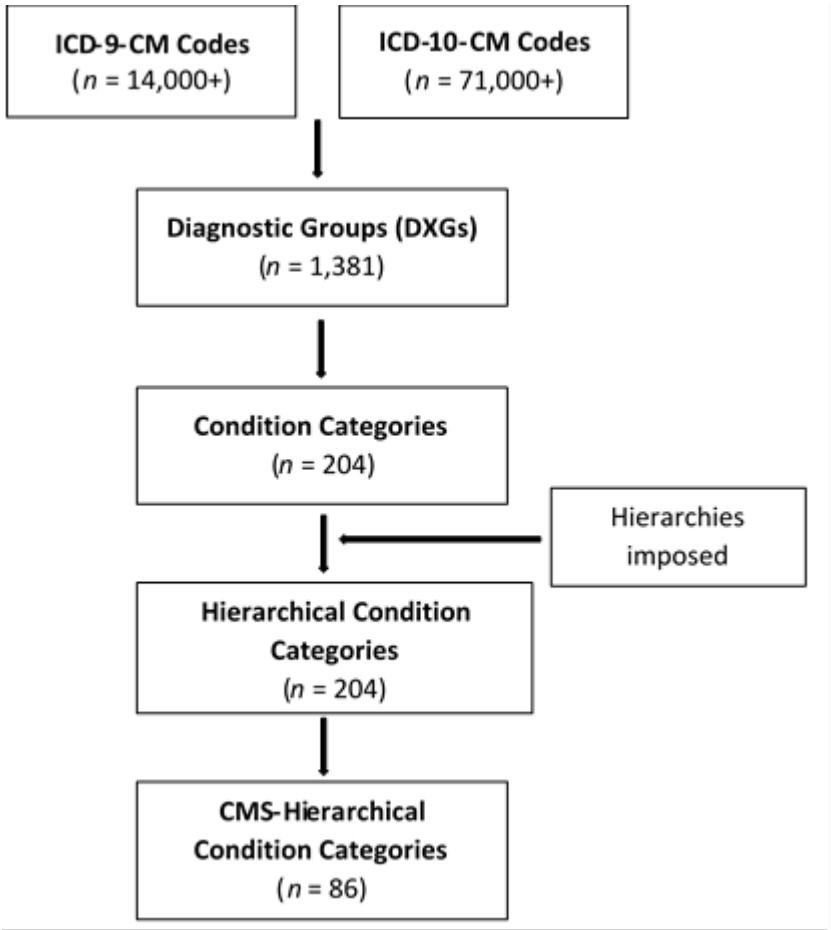
The CMS-HCC prospective risk adjustment model is used as a method for measuring the health risks of an enrollee population and modifying payments to reflect the predicted expenditures of that population. Measurement of enrollee risks is achieved by designing and estimating models to predict expenditures based on enrollee demographic characteristics, medical diagnoses, and other individual information. These models assign a risk score, scaled such that the population average is 1.0, to each individual in a population, and the mean risk score for a group of enrollees indicates the group's overall health risks and expected level of health care expenditures. This mean risk score can be applied to adjust provider payments either upward or downward to better reflect the health status and predicted health care expenditures for a beneficiary.

Medical diagnoses in risk adjustment models are represented by HCCs. These are groups of diagnosis codes obtained from beneficiary claims data (bills to Medicare submitted by medical care providers) to indicate sets of similar medical conditions. The diagnosis codes are grouped first into Condition Categories (CCs) that are related clinically and associated with similar costs. Some of the CCs are then organized into hierarchies, in which having a more severe manifestation of an illness takes precedence over a less-severe manifestation; and for purposes of risk adjustment a beneficiary would have only one

HCC flag in any given hierarchy (see **Figure 1**). Risk adjustment models are additive, which means that an individual's risk score will reflect the sum of the estimated cost increments for all diagnosed conditions, except where a lower HCC in a hierarchy is superseded by a higher HCC.

The CMS-HCC risk adjustment model used in MA, the Medicare Shared Savings Program, and the different Innovation Center models is a prospective model design, in which the payment or PY expenditures are predicted using the prior year's diagnoses, and hence the current year's risk scores are calculated based on diagnoses recorded during the previous calendar year. The HHS-HCC model used to calculate transfer payments and charges for the Exchanges under the Affordable Care Act is a concurrent model—using current-year diagnoses to predict expenditures and generate risk scores for the same year.

Figure 1. CMS-HCC Prospective Risk Adjustment Model Used in MA Version 24, HCC Definition and Clinical Hierarchies



In Medicare, the CMS-HCC prospective risk adjustment model is generally applied to payments where organizations are serving relatively large panels of enrollees or aligned beneficiaries. With larger panels of enrollees and aligned beneficiaries, challenges associated with risk scores and random variation in high-need, high-expenditure beneficiaries diminish; acute events that are hard to predict tend to get averaged out across the population. In smaller panels, however, an unusually high (or low) frequency of acute events can have large financial impacts. In this context, a concurrent model is well suited to improve fairness by compensating for unforeseen spikes in acute events.

ii. Normalization

Normalization is a mechanism to calibrate the population-average risk score to 1.0 in a given year. Risk models are calibrated using expenditures incurred within a particular year, the denominator year. In Medicare, when risk scores are calculated for beneficiaries and expenditures in years other than the denominator year, the average population risk score can diverge from 1.0 because of changes in the demographic structure of the Medicare fee-for-service (FFS) population, the prevalence of conditions in the FFS population, and the reporting of conditions on FFS claims. If population risk scores have an

average greater (less) than 1.0 and are applied to the expected cost of care in the payment year, there will be an overpayment (underpayment) to the population in aggregate. In MA, CMS applies a normalization factor to risk scores in years other than the denominator year to maintain a 1.0 average risk score for the population and avoid over/underpayment.[3]

iii. Coding Intensity

Risk adjustment affects each DCE's and KCE's financial Benchmark and DC/KCC Rate Book, which links each participant's payments to its risk scores. This sets up an incentive for providers to code more diagnoses on their claims to raise their PY risk scores, a practice known as greater "coding intensity" (alternately, "more complete and accurate coding"). Coding intensity does not necessarily involve fraud because there is some discretion and variability in what diagnoses are recorded on claims and different degrees of "diagnostic discovery." Further, the Innovation Center encourages participants to improve their care management and coordination, which will likely result in the participants engaging in more complete coding of chronic conditions.

Given the incentives for greater coding intensity, Medicare payment programs employing risk adjustment have established mechanisms to offset the effects of greater diagnostic coding on Medicare payments—that is, to avoid or limit any overpayments resulting from differential coding patterns. The Innovation Center's NGACO program, for example, employs caps to limit the amount of risk score growth (or decline) reflected in Benchmarks for ACO-aligned beneficiaries. The MA program makes a coding pattern adjustment to MA risk scores. The Medicare Shared Savings Program originally did not allow any increase in ACO continuously assigned beneficiary risk scores (other than from demographic factors) to affect Benchmarks and is now employing a 3% cap on risk score growth.

IV. Application of Risk Adjustment

In GPDC and KCC (CKCC options), risk adjustment is applied to determine the Benchmarks and also to standardize Benchmark components (baseline expenditures and the DC/KCC Rate Book). The Benchmarks are adjusted to reflect the health status of the aligned beneficiaries being served in each PY. The Benchmark components are standardized to calculate the costs of an average 1.0 beneficiary in Medicare FFS. Furthermore, refinements to the risk adjustment approach are being implemented to address two challenges: (1) accurately risk adjusting payments to small organizations serving complex, chronically and seriously ill beneficiaries with high expenditures; and (2) reducing provider incentives to increase risk scores through increased diagnosis reporting. Risk adjustment is also applied to the capitated payments in GPDC so that these payments reflect the health status of the aligned beneficiaries.

Benchmarks. Risk scores calculated by the methods described in this paper affect the Benchmark calculation for each DCE or KCE, which in turn affects shared savings or losses amounts. Each DCE or KCE is assigned a risk score calculated as the mean of the individual risk scores of its assigned beneficiary population, weighted by eligible months of assignment to that DCE or KCE. These risk scores are derived from demographic characteristics and diagnoses recorded on FFS Part A and Part B claims.[4] Each DCE or KCE risk score indicates predicted expenditures for its aligned beneficiaries relative to the mean of the

[3] https://www.cms.gov/files/document/2021-advance-notice-part-ii.pdf, p. 35.
[4] The MA data filtering logic is applied for the calculations of risk scores.

population and is necessary to ensure that the Benchmark is appropriate for measuring cost performance. Risk scores for a DCE or KCE are distinct for Aged & Disabled and ESRD Benchmarks.

Capitated Payments. For GPDC, the Total Care Capitation and Primary Care Capitation capitated payments made to a DCE are subject to risk adjustment. Risk scores calculated for the different DCE types are used to risk adjust these payments because these payments are calculated as a percentage of the PY Benchmark. For the CKCC options of the KCC Model, the payment mechanisms (CKD Quarterly Capitation Payment, Adjusted Monthly Capitation Payment, and Kidney Transplant Bonus) are not risk adjusted.

Standardizing Blended Benchmark Components. Lastly, in the process of calculating the standardized Blended Benchmark, the baseline and regional rate (determined from the DC/KCC Rate Book) components are standardized with risk scores to estimate an average 1.0 expenditure amount.

Coding Intensity and Normalization. Risk scores are normalized and subject to coding intensity limitations. The GPDC and KCC Models each use different measures to reduce increases in payments triggered by increases in risk score growth and also to reduce payment incentives to engage in activities targeting risk score growth.

GPDC incorporates adjustments for coding intensity that include a retrospective CIF adjustment and a risk score growth cap. After normalizing risk scores for growth relative to a reference population (see section on Normalization below), a retrospective CIF is applied to ensure no net growth in average risk scores. Nonetheless, individual DCEs may still experience risk score growth. To limit the impact of and reduce incentives for coding intensity by each DCE, a symmetric cap of ±3.0% is also applied to the risk scores for Standard and New Entrant DCEs. This cap is applied before the retrospective CIF adjustment. A cap may be applied to the High Needs Population DCEs starting in PY2024 and onward if their level of coding growth observed is greater than the capped coding growth observed for the Standard and New Entrant DCEs. Finally, for KCEs, a cap of ±3.0% and ±6.0% is applied to the ESRD and CKD Stages 4 or 5 risk scores, respectively.

Table 1 summarizes the risk score adjustment steps that will be applied to each DCE/KCE type, and the order in which those steps will be applied.

Table 1. Risk Score Adjustment Process by DCE/KCE Type

Adjustment Steps	Standard and New Entrant DCEs	High Needs Population DCEs	KCE
1. Prospective estimated normalization	X	X	
2. Normalization correction adjustment factor	X	X	
3. Retrospective normalization			X
4. Risk score cap	X		X
5. Retrospective CIF	X	X	

For the CKCC options within the KCC Model, only the cap on year-to-year risk score growth is applied to the risk scores. This model forgoes use of the retrospective CIF adjustment because the Innovation

Center anticipates increased coding intensity for the aligned population relative to the non-aligned population because of increased incentives for providers to deliver care to patients with late-stage CKD.

V. Standard and New Entrant DCEs

The CMS-HCC prospective risk adjustment model (V24) is used for Standard and New Entrant DCEs. CMS and stakeholders have extensive experience with this risk adjustment model and are familiar with its design, application, and impacts. The CMS-HCC model is well suited for Standard and New Entrant DCEs because it predicts well for large panels of beneficiaries, emphasizing the cost variations that are driven by expensive chronic conditions. Over the course of the GPDC performance period, the Innovation Center will assess the need to update the current version of the CMS-HCC risk adjustment model and may move to an updated version. The impacts of COVID-19 on risk adjustment are being considered as the Innovation Center moves forward with the risk adjustment policies for GPDC. (DCEs should refer to GPDC Options website for any future changes.[5])

i. Parameters of the CMS-HCC Prospective Risk Adjustment Model

Beneficiary risk scores calculated with the CMS-HCC prospective risk adjustment model use diagnoses reported in the prior year to predict expenditures during the PY. Data used to generate risk scores come from Part A and Part B claims.[6] For example, DCEs in PY2022 will be assigned scores based on their beneficiaries' claims history throughout 2021. Beneficiaries without a complete 12-month diagnostic profile from the prior year have a "new enrollee" risk score calculated with a model including only demographic factors, dual eligibility status, and originally disabled status (see "C. New Enrollees Model," below).

The CMS-HCC prospective risk adjustment model Version 24 (V24) is being used for Standard and New Entrant DCEs; this is the same model used in MA. The fully calibrated CMS-HCC Prospective Risk adjustment model can be found in Table VI-1, Table VI-2, and VI-3 on pages 74, 82, and 83, respectively, of the Announcement of Calendar Year 2020 Medicare Advantage Capitation Rates and Medicare Advantage and Part D Payment Policies and Final Call Letter (2020 Announcement).[7] This model may be updated over the course of the Model performance period PY2021 through PY2026 (see "Calibration of the Model" section below).

21st Century Cures Act (2016). The 21st Century Cures Act (2016) directed specific modifications for the CMS-HCC model beginning in 2019. These modifications affect risk adjustment for Standard and New Entrant DCEs, and they include the following:

- "Taking into account total number of diseases or conditions." This has been achieved by including the payment HCC count indicator variables in the model specifications. To avoid incentives not to code HCCs, any count variables that would have a negative coefficient are removed from the model.
- "Evaluation of mental health and substance use disorders." The CMS-HCC substance use disorder HCCs were reconfigured and augmented in the CMS-HCC prospective model (V24) that

[5] Please refer to the GPDC website linked here: https://innovation.cms.gov/innovation-models/direct-contracting-model-options.
[6] The MA data filtering logic is applied for the calculations of risk scores.
[7] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf

was implemented in 2021, and two dementia-related HCCs were added. These HCCs are also included in the CMMI-HCC concurrent risk adjustment model.
- "Evaluation of chronic kidney disease." HCC 138 (CKD Stage 3) was added to the CMS-HCC models.

Calibration of the Model. The CMS-HCC prospective risk adjustment model has been calibrated using 2014–2015 Medicare FFS claims data. Calibration of the model is required to develop the risk scores. CMS may rebase or recalibrate the CMS-HCC prospective risk adjustment model, V24, over the course of the model performance period to improve predictive accuracy. The Innovation Center will provide information regarding any changes prior to the start of the performance period. The List of Disease Categories for the 2020 Prospective Risk Adjustment Model can be found in Table VI-4 of the 2020 Announcement.[8]

CMS-HCC Prospective Risk Adjustment Model Coefficients. The CMS-HCC prospective risk adjustment model is used to calculate risk scores for beneficiaries aligned to Standard DCEs or New Entrant DCEs. This same version of the CMS-HCC model is one of the models used to determine payments for MA plans.[9] This model, currently in version 24 for payment year 2022, includes 86 HCCs along with a set of 24 age-sex indicator variables. There is also a set of payment HCC count variables to better capture the higher costs of beneficiaries with multiple HCCs. The full model specification includes the following:

- 24 age-gender indicator variables: female/male interacted with ages 0–34, 35–44, 45–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85–89, 90–94, and 95 or older;
- 86 CMS-HCCs (see below);
- a current-year dual-enrollment (Medicare and Medicaid) status indicator (included for the institutional model segment only);
- an originally disabled indicator, flagging beneficiaries who were entitled by disability when they joined Medicare but are currently entitled by age;
- multiplicative interactions of selected HCCs with demographic variables, allowing the incremental effect of the HCC to differ by the presence of the demographic variable;
- multiplicative interactions of selected HCCs or "disease" interactions, allowing the incremental effect of the HCC to differ by the presence of another HCC; and
- a set of number of payment HCC (count) indicator variables to allow higher predicted expenditures for beneficiaries with larger numbers of HCCs.

CMS-HCC Prospective Risk Adjustment Model Segments. The CMS-HCC model currently includes eight distinct segments. A model segment is defined as a separate calibration (set of coefficient weights for each risk marker in the model) for a given subpopulation, such as community-residing versus long-term institutional beneficiaries, or those eligible for Medicare because of age versus disability status.

A comparison of model segments in the CMS-HCC non-ESRD and CMS-HCC ESRD models is shown in **Table 2**.

[8] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf. Note, this model is referred to as the Alternative Payment Condition Count Model in the 2020 Announcement.
[9] For more detailed information on the CMS-HCC model see the 2021 Advance Notices and Announcement https://www.cms.gov/files/document/2021-announcement.pdf.

Table 2. Model Segments (Subpopulations) for the CMS-HCC Risk Adjustment Model

CMS-HCC Non-ESRD	CMS-HCC ESRD
• Community Non-Dual Aged • Community Non-Dual Non-Aged • Community Full Benefit Dual Aged • Community Full Benefit Dual Non-Aged • Community Partial Benefit Dual Aged • Community Partial Dual Non-Aged • Institutional • New Enrollees	• Continuing Enrollee Dialysis • New Enrollees Dialysis • Kidney Transplant [Months 1–3] • Functioning Graft Community • Functioning Graft Institutional • Functioning Graft New Enrollees

CMS-HCC Prospective Risk Adjustment Example Risk Score. The following examples illustrate how a raw risk score is calculated, and more specifically they show how the additive and hierarchical design of HCC models are applied in the calculation. Consider two beneficiaries with the following base-year diagnoses:

- Beneficiary A: 67-year-old female, three HCCs: HCC35 (Inflammatory Bowel Disease), HCC137 (CKD, Severe, Stage 4), and HCC138 (CKD, Moderate, Stage 3).
- Beneficiary B: 88-year-old male, five HCCs: HCC18 (Diabetes with Chronic Complications), HCC27 (End-Stage Liver Disease), HCC40 (Rheumatoid Arthritis and Inflammatory Connective Tissue Disease), HCC52 (Dementia without Complication), and HCC88 (Angina Pectoris).

The risk score calculations for these two beneficiaries are as follows in **Table 3**.

The raw risk scores are obtained by adding up the relative factors of the individual risk markers. Note that Beneficiary A's risk score does not include any weight for HCC 138 CKD Stage 3, because HCC 137 CKD Stage 4 excludes HCC 138 according to the CMS-HCC model's clinical hierarchies. Beneficiary A is predicted to cost slightly less than average (risk score = 0.920 compared to the population average of 1.000). Beneficiary B's risk score consists of the sum of all five HCC relative factors, plus an additional increment tied to having an HCC count equal to five. In total, Beneficiary B is predicted to cost nearly three times as much as the population average (risk score = 2.814).

Table 3. Examples of Risk Score Calculations

Beneficiary A		Beneficiary B	
Characteristic	**Relative Factor**	**Characteristic**	**Relative Factor**
65- to 69-year-old female	0.323	85- to 89-year-old male	0.686
HCC35	0.308	HCC18	0.302
HCC137	0.289	HCC27	0.882
HCC138	0.000	HCC40	0.421
		HCC52	0.346
		HCC88	0.135
		HCC count=5	0.042
TOTAL = risk score	**0.920**	**TOTAL = risk score**	**2.814**

For presentation purposes, the relative factors and risk scores are rounded to 3 decimal places.

ii. New Enrollees Model

Beneficiaries may become eligible for Medicare at any point during a calendar year. Because of this flexibility, certain beneficiaries who are aligned to DCEs may lack a complete 12-month diagnostic profile from the prior calendar year. To address this limited lookback period, these beneficiaries have a risk score calculated using the New Enrollees Risk Adjustment Model that only accounts for the beneficiary's demographic factors. For example, beneficiaries aligned to Standard DCEs or New Entrant DCEs in PY2022 who initially lack a 12-month lookback period will have New Enrollee risk scores until the beneficiary attains a full calendar year of claims history to transition into the prospective risk adjustment model. The relative factors for the Aged and Disabled New Enrollees may be found in Table VI-2 of the 2020 Announcement.[10]

iii. Enrollees with End-Stage Renal Disease Risk Adjustment Model

Because of the unique expenditure profile associated with treating high-acuity patients with ESRD, the Innovation Center uses a separate risk adjustment model to calculate the financial Benchmarks for all aligned beneficiaries with ESRD, including beneficiaries aligned to Standard DCEs and New Entrant DCEs. The model is the same one used for ESRD beneficiaries in MA, the CMS-HCC ESRD model Version 21 (V21), a prospective design last updated in 2020 with separate sets of risk factors for new enrollees dialysis, continuing enrollees dialysis, and transplant recipient beneficiaries. The List of Disease Hierarchies for the ESRD Model may be found in Table VI-12 in the 2020 Announcement.[11] Please refer to Tables VI-5–VI-10 in the same link for the relative factors by segment.

[10] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf. Note, this model is referred to as the Alternative Payment Condition Count Model in the 2020 Announcement.

[11] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf. Note, this model is referred to as the ESRD Model in the 2020 Announcement.

In MA, the CMS-HCC ESRD risk adjustment model uses six separate sets of risk scores allowing for different predicted expenditures for each of the following subpopulations (segments):

- Continuing Enrollees in Dialysis (includes community and institutionalized enrollees)
- New Enrollees in Dialysis
- Kidney Transplant (Months 1–3)
- Functioning Graft for Community Population
- Functioning Graft for Institutionalized Population
- Functioning Graft New Enrollees

The ESRD model risk scores are used for the following three populations with different ESRD statuses in the current (performance) year:

1. Dialysis: The ESRD dialysis component of the ESRD model is used to measure risks for beneficiaries who are in dialysis status.
2. Transplant: Transplant factors measure risk for beneficiaries who have a kidney transplant. Factors are used in conjunction with the ESRD Dialysis State Rate Book to pay for the month in which a transplant occurred and the following 2 months.
3. Post-graft: The post-graft component of the ESRD model measures risk for beneficiaries starting with the fourth month after a kidney transplant, for as long as they have a functioning graft (i.e., do not return to dialysis status).

If a beneficiary from Standard and New Entrant DCE transitions into ESRD during the course of the PY, the aligned beneficiary will initially receive a CMS-HCC prospective risk adjustment model risk score, and after gaining ESRD eligibility the same beneficiary will receive the appropriate ESRD risk adjustment model risk score. For kidney transplant recipients, risk scores are calculated by the ESRD transplant model for 3 months; beginning in the fourth month the beneficiary transitions to the appropriate ESRD functioning graft model risk score.

iv. Normalization

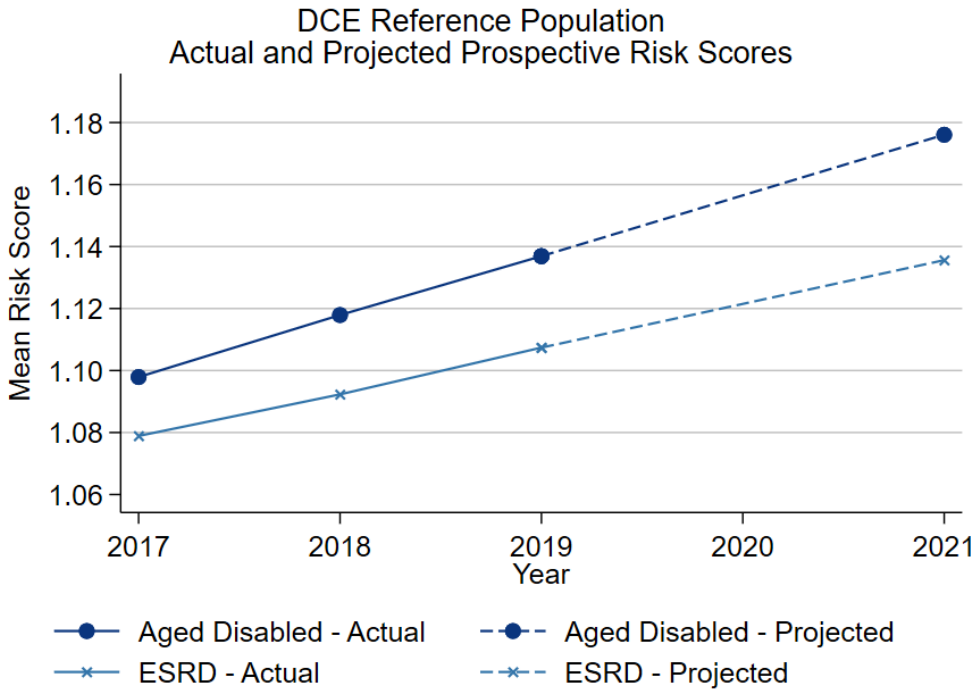
Risk scores calculated using the CMS-HCC prospective model, including both non-ESRD and ESRD models and the New Enrollees (demographic only) model, are normalized each year. Risk models are estimated based on expenditures incurred during a particular payment year, also called the denominator year. A normalization factor is applied to DCE risk scores to adjust for changes in risk score growth relative to the denominator year of the risk adjustment model being used. The normalization factor for each year is the average risk score of the DC National Reference Population in that year; DCE risk scores are normalized by dividing by this factor.

Because the normalization factor for each year is a function of observed risk scores, a preliminary normalization factor will be estimated and applied during each PY. For each PY, preliminary normalization factors will be determined separately for the CMS-HCC prospective risk adjustment model and the CMS-HCC ESRD model. The PY preliminary normalization factor is the projected average risk score for the payment year, based on the observed historical trend in risk scores for the DC National Reference Population. This projection is done separately for each risk model. Dividing the DCE risk scores by the projected average risk score maintains an average risk score of 1.0 in the payment year for beneficiaries in the DC National Reference Population. A retrospective normalization correction adjustment factor is then applied during reconciliation after the payment year has ended and once the

actual growth trend can be measured with observed data. Normalization of base-year (2017, 2018, and 2019) risk scores is based on actual observed risk scores of the DCE reference population.

Projected PY2022 mean risk scores will be calculated similarly to how projected PY2021 mean risk scores were calculated, but are not provided in this document. **Figure 2** provides the initial preliminary estimates of 2021 projected mean risk scores for both Aged-Disabled and ESRD beneficiary months using a prospective V24 CMS-HCC risk model for Aged-Disabled risk scores and the V21 ESRD risk model for ESRD scores.

Figure 2. Projected Prospective Mean Risk Score for Aged-Disabled and ESRD beneficiaries



Risk scores in 2022 will be normalized using a method similar to the one used to normalize risk scores in 2021, which is partially shown in Figure 2. Risk scores presented reflect the national mean CMS-HCC prospective risk score in each calendar year for the DCE eligible reference population. Actual mean risk scores are calculated separately for Aged-disabled and ESRD beneficiary months, and a projected mean 2021 risk score is calculated for each benchmark. The projected 2021 mean risk score is an estimated linear trend projection based on the 2017, 2018, and 2019 mean risk scores. Risk scores are normalized in each year by dividing by the actual mean risk score. Risk scores in 2021 are normalized prospectively by dividing each risk score by the projected mean risk score for 2021.

The mean national DCE reference population (Aged-disabled) prospective risk score is 1.1179 in 2018 and 1.1369 in 2019, an increase of about 1.7%. Based on a linear trend estimated using 2017 through 2019 mean risk scores, the projected mean 2021 risk score is 1.176. This represents a 1.7% annual projected growth rate from 2019 through 2021. This initial preliminary estimate uses the same prospective risk model and DCE eligible reference population definition as will be used in GPDC for Standard and New Entrant DCEs; however, the final preliminary normalization factor will be updated depending on additional empirical evidence as appropriate. The normalization correction factors will be

provided as part of the payment reconciliation process after the PY. Similarly, for the ESRD risk adjustment model, the 2021 estimated preliminary normalization factor is 1.109 and the normalization correction factor will be provided as part of the payment reconciliation process after the PY.

v. Coding Intensity

For Standard and New Entrant DCEs, an annual retrospective CIF is used in combination with the application of a symmetric 3% cap to limit risk score growth.[12] The normalized risk scores are subject to the cap first, and then to the retrospective CIF. Risk score growth for voluntarily aligned beneficiaries in their first year of alignment is excluded from the application of the retrospective CIF and the cap, because initially DCEs are not responsible for the risk score diagnoses reported and used for DCEs' risk adjusted payments. An example calculation, which includes the normalization of risk scores and the application of the symmetric 3% cap and the CIF can be found in Appendix C.

DCE-Specific Risk Score Growth Symmetric 3% Cap. A symmetric 3% cap is applied to DCE-specific risk score growth for all aligned beneficiaries in Standard and New Entrant DCEs. Initially, voluntarily aligned beneficiaries are excluded from the application of the symmetric 3% cap in their first model performance year of alignment; however, voluntarily aligned beneficiaries in their second or later model performance year of alignment are included in the application of the symmetric 3% cap even if they have not yet triggered claims-alignment. Risk score growth is determined and the cap applied for each PY relative to an annual rolling risk score reference year (see **Table 4**). The average normalized risk score for the DCE in the PY is constrained to be no more than 3% above or below the DCE's normalized risk score for the DCE-specific reference population. The cap is applied separately for the Aged/Disabled and ESRD populations. The retrospective CIF is applied after the cap. Additionally, the symmetric 3% cap will not be applied if the DCE does not have sufficient claims experience to construct a reliable reference risk score in the reference year for any given PY. This determination is made separately for Aged/Disabled beneficiaries and for ESRD beneficiaries, and considers both a minimum number of beneficiaries in the reference population used to generate the cap as well as the relative size of the reference population and the population subject to the cap in the performance year. For PY2022, the minimum reference population threshold will be 1,500 Aged/Disabled beneficiaries, and 50 ESRD beneficiaries. Insufficient claims experience will also be recognized and the cap will not be applied when the performance year population subject to the cap is more than three times as large as the historical reference population used to establish the cap.

Table 4. Reference Population for Applying the Symmetric 3% Cap

Performance Year	Reference Year
IP (2020)	NA
PY2021	2019
PY2022	2020
PY2023	2021[a]
PY2024	2022

[12] After application of the CIF, although the DCE's risk score growth will always be below +3%, it is possible that the DCE's risk score growth could be below -3%, which would be outside of the symmetric cap. Were the CIF to be 99.5% (0.5% reduction), for example, the effective range of DCE-level risk score growth would in fact be −3.5% to +2.5%.

Performance Year	Reference Year
PY2025	2023
PY2026	2024

[a] Note that CMS is continuing to monitor the potential impact of COVID-19 on reference years for applying the symmetric cap. For example, CMS may determine that 2021 is not appropriate to use as a reference year for PY2023 and instead use PY2020 to avoid biases introduced by claims with CY2020 dates of service.

Model-Level Retrospective Coding Intensity Factor. A retrospective CIF adjustment is applied to Standard and New Entrant DCEs annually during final reconciliation after the payment year has ended. The CIF is applied as a multiplier to the normalized DCE mean risk scores. The CIF adjustment is tailored for application to risk scores based on the CMS-HCC prospective risk adjustment model such that the change in normalized payment risk scores, after the application of the cap, across all aligned beneficiaries, is zero between the most recent baseline year (Baseline Year 3 or 2019) and the PY. Initially, voluntarily aligned beneficiaries are excluded from the application of the CIF in their first model performance year of alignment; however, voluntarily aligned beneficiaries in their second or later model performance year of alignment are included in the application of the CIF even if they have not yet triggered claims-alignment. A CIF is calculated for Aged/Disabled beneficiaries to align with the CMS-HCC risk adjustment model. In addition, a separate CIF is calculated for ESRD beneficiaries to align with the ESRD risk adjustment model. The risk score reference population for each PY is shown in **Table 5**.

Table 5. Risk Score Reference Population for Establishing the CIF

Performance Year	Reference Population for CIF	
	Aged/Disabled	ESRD
IP–2020	NA	NA
PY2021	2019	2019
PY2022	2019	2019
PY2023	2019	2019
PY2024	2019	2019
PY2025	2019	2019
PY2026	2019	2019

Voluntarily Aligned Beneficiaries. Risk score growth for voluntarily aligned beneficiaries in their first model performance year of alignment is excluded from the retrospective CIF and the cap, because the Standard and New Entrant DCEs are not responsible for the initial reporting of risk score diagnoses for the CMS-HCC prospective risk adjustment model. Because the DCE cannot be held accountable for any risk score growth among these voluntarily aligned beneficiaries, risk score growth is not constrained for them by either the retrospective CIF or the symmetric 3% cap; however, voluntarily aligned beneficiaries in their second or later model performance year of alignment are subject to both the cap and retrospective CIF even if they have not yet triggered claims-alignment.

VI. High-Needs Population DCEs

In GPDC, CMS uses a similar, but revised and concurrent, version of the CMS-HCC prospective risk adjustment model, the CMMI-HCC concurrent risk adjustment model (referred to here as the CMMI-HCC concurrent model). The CMMI-HCC concurrent model has been calibrated and subjected to evaluation analyses. It is similar to the CMS-HCC prospective model, following most of the 21st Century Cures Act requirements and including most of the prospective model variables. The key benefit of the CMMI-HCC concurrent model over the CMS-HCC prospective risk adjustment model for high-needs populations is that it more accurately predicts their higher costs incurred during the performance year. This provides a more stable financial position for High Needs Population DCEs serving small, complex, chronically and seriously ill populations with highly variable, high-cost needs. This should incentivize improved health care management and the provision of higher quality care for this vulnerable population.

A concurrent risk model for aligned beneficiaries uses demographic indicators and diagnoses from the PY to predict expenditures in the same year. Concurrent risk models are better able to predict costs for populations with high disease burden or who are otherwise seriously ill because the approach can better capture a rapid deterioration in health in the current year, such as through the occurrence of acute episodes that are difficult to predict or prevent (e.g., heart attack). This is a departure from the existing CMS-HCC prospective risk adjustment model, which predicts current-year costs using health status indicators (diagnoses) from the prior year.

The impacts of COVID-19 on risk adjustment are being considered as the Innovation Center moves forward with risk adjustment policies for the GPDC and KCC models. Any related changes to the risk adjustment models will be communicated to participants.

i. Parameters of the CMMI-HCC Concurrent Risk Adjustment Model

The CMMI-HCC concurrent model generates risk scores for most beneficiaries aligned to High Needs Population DCEs, including newly aligned enrollees and continuing enrollees; those who qualify for Medicare by disability status and those who qualify by age; community-residing and long-term institutional Medicare beneficiaries; and those who have dual eligibility with state Medicaid programs. The only aligned beneficiaries in High Needs Population DCEs who do not receive risk scores from this model are ESRD patients receiving dialysis or those who have recently received kidney transplants.

Risk adjustment for High Needs Population DCEs (and also Standard and New Entrant DCEs) uses a separate model for beneficiaries in ESRD dialysis or the first 3 months of post-kidney transplant status. For these beneficiaries, risk scores are generated from the standard prospective CMS-HCC ESRD model. Note that kidney transplant patients who are at least 4 months post-graft, however, are included in the general CMMI-HCC concurrent model population.

CMMI-HCC Concurrent Model Design. The CMMI-HCC concurrent risk adjustment model is based on the CMS-HCC prospective model used for Standard and New Entrant DCE types, in MA, the Medicare Shared Savings Program, and the NGACO Program, and is therefore similar in design and structure. The CMMI-HCC concurrent model builds from Version 24 (V24) of the CMS-HCC prospective model, including largely the same payment HCCs and also incorporates most of the features required by the 21st Century Cures Act; for example, it includes a set of HCC condition count variables.

A key difference between the CMMI-HCC concurrent model and the CMS-HCC prospective model is that for a given year of expenditures, HCCs in the concurrent model are measured concurrently for aligned

beneficiaries based on diagnoses reported in the same year, whereas HCCs in the prospective model are measured prospectively for aligned beneficiaries based on diagnoses reported in the prior year. Because of the concurrent nature of the CMMI-HCC model, acute conditions are weighted more heavily than chronic conditions in the model, and demographic factors receive relatively less weight. This is evidenced by differences in the calibrated coefficients of the HCCs included in the two models (concurrent and prospective). For PY2022, the CMMI-HCC concurrent model calibration is based on 2018 Medicare FFS data, with diagnoses and expenditures drawn from the same calendar year.

Below is a summary of the key design features of the CMMI-HCC concurrent model.

CMMI-HCC Model Risk Factors and Demographic Variables. The CMMI-HCC concurrent model uses a modified version of the V24 CMS-HCC prospective model HCCs. The CMMI-HCC specification includes 85 HCCs rather than the 86 in the CMS-HCC model,[13] with slight modifications to some HCC hierarchies and coefficient constraints. For some HCCs, there is a sizable difference in expected expenditures between aged (65 or older) beneficiaries and non-aged beneficiaries; these conditions tend to be associated with larger expenses in the non-aged population. To model these differences, we include interaction variables that indicate whether an individual has the HCC and is non-aged (less than 65). These HCCs include HCC46, Severe Hematological Disorders, HCC110, Cystic Fibrosis, and HCC136 or HCC137, CKD Stage 5 or CKD Stage 4. The CMMI-HCC concurrent model includes a set of 24 age-gender categories to model variations in risk among these demographic groups, and also to serve as predicted expenditure levels for people with zero HCCs.

CMMI-HCC Model Segments. The CMS-HCC prospective model, on which the CMMI-HCC concurrent model is based, uses separately calibrated "model segments" to generate risk scores for different demographic groups. There are separate model segments for long-term institutional residents and community-residing beneficiaries; for the aged population and for those who qualify for Medicare by disability status; and for dual-eligible Medicaid beneficiaries and those who are not enrolled in Medicaid. To maintain simplicity, the CMMI-HCC concurrent model, however, is calibrated on—and can provide risk scores for—most Medicare beneficiaries. The CMMI-HCC concurrent model is therefore a single model; it does not have model segments. Furthermore, the demographic factors which are used to segment the CMS-HCC prospective model—including dual Medicare/Medicaid eligibility status, disability status, and institutional status—do not have much predictive power in the concurrent model, so it is not necessary to include these factors as predictors in the risk model.

Beneficiaries who are 4 or more months beyond their kidney transplant procedure are assigned risk scores using the CMMI-HCC concurrent model. To reflect the additional costs of these patients, the model includes a set of four post-graft indicator variables that capture the additional risks these people represent:

- 4 to 9 months post-graft, age less than 65
- 4 to 9 months post-graft, age 65 or greater
- 10 or more months post-graft, age less than 65
- 10 or more months post-graft, age 65 or greater

[13] HCC 134 Dialysis Status is removed from the CMMI-HCC specification because these beneficiaries will receive a risk score calculated from the appropriate CMS-HCC ESRD model segment. Dialysis expenditures for non-ESRD beneficiaries will be included in other related model factors.

Each post-graft assigned beneficiary is flagged with one of these four indicators and receives a risk increment associated with the relevant status.

HCC Count Variables. To reflect the higher costs of beneficiaries with multiple diagnoses (or HCCs), a series of payment HCC count indicator variables is included in the CMMI-HCC concurrent model specification. These were introduced in the CMS-HCC prospective model to comply with a requirement in the 21st Century Cures Act, and payment HCC count variables are similarly included here to improve predictive accuracy for people with and without multiple comorbidities in their risk profile.

The payment HCC count variables are implemented as a set of 11 indicators for people with exactly 5, 6, 7, etc. up to 14 payment HCCs and then a single indicator for anyone with 15 or more HCCs. Only HCCs that are included in the CMMI-HCC concurrent model specification are included in the count; "nonpayment" HCCs that are not in the model are not taken into consideration.

With these payment HCC count variables included in the model, the marginal effect of an HCC diagnosis on an individual's risk score thus depends on how many other HCCs are present in the risk profile. So for a beneficiary with six HCCs, for example, the incremental effect of reporting an additional HCC therefore consists of two components: (1) the coefficient on the additional HCC, and (2) the difference between the HCC count = 7 coefficient and the HCC count = 6 coefficient.

21st Century Cures Act (2016). The 21st Century Cures Act (2016) directed specific modifications for the CMS-HCC model beginning in 2019. These modifications have mostly been incorporated into the CMMI-HCC concurrent risk adjustment model, and they include the following:

- "Taking into account total number of diseases or conditions." As discussed above, this has been achieved by including the payment HCC count indicator variables in the model specifications. To avoid incentives not to report HCCs, any count variables that would have a negative coefficient are removed from the model.
- "Evaluation of mental health and substance use disorders." The CMS-HCC substance use disorder HCCs were reconfigured and augmented in the CMS-HCC prospective model (V24) that will also be one of the models implemented in 2021, and two dementia-related HCCs were added. These are also included in the CMMI-HCC concurrent risk adjustment model.
- "Evaluation of chronic kidney disease." HCC 138 (Chronic Kidney Disease Stage 3) was added to the CMS-HCC models, but in the CMMI-HCC concurrent model the coefficient was constrained to zero because its unconstrained estimate was negative.

Calibration Data and Model Estimation. The CMMI-HCC concurrent model has been calibrated using 2018 Medicare FFS claims data. Calibration of the model is required to develop the risk scores. CMMI may rebase or recalibrate the CMMI-HCC concurrent model, V1, over the course of the model performance period (PY2021 through PY2026) to make improvements to predictive accuracy. In the process of recalibrating or rebasing the risk adjustment model, the Innovation Center will provide information regarding any changes prior to the start of the performance period. The relative factors for the CMMI-HCC concurrent model (V1) in 2022 are provided in Appendix B.

The CMMI-HCC concurrent model uses demographic indicators and diagnoses from the PY to predict expenditures in the same year. As with the prospective model, each beneficiary's risk profile is based on Part A and Part B claims and demographic information.[14] The concurrent model, however, does not

[14] The MA data filtering logic is applied for the calculations of risk scores.

require a full 12 months of enrollment or claims data; risk scores can be generated using as many eligible months of enrollment as are available.

The CMMI-HCC concurrent model is calibrated using a 100% sample of calendar year 2018 Medicare enrollment and claims records. This calibration sample includes continuing and new enrollees; because of the concurrent model design, no separate model for new enrollees is needed. As mentioned in the previous section, the calibration sample includes beneficiaries who are eligible by disability or by age; who reside in institutional settings or in the community; who are Medicaid-enrolled and not Medicaid-enrolled. Only U.S. residents enrolled in both Medicare Parts A and B are included in the data. Beneficiaries with fewer than 12 eligible months of claims are included in the sample, and their expenditures are annualized—that is, extrapolated to the amount that would have been incurred over a full 12 months.

Expenditures (amounts paid by Medicare, excluding beneficiary cost sharing or any third-party payments) to be included are all physician and other eligible provider claims, supplier or carrier claims, durable medical equipment, inpatient facility paid amounts, skilled nursing facility paid amounts, outpatient facility paid amounts, home health aide expenditures, and hospice care costs. Inpatient pass-through payments are included; Part D (prescription drug) claims are excluded.

Explanatory variables in the model, as described above, include the following:

- 24 age-sex indicator variables
- 85 CMMI-HCCs (modified from CMS-HCCs as described in Section 2, above)
- 4 post-(kidney)-graft indicators
- 11 payment HCC count indicators (5, 6, 7, …, 14, 15+)
- 3 interactions of specific HCCs with an age less than 65 indicator

Diagnoses are included from claims with the filters described above. Claims must have a through date during one of the beneficiary's eligible months. Thus, HCCs are defined only from diagnoses reported for services received during eligible months, not during all months of the year. The reason for this restriction is to better match expenditures and associated diagnoses.

The CMMI-HCC concurrent model is estimated by weighted ordinary least squares. The weight applied to each individual observation is the number of eligible months divided by 12 (person years).

Because the dependent variable in the regression (annualized expenditures) is in dollars, coefficient estimates are calculated as dollar amounts. To generate risk scores, these dollar coefficients are converted to relative coefficients by dividing them by the mean expenditures of the calibration sample. This allows risk scores to have an overall mean of 1.0, and they express a predicted expenditure for each beneficiary relative to the population mean.

In addition, as in the CMS-HCC prospective model, coefficient constraints are imposed to uphold the principle that higher clinically ranked HCCs in an HCC hierarchy have at least as large incremental predicted expenditures as lower ranked HCCs. Constraints generally have the effect of averaging two or more groups together when, unconstrained, there is a violation of clinical logic.

Appendix A shows the calibrated CMMI-HCC concurrent model with relative coefficients.

CMMI-HCC Concurrent Model Example Risk Score Calculations. As with the CMS-HCC prospective model, the CMMI-HCC concurrent model is additive and hierarchical. **Table 6** provides two examples to illustrate how a raw risk score is calculated from a beneficiary risk marker profile:

- Beneficiary C: 62-year-old female, three HCCs: HCC19 (Diabetes without Complication), HCC137 (Chronic Kidney Disease, Severe, Stage 4), and HCC138 (Chronic Kidney Disease, Moderate, Stage 3).
- Beneficiary D: 80-year-old male, five HCCs: HCC8 (Metastatic Cancer and Acute Leukemia), HCC40 (Rheumatoid Arthritis and Inflammatory Connective Tissue Disease), HCC78 (Parkinson's and Huntington's Diseases), HCC86 (Acute Myocardial Infarction), and HCC108 (Vascular Disease).

Table 6. Examples of Risk Score Calculations

Beneficiary C		**Beneficiary D**	
Characteristic	**Relative Factor**	**Characteristic**	**Relative Factor**
60- to 64-year-old female	0.156	80- to 84-year-old male	0.134
HCC19	0.056	HCC8	2.725
HCC137	0.139	HCC40	0.246
HCC138	0.000	HCC78	0.278
HCC137 and age <65	0.453	HCC86	0.965
		HCC108	0.173
		HCC count = 5	0.043
TOTAL = risk score	**0.804**	**TOTAL = risk score**	**4.564**

For presentation purposes, the relative factors and risk scores are rounded to 3 decimal places.

As we saw with the CMS-HCC prospective model above, because HCC137 (CKD Stage 4) is above HCC138 (CKD Stage 3) in the kidney hierarchy, Beneficiary C's score is credited with the HCC137 coefficient but not the HCC138 coefficient. Also, note that Beneficiary C receives an increment to her risk score of 0.453 because of the higher costs of chronic kidney disease in the under-age-65 population. The resulting risk scores indicate that Beneficiary C's expenditures are predicted to be 80.4% of the population mean.

For Beneficiary D, there are no hierarchies that exclude any of this person's five HCCs, so the risk score includes the sum of all five HCC coefficients. In addition, because this person has five HCCs, the indicator for an HCC count of five is also added to the total. In sum, the risk score of 4.564 indicates that Beneficiary D's costs are expected to be about four and a half times as large as the population mean in the current year.

ii. Model Performance

The Innovation Center has conducted analyses to evaluate how well the model may perform in GPDC. Risk adjustment models are commonly evaluated with predictive ratios and R-squared values. Predictive ratios calculate the mean predicted expenditure divided by the mean actual expenditure for individuals in a selected subpopulation, such as people who share a particular demographic characteristic, health characteristic, or condition. This statistic allows us to see whether the model tends to over- or under-

predict on average for these types of individuals and by how much. An ideal predictive ratio is 1.0, indicating that the model correctly predicts mean expenditures for the group.

Model performance can also be evaluated using an R-squared value (R^2), which expresses how much variation in individual health care spending is explained by the model. The higher the R^2, the better the model fits the data.

The CMMI-HCC concurrent model was developed for High Needs Population DCEs with two primary objectives in mind: (1) to predict expenditures for high-risk beneficiaries accurately, and (2) to better explain the high variation in risk scores among DCEs. Two performance measures illustrate that the CMMI-HCC model is well suited to these purposes.

For the first point, we calculated predictive ratios for subpopulations based on the decile of expenditures predicted by the model; this stratifies beneficiaries from those expected to incur the highest costs (tenth decile) from those expected to have the lowest (first decile). High-needs DCEs will be populated by high-risk beneficiaries from the upper portion of this distribution, so it is important that the CMMI-HCC model predict accurately for the tenth decile. With a value of 1.009, we see that this subpopulation of people with the highest health risks are over-predicted by the model by only 0.9%, on average. This is quite good and indicates a level of accuracy similar to the performance of the CMS-HCC prospective model.

To address the second point, the R^2 statistic obtained in a model calibration regression measures what portion of the variation in individual expenditures is explained by the variables in the model. For the CMS-HCC prospective model, this value is 0.1245 for the non-dual aged beneficiary segment.[15] The comparable statistic for the CMMI-HCC concurrent model is 0.4911, which indicates that almost half of the variation in individual expenditures is explained by the model's risk markers. This is a feature of concurrent models, which inherently capture more expenditure variation because the explanatory variables are drawn from the same time period as the expenditures they are predicting. Relative to a prospective model design, a concurrent model is therefore well suited for smaller panels of beneficiaries with highly variable health statuses and costs. **Table 7** compares the R^2 statistic for these models.

Table 7. R-Squared Statistic for the CMS-HCC Prospective and CMMI-HCC Concurrent Models

	CMS-HCC Prospective Model*	CMMI-HCC Concurrent Model
R^2 statistic	0.1245	0.4911

* The CMS-HCC R^2 statistic is from the non-dual aged model segment, which includes a large majority of beneficiaries.

iii. New Enrollees Model Will Not Be Applied

As with the prospective model, each beneficiary's risk profile is based on Part A and Part B claims and demographic information.[16] The concurrent model, however, does not require a full 12 months of enrollment or claims data; risk scores can be generated using as many eligible months of enrollment as are available. As a result, the New Enrollees Model based on demographic information is not used in tandem with the CMMI-HCC Concurrent model.

[15] This segment represents the vast majority of beneficiaries in MA.

[16] The MA data filtering logic will be applied for the calculations of risk scores.

iv. Enrollees with End-Stage Renal Disease Risk Adjustment Model

Because of the unique expenditure profile associated with treating high-acuity patients with ESRD, CMS continues to use a separate risk adjustment model to calculate the financial Benchmarks for all aligned beneficiaries with ESRD, including beneficiaries aligned to High Needs Population DCEs. The model is the same one used for ESRD beneficiaries in MA: version 21 of the CMS-HCC ESRD model (V21), a prospective design last updated in 2020 with separate sets of risk factors for new enrollees dialysis, continuing enrollees dialysis, and transplant recipient beneficiaries. The List of Disease Hierarchies for the ESRD Model may be found in Table VI-12 of the 2020 Announcement.[17] Please refer to Tables VI-5–VI-10 in the same link for the relative factors by segment.

In MA, the CMS-HCC ESRD risk adjustment model uses six separate sets of risk scores allowing for different predicted expenditures for each of the following subpopulations (segments):

- Continuing Enrollees in Dialysis (includes community and institutional enrollees)
- New Enrollees in Dialysis
- Kidney Transplant (Months 1–3)
- Functioning Graft for Community Population
- Functioning Graft for Institutionalized Population
- Functioning Graft New Enrollees

The ESRD prospective model risk scores are used for the following three populations with different ESRD statuses in the current (performance) year:

1. Dialysis: The ESRD dialysis component of the ESRD prospective model is used to measure risks for beneficiaries who are in dialysis status.
2. Transplant: Transplant factors measure risk for beneficiaries who have a kidney transplant. Factors are used in conjunction with the ESRD Dialysis State Rate Book to pay for the month in which a transplant occurred and the following 2 months.
3. Post-graft: The post-graft component of the ESRD prospective model measures risk for beneficiaries starting with the fourth month after a kidney transplant, for as long as they have a functioning graft (i.e., do not return to dialysis status).

If a beneficiary from a High Needs Population DCE transitions into ESRD during the course of the PY, the aligned beneficiary initially receives a CMMI-HCC concurrent risk adjustment model risk score, and after gaining ESRD eligibility the same beneficiary receives the appropriate ESRD risk adjustment model risk score. For kidney transplant recipients, risk scores are calculated by the ESRD transplant model for 3 months; beginning in the fourth month the beneficiary transitions back to the CMMI-HCC concurrent model risk score.

v. Normalization

For High Needs Population DCEs, risk scores calculated using the CMMI-HCC concurrent risk adjustment model and the ESRD model are normalized in each year. A normalization factor is applied to DCE risk scores to adjust for changes in risk score growth relative to the denominator year of the risk adjustment model being used. The normalization factor for each year is the average risk score of the GPDC National

[17] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf

Reference Population in that year; DCE risk scores are normalized by dividing by this factor. Because the normalization factor for each year is a function of observed risk scores, a preliminary normalization factor will be estimated and applied during each PY. For each PY, preliminary normalization factors will be determined separately for the CMMI-HCC concurrent risk adjustment model and for the CMS-HCC ESRD model. The PY preliminary normalization factor is the projected average risk score for the payment year, based on the observed historical trend in risk scores for the GPDC National Reference Population. This projection is done separately for each risk model. Dividing the risk scores by the projected average risk score maintains an average risk score of 1.0 in the payment year for beneficiaries in the DC National Reference Population. A retrospective normalization correction adjustment factor is then applied during reconciliation after the payment year has ended, and once the actual growth trend can be measured with observed data.

The estimated preliminary normalization factor for PY2022 will be calculated similarly to the estimated preliminary normalization factor for PY2021. For the CMMI-HCC concurrent risk adjustment model, the estimated preliminary normalization factor for PY2021 was 1.079 and the normalization correction factors will be provided as part of the payment reconciliation process after the PY. Similarly, for the ESRD risk adjustment model, the estimated preliminary normalization factor for PY2021 was 1.109 and the normalization correction factor will be provided as part of the payment reconciliation process after the PY. More information on the calculation of the normalization factors can be found in the normalization subsection of the Standard and New Entrant section above.

vi. Coding Intensity

For High Needs Population DCEs, an annual retrospective CIF is used to limit risk score growth. The risk scores will be normalized first, and then subject to the CIF.

Model-Level Retrospective Coding Intensity Factor. A retrospective CIF is applied to High Needs Population DCEs annually during final reconciliation after the PY has ended. The retrospective CIF is applied as a multiplier to the DCE mean risk scores. The retrospective CIF adjustment is tailored for application to risk scores based on the CMMI-HCC concurrent model (for Aged/Disabled beneficiaries). The retrospective CIF ensures that the normalized change in payment risk scores across all claims-aligned beneficiaries is zero between the baseline year (Baseline Year 3, 2019) and the PY. Separate retrospective CIFs are calculated for Aged/Disabled and ESRD beneficiaries to align with the CMMI-HCC concurrent model and the ESRD prospective model, respectively. A reference population of beneficiaries meeting the eligible criteria for GPDC in 2019 is used (see **Table 8**).

Table 8. Risk Score Reference Population for Establishing the Retrospective CIF

Performance Year	Reference Population for Retrospective CIF	
	Aged/Disabled	ESRD
IP (2020)	NA	NA
PY2021	2019	2019
PY2022	2019	2019
PY2023	2019	2019
PY2024	2019	2019
PY2025	2019	2019

Performance Year	Reference Population for Retrospective CIF	
	Aged/Disabled	ESRD
PY2026	2019	2019

Potential for DCE-Level Risk Score Growth Cap PY2024 Onward. A cap may be applied to the High Needs Population DCEs starting in PY2024 and onward if their level of coding growth observed is greater than the capped coding growth observed for the Standard and New Entrant DCEs. The appropriate cap value level for the CMMI-HCC concurrent model will be determined and communicated to stakeholders prior to the start of PY2024.

VII. Kidney Care Choices

The CKCC Options of the KCC Model leverage a risk adjustment methodology that shares similarities with the Standard and New Entrant DCEs in GPDC. Beneficiaries with late-stage CKD (stages 4 and 5) and beneficiaries with ESRD are aligned to KCEs.

The CMS-HCC prospective model is used to establish the Benchmark and risk adjust expenditures for KCEs' CKD 4 and CKD 5 beneficiaries. The same version of the CMS-HCC prospective model (V24) that is being applied in MA for 2022 will be applied to KCEs in 2022. CMS evaluated several risk adjustment models in an effort to determine how to most accurately reimburse providers for the late-stage CKD population. These analyses indicated that the CMS-HCC prospective risk scores yield more accurate Benchmarks than alternatives, including the CMMI-HCC concurrent risk model for the CKD4 and CKD5 populations. For beneficiaries with ESRD, CKCC will continue to use the same CMS-HCC ESRD prospective model which is applied in MA. The relative factors for the ESRD Models begin with Table VI-5 in the 2020 Announcement.[18]

The impacts of COVID-19 on risk adjustment are being considered as the Innovation Center moves forward with risk adjustment policies for GPDC and the KCC Model. Any related changes to the risk adjustment models will be communicated to participants. (KCC participants should review the KCC website for any future changes.)

i. Parameters of the CMS-HCC Prospective Model

Beneficiary risk scores calculated with the CMS-HCC prospective model use diagnoses reported in the prior year to predict expenditures during the PY. Data to generate risk scores come from Part A and Part B claims.[19] For example, KCEs in PY2022 will be assigned scores based on their beneficiaries' claims history throughout 2021. Beneficiaries without a complete 12-month diagnostic profile from the prior year have a "new enrollee" risk score calculated with a model including only demographic factors, dual eligibility status, and originally disabled status (see **Table 9**).

[18] Please refer to the following link for model details: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/Announcement2020.pdf. Note, this model is referred to as the Alternative Payment Condition Count Model in the 2020 Announcement.
[19] The MA data filtering logic is applied for the calculations of risk scores.

21st Century Cures Act (2016). The 21st Century Cures Act (2016) directed specific modifications for the CMS-HCC prospective model beginning in 2019. These modifications will affect risk adjustment for KCEs, and they include the following:

- "Taking into account total number of diseases or conditions." This has been achieved by including the payment HCC count indicator variables in the model specifications. To avoid incentives not to code HCCs, any count variables that would have a negative coefficient are removed from the model.
- "Evaluation of mental health and substance use disorders." The CMS-HCC substance use disorder HCCs were reconfigured and augmented in the CMS-HCC prospective model (V24) that will be one of the models implemented in 2021, and two dementia-related HCCs were added. These will also be included in the CMMI-HCC concurrent risk adjustment model.

Calibration of the Model. The CMS-HCC prospective risk adjustment model has been calibrated using 2014–2015 Medicare FFS claims data. Calibration of the model is required to develop the risk scores. CMS may rebase or recalibrate the CMS-HCC prospective risk adjustment model, V24, over the course of the model performance period to ensure optimal predictive accuracy. The Innovation Center will provide information regarding any changes prior to the start of the performance period.

CMS-HCC Prospective Model Coefficients. The CMS-HCC prospective model is used to calculate risk scores for beneficiaries aligned to KCEs. This same version of the CMS-HCC prospective model is one of the models used to determine payments for MA plans.[20] This model, currently in version 24 for payment year 2022, includes 86 HCCs along with a set of 24 age-sex indicator variables. There is also a set of payment HCC count variables to better capture the higher costs of beneficiaries with multiple HCCs. The full model specification includes the following:

- 24 age-gender indicator variables: female/male interacted with ages 0–34, 35–44, 45–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85–89, 90–94, and 95 or older;
- 86 CMS-HCCs (see below);
- a current-year dual-enrollment (Medicare and Medicaid) status indicator;
- an originally disabled indicator, flagging beneficiaries who were entitled by disability when they joined Medicare but are currently entitled by age;
- a current-year institutional status indicator;
- multiplicative interactions of selected HCCs with demographic variables, allowing the incremental effect of the HCC to differ by the presence of the demographic variable;
- multiplicative interactions of selected HCCs or "disease" interactions, allowing the incremental effect of the HCC to differ by the presence of another HCC; and
- a set of number of payment HCC (count) indicator variables to allow higher predicted expenditures for beneficiaries with larger numbers of HCCs, for example four, five, or six total HCCs.

CMS-HCC Prospective Risk Adjustment Model Segments. The most recent CMS-HCC model (V24) includes eight distinct segments. A model segment is defined as a separate calibration (set of coefficient weights for each risk marker in the model) for a given subpopulation, such as community-residing versus long-term institutional beneficiaries, or those eligible for Medicare because of age versus disability

[20] For more detailed information on the CMS-HCC model see the 2021 Advance Notices and Announcement https://www.cms.gov/files/document/2021-announcement.pdf

status. A comparison of model segments in the CMS-HCC non-ESRD and CMS-HCC ESRD models is shown in **Table 9**.

Table 9. Model Segments (Subpopulations) for the CMS-HCC Risk Adjustment Model

CMS-HCC Non-ESRD	CMS-HCC ESRD
• Community Non-Dual Aged • Community Non-Dual Non-Aged • Community Full Benefit Dual Aged • Community Full Benefit Dual Non-Aged • Community Partial Benefit Dual Aged • Community Partial Dual Non-Aged • Institutional • New Enrollees	• Continuing Enrollee Dialysis • New Enrollee Dialysis • Kidney Transplant [Months 1–3] • Functioning Graft Community • Functioning Graft Institutional • Functioning Graft New Enrollee

CMS-HCC Prospective Risk Adjustment Example Risk Score. The following examples illustrate how a raw risk score is calculated, and more specifically they show how the additive and hierarchical design of HCC models are applied in the calculation. Consider two beneficiaries with the following base-year diagnoses:

- Beneficiary A: 67-year-old female, three HCCs: HCC35 (Inflammatory Bowel Disease), HCC137 (Chronic Kidney Disease, Severe, Stage 4), and HCC138 (Chronic Kidney Disease, Moderate, Stage 3).
- Beneficiary B: 88-year-old male, five HCCs: HCC18 (Diabetes with Chronic Complications), HCC27 (End-Stage Liver Disease), HCC40 (Rheumatoid Arthritis and Inflammatory Connective Tissue Disease), HCC52 (Dementia without Complication), and HCC88 (Angina Pectoris).

The risk score calculations for these two beneficiaries are presented **Table 10**.

Table 10. CMS-HCC Prospective Risk Score Calculations

Beneficiary A		Beneficiary B	
Characteristic	**Relative Factor**	**Characteristic**	**Relative Factor**
65- to 69-year-old female	0.323	85- to 89-year-old male	0.686
HCC35	0.308	HCC18	0.302
HCC137	0.289	HCC27	0.882
HCC138	0.000	HCC40	0.421
		HCC52	0.346
		HCC88	0.135
		HCC count = 5	0.042
TOTAL = risk score	**0.920**	**TOTAL = risk score**	**2.814**

For presentation purposes, the relative factors and risk scores are rounded to 3 decimal places.

The raw risk scores are obtained by adding up the relative factors of the individual risk markers. Note that Beneficiary A's risk score does not include any weight for HCC 138 Chronic Kidney Disease Stage 3, because HCC 137 Chronic Kidney Disease Stage 4 excludes HCC 138 according to the CMS-HCC model's clinical hierarchies. Beneficiary A is predicted to cost slightly less than average (risk score = 0.920 compared to the population average of 1.000). Beneficiary B's risk score consists of the sum of all five HCC relative factors, plus an additional increment tied to having an HCC count equal to five. In total, Beneficiary B is predicted to cost nearly three times as much as the population average (risk score = 2.814).

ii. New Enrollee Model

Beneficiaries may become eligible for Medicare at any point during a calendar year. Because of this flexibility, certain beneficiaries who are aligned to KCEs may lack a complete 12-month diagnostic profile from the prior calendar year. To address this limited lookback period, these beneficiaries have a risk score calculated using the New Enrollee Risk Adjustment Model that only accounts for the beneficiary's demographic factors. Once a beneficiary attains a 12-month lookback period for Part A and Part B claims data, the beneficiary's assigned scores are updated using the appropriate risk adjustment model; the CMS-HCC prospective risk adjustment model for CKD 4 or 5 beneficiaries and the CMS ESRD prospective risk adjustment model for ESRD beneficiaries. For example, beneficiaries aligned to KCEs in PY2022 who initially lack a 12-month lookback period will have New Enrollee risk scores until the beneficiary attains a full calendar year of claims history to transition into the CMS-HCC prospective risk adjustment model.

iii. Enrollees with CMS-HCC ESRD Prospective Model

Because of the unique expenditure profile associated with treating high-acuity patients with ESRD, the Innovation Center continues to use a separate risk adjustment model to calculate the financial Benchmarks for all aligned beneficiaries with ESRD in KCEs. If an aligned beneficiary in a KCE transitions from CKD 4 or 5 into ESRD during the course of the PY, the aligned beneficiary's KCE initially receives CMS-HCC Prospective model risk scores, and then the beneficiary receives the appropriate CMS-HCC ESRD prospective model risk scores corresponding to the months for which the beneficiary was ESRD. The CMS-HCC ESRD prospective model calculates prospective risk scores using prior-year diagnoses to predict expenditures during the PY.

The prospective model is the same CMS-HCC ESRD prospective model which is applied in MA and which uses six separate calibrations to assign risk scores to six model segments (subpopulations). It was last updated in 2020 and was calibrated on 2014–2015 data, and is referred to as V21.[21] Separate segments allow for different predicted expenditures for each of the following subpopulations, and they are structured as follows:

- Continuing Enrollees Dialysis (includes community and institutional enrollees)
- New Enrollees Dialysis (also referred to as the Demographic Risk Score)
- Kidney Transplant (Months 1–3)
- Functioning Graft Community
- Functioning Graft Institutionalized
- Functioning Graft New Enrollees

[21] The relative factors for the ESRD Models begin with Table VI-5 in the 2020 Announcement.[21]

These components of the CMS-HCC ESRD prospective model are used to pay for populations with different ESRD statuses in the current (performance) year:

1. Dialysis: The ESRD dialysis component of the CMS-HCC ESRD prospective model is used to pay for beneficiaries who are in dialysis status.
2. Transplant: Transplant factors are used to pay for beneficiaries who have a kidney transplant. Factors are used in conjunction with the ESRD Dialysis State Rate Book to pay for the month in which a transplant occurred and the following 2 months.
3. Post-graft: The post-graft component of the CMS-HCC ESRD prospective model is used to pay for beneficiaries starting with the fourth month after a kidney transplant, for as long as they have a functioning graft (i.e., do not return to dialysis status).

To be aligned in the KCC Model, however, a beneficiary must also not be *ineligible due to transplant.*[22] If an aligned CKD or ESRD beneficiary transitions to Transplant, those beneficiary months do not enter the CKCC Benchmark computations (i.e., they are removed from the base year and performance year). This means that expenditures associated with the beneficiary following the transplantation are no longer counted toward the KCE's financial calculation, and no separate Benchmark is calculated for this beneficiary. In the case where the transplant fails, the beneficiary is de-aligned. The beneficiary can be realigned as a CKD or ESRD beneficiary either to the original KCE or to a different KCE in the following PY.

iv. Normalization

For KCEs, risk scores calculated using the CMS-HCC prospective model, the ESRD model, and the New Enrollee model are normalized each year. A normalization factor is applied to DCE risk scores to adjust for changes in risk score growth relative to the denominator year of the risk adjustment model being used. The normalization factor for each year is the average risk score of the DC National Reference Population[23] in that year; KCE risk scores are normalized by dividing by this factor. The estimated 2022 preliminary normalization factor will be calculated similarly to the 2021 preliminary normalization factor described in the Standard and New Entrant section above.

v. Coding Intensity

For KCEs, a KCE-level symmetric cap on risk score growth is applied. The risk scores are normalized first, and then the cap will be applied.

KCE-Level Risk Score Growth Symmetric Cap. A symmetric cap is applied to KCE-specific risk score growth. Risk score growth is determined and the cap applied for each PY relative to an annual rolling risk score reference year (see **Table 11**). The cap is applied separately for the CKD Stages 4 or 5 (Aged/Disabled) and ESRD populations, with the ESRD and CKD Stages 4 or 5 populations having different Risk Score Growth Caps. For the ESRD population, the average normalized risk score for the KCE in the PY is compared to the average normalized risk score for the KCE during the PY's corresponding reference year and constrained to 3% above or below the average risk score of the KCE during the reference year. For the CKD Stages 4 or 5 population, the average normalized risk score for the KCE in the PY is compared to the average normalized risk score for the KCE during the PY's

[22] Beneficiaries are made ineligible due to transplant on the month of transplant and the following 12 months. To be aligned, the beneficiary must not be ineligible due to transplant at the time alignment is run.
[23] The DC Reference Population is used to normalize risk scores rather than a reference population created using the more restrictive KCC alignment criteria.

corresponding reference year and constrained to 6% above or below the average risk score of the KCE during the reference year.

Table 8. Reference Year for Applying the Symmetric Cap

Performance Year	Reference Year
IP–2021	NA
PY2022	2020
PY2023	2020[a]
PY2024	2022
PY2025	2023
PY2026	2024

[a] Please note that CY2020 will be used as the reference year instead of CY2021 for PY2023 in order to avoid coding biases that may be introduced by COVID-19.

VIII. Monitoring and Audits

The Innovation Center will conduct routine evaluation and monitoring, and audits based on medical record reviews, of the risk scores used in the financial and payment methodologies for Standard DCEs, New Entrant DCEs, High Needs Population DCEs, and KCEs. Increases in risk score growth and diagnosis data will be validated to ensure payment integrity.

Evaluation and Monitoring. Evaluation and monitoring could include comparing risk scores for beneficiaries in the Standard DCEs, New Entrant DCEs, and High Needs Population DCEs, and KCEs with other beneficiaries in the FFS program. This comparison could be conducted for each model PY. Likewise, trend analyses in annual risk score increases throughout the period of performance will be conducted. The Innovation Center could implement additional coding intensity measures if an unacceptable level of coding intensity is identified.

Medical Record Reviews. In addition, the Innovation Center expects to conduct audits based on medical record review to validate diagnoses submitted for risk adjusting payments. Diagnoses that are not supported by medical record documentation will be considered invalid for payment purposes, and the extent of improper payments would be further assessed.

IX. Risk Score Reporting and Operations

Quarterly Benchmark Reports provide the DCEs and KCEs with their prospective Benchmark and quarterly updates of financial performance on a year-to-date basis for aligned beneficiaries that remain alignment-eligible at the end of that reporting period. Risk scores used in payment are also shared with DCEs and KCEs throughout each PY. These risk scores are calculated at the beneficiary level and include initial, updated, and final risk scores. These risk scores are provided multiple times over the course of a year. A claims submission deadline for risk score calculations is defined by CMS. After this deadline, no additional diagnoses will be accepted for risk score calculations and after financial reconciliation all risk scores will be considered final.

X. Conclusion

GPDC and the CKCC Options of the KCC Model provide a unique set of challenges and an opportunity to test and implement risk adjustment for benchmarking and payment purposes in FFS. This includes the opportunity to test the newly designed CMMI-HCC concurrent risk adjustment model for organizations that serve high-needs populations and to determine whether it provides more accurate financial compensation. The Innovation Center appreciates the opportunity to partner with DCEs and KCEs and seeks to achieve payment accuracy through improved risk adjustment methods. Resources on risk adjustment policy and operations will be routinely made available to participants to further clarify the risk adjustment methodology and facilitate technical aspects of the payment process by, for example, interpreting participant reports, calculating risk scores, and explaining risk adjusted Benchmarks. The risk adjustment methodology should be considered in the context of the larger benchmarking and capitation policy. Participants are encouraged to review the GPDC and CKCC websites, more specifically links to the finance and benchmarking and risk adjustment materials, and MA documents addressing risk adjustment models and policy.[24,25]

[24] For more information on GPDC, please refer to the following link: https://innovation.cms.gov/innovation-models/direct-contracting-model-options.

[25] For more information on the CKCC Options, please refer to the following link*:* https://innovation.cms.gov/innovation-models/kidney-care-choices-kcc-model.

[This page intentionally left blank.]

Appendix A: CMMI-HCC Coefficients

Table A-1. List of Disease Categories for Concurrent Risk Adjustment Model

Hierarchical Condition Category	If the disease group is listed in this column…	… Then drop the HCC(s) listed in this column
	Hierarchical Condition Category Label	
8	Metastatic Cancer and Acute Leukemia	9, 10, 11, 12
9	Lung and Other Severe Cancers	10, 11, 12
10	Lymphoma and Other Cancers	11, 12
11	Colorectal, Bladder, and Other Cancers	12
17	Diabetes with Acute Complications	18, 19
18	Diabetes with Chronic Complications	19
27	End-Stage Liver Disease	28, 29, 80
28	Cirrhosis of Liver	29
46	Severe Hematological Disorders	48
51	Dementia With Complications	52
54	Substance Use with Psychotic Complications	55, 56
55	Substance Use Disorder, Moderate/Severe, or Substance Use with Complications	56
57	Schizophrenia	58, 59, 60
58	Reactive and Unspecified Psychosis	59, 60
59	Major Depressive, Bipolar, and Paranoid Disorders	60
70	Quadriplegia	71, 72, 103, 104, 169
71	Paraplegia	72, 104, 169
72	Spinal Cord Disorders/Injuries	169
82	Respirator Dependence/Tracheostomy Status	83, 84
83	Respiratory Arrest	84
86	Acute Myocardial Infarction	87, 88
87	Unstable Angina and Other Acute Ischemic Heart Disease	88
99	Intracranial Hemorrhage	100
103	Hemiplegia/Hemiparesis	104
106	Atherosclerosis of the Extremities with Ulceration or Gangrene	107, 108, 161, 189
107	Vascular Disease with Complications	108
110	Cystic Fibrosis	111, 112
111	Chronic Obstructive Pulmonary Disease	112

Hierarchical Condition Category	If the disease group is listed in this column…	… Then drop the HCC(s) listed in this column
114	Aspiration and Specified Bacterial Pneumonias	115
136	Chronic Kidney Disease, Stage 5 (mod hierarchy)	137, 138
137	Chronic Kidney Disease, Severe (Stage 4) (mod hierarchy)	138
157	Pressure Ulcer of Skin with Necrosis Through to Muscle, Tendon, or Bone	158, 159, 161
158	Pressure Ulcer of Skin with Full Thickness Skin Loss	159, 161
159	Pressure Ulcer of Skin with Partial Thickness Skin Loss	161
166	Severe Head Injury	80, 167

Appendix B: Concurrent Risk Adjustment Relative Factors

Table B-1. CMMI-HCC Concurrent Risk Adjustment Model Relative Factors

Variable		Relative Factors
Age/Sex Cells		
F0_34	Age range 0–34, Female	0.1559
F35_44	Age range 35–44, Female	0.1559
F45_54	Age range 45–54, Female	0.1559
F55_59	Age range 55–59, Female	0.1559
F60_64	Age range 60–64, Female	0.1559
F65_69	Age range 65–69, Female	0.1949
F70_74	Age range 70–74, Female	0.1949
F75_79	Age range 75–79, Female	0.1949
F80_84	Age range 80–84, Female	0.1949
F85_89	Age range 85–89, Female	0.1949
F90_94	Age range 90–94, Female	0.2512
F95_GT	Age range 95+, Female	0.3532
M0_34	Age range 0–34, Male	0.0559
M35_44	Age range 35–44, Male	0.0559
M45_54	Age range 45–54, Male	0.0559
M55_59	Age range 55–59, Male	0.0559
M60_64	Age range 60–64, Male	0.0559
M65_69	Age range 65–69, Male	0.1340
M70_74	Age range 70–74, Male	0.1340
M75_79	Age range 75–79, Male	0.1340
M80_84	Age range 80–84, Male	0.1340
M85_89	Age range 85–89, Male	0.1340
M90_94	Age range 90–94, Male	0.1340
M95_GT	Age range 95+, Male	0.2279
HCCs		
1	HIV/AIDS	0.2847
2	Septicemia, Sepsis, Systemic Inflammatory Response Syndrome/Shock	1.1030
6	Opportunistic Infections	0.9210
8	Metastatic Cancer and Acute Leukemia	2.7247
9	Lung and Other Severe Cancers	0.8743
10	Lymphoma and Other Cancers	0.6678
11	Colorectal, Bladder, and Other Cancers	0.2083
12	Breast, Prostate, and Other Cancers and Tumors	0.2083
17	Diabetes with Acute Complications	0.4229
18	Diabetes with Chronic Complications	0.0555

Variable		Relative Factors
19	Diabetes without Complication	0.0555
21	Protein-Calorie Malnutrition	1.5099
22	Morbid Obesity	0.1876
23	Other Significant Endocrine and Metabolic Disorders	0.1428
27	End-Stage Liver Disease	0.5031
28	Cirrhosis of Liver	0.0660
29	Chronic Hepatitis	0.0660
33	Intestinal Obstruction/Perforation	1.0700
34	Chronic Pancreatitis	0.2739
35	Inflammatory Bowel Disease	0.2258
39	Bone/Joint/Muscle Infections/Necrosis	0.9684
40	Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	0.2462
46	Severe Hematological Disorders	0.9257
47	Disorders of Immunity	0.9672
48	Coagulation Defects and Other Specified Hematological Disorders	0.3814
51	Dementia With Complications	0.3057
52	Dementia Without Complication	0.3057
54	Substance Use with Psychotic Complications	0.7220
55	Substance Use Disorder, Moderate/Severe, or Substance Use with Complications	0.2926
56	Substance Use Disorder, Mild, Except Alcohol and Cannabis	0.2926
57	Schizophrenia	0.5725
58	Reactive and Unspecified Psychosis	0.5725
59	Major Depressive, Bipolar, and Paranoid Disorders	0.1677
60	Personality Disorders	0.1677
70	Quadriplegia	0.7435
71	Paraplegia	0.7435
72	Spinal Cord Disorders/Injuries	0.7435
73	Amyotrophic Lateral Sclerosis and Other Motor Neuron Disease	0.8043
74	Cerebral Palsy	0.0000
75	Myasthenia Gravis/Myoneural Disorders and Guillain-Barre Syndrome/Inflammatory and Toxic Neuropathy	0.5403
76	Muscular Dystrophy	0.1906
77	Multiple Sclerosis	0.5095
78	Parkinson's and Huntington's Diseases	0.2778
79	Seizure Disorders and Convulsions	0.1260
80	Coma, Brain Compression/Anoxic Damage	1.5190

Variable		Relative Factors
82	Respirator Dependence/Tracheostomy Status	4.4570
83	Respiratory Arrest	1.6367
84	Cardio-Respiratory Failure and Shock	0.9949
85	Congestive Heart Failure	0.3126
86	Acute Myocardial Infarction	0.9650
87	Unstable Angina and Other Acute Ischemic Heart Disease	0.6713
88	Angina Pectoris	0.1678
96	Specified Heart Arrhythmias	0.2539
99	Intracranial Hemorrhage	1.0540
100	Ischemic or Unspecified Stroke	0.2868
103	Hemiplegia/Hemiparesis	0.7026
104	Monoplegia, Other Paralytic Syndromes	0.4081
106	Atherosclerosis of the Extremities with Ulceration or Gangrene	1.5502
107	Vascular Disease with Complications	0.5992
108	Vascular Disease	0.1732
110	Cystic Fibrosis	0.5460
111	Chronic Obstructive Pulmonary Disease	0.0762
112	Fibrosis of Lung and Other Chronic Lung Disorders	0.0762
114	Aspiration and Specified Bacterial Pneumonias	1.0537
115	Pneumococcal Pneumonia, Empyema, Lung Abscess	0.1374
122	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	0.0356
124	Exudative Macular Degeneration	0.3653
135	Acute Renal Failure	0.8558
136	Chronic Kidney Disease, Stage 5	0.1387
137	Chronic Kidney Disease, Severe (Stage 4)	0.1387
138	Chronic Kidney Disease, Moderate (Stage 3)	0.0000
157	Pressure Ulcer of Skin with Necrosis Through to Muscle, Tendon, or Bone	1.8170
158	Pressure Ulcer of Skin with Full Thickness Skin Loss	1.1260
159	Pressure Ulcer of Skin with Partial Thickness Skin Loss	0.6845
161	Chronic Ulcer of Skin, Except Pressure	0.1049
162	Severe Skin Burn or Condition	1.7078
166	Severe Head Injury	1.5190
167	Major Head Injury	0.3867
169	Vertebral Fractures without Spinal Cord Injury	0.5770
170	Hip Fracture/Dislocation	1.8075
173	Traumatic Amputations and Complications	1.0607
176	Complications of Specified Implanted Device or Graft	1.3937
186	Major Organ Transplant or Replacement Status	1.5373

Variable		Relative Factors
188	Artificial Openings for Feeding or Elimination	0.7851
189	Amputation Status, Lower Limb/Amputation Complications	0.1076
Post-Kidney Transplant Indicators		
	Age <65 and 4–9 months post-graft	1.9729
	Age <65 and 10+ months post-graft	0.1835
	Age >= 65 and 4–9 months post-graft	2.3938
	Age >= 65 and months post-graft	0.2678
Count of HCCs in the Model		
	# of payment HCCs =5	0.0433
	# of payment HCCs =6	0.1425
	# of payment HCCs =7	0.2854
	# of payment HCCs =8	0.4763
	# of payment HCCs =9	0.7227
	# of payment HCCs =10	1.0152
	# of payment HCCs =11	1.4179
	# of payment HCCs =12	1.9065
	# of payment HCCs =13	2.4376
	# of payment HCCs =14	3.0497
	# of payment HCCs >=15	5.2582
HCC Interactions with Age < 65		
46	Severe Hematological Disorders	2.5608
110	Cystic Fibrosis	1.2052
136	Chronic Kidney Disease, Stage 5 (mod hierarchy)	0.4535
137	Chronic Kidney Disease, Severe (Stage 4) (mod hierarchy)	0.4535

NOTES:

Relative Factors: Relative factors are calculated by dividing each coefficient estimate by average spending in our 2018 Medicare FFS concurrent modeling sample, $10,717.60. For presentation purposes, we round the relative factors to 4 decimal places. For the DC/KCC models, raw risk scores will be normalized each year for the DC reference population.

Concurrent Sample Criteria:

1. At least 1 month of eligibility in concurrent year.
2. Only months with Part A&B enrollment, non-HMO, non-ESRD (dialysis and transplant) non-MSP are included as eligible.
3. Ineligible months are excluded from diagnoses and expenditure data, but beneficiaries with ineligible months are retained with eligible months only.
4. Include post-graft status months as eligible (codes G, R, or Y).
5. U.S. residents only.

6. Sample includes aged and disabled, non-dual-eligible and dual-eligible, community-residing and institutional beneficiaries.

Age Definition: Age is defined as of February 1, 2018.

CMS-HCCs: CMS-HCCs = CMS-Hierarchical Condition Categories. CMS-HCCs are based on ICD-10-CM diagnosis codes from valid sources (including hospital inpatient and physician office). There are 86 V24 CMS-HCCs, among which 85 CMS-HCCs are used in this risk adjustment model. (HCC134 Dialysis Status is excluded.) However, given the CMS-HCC groups, the effective number of CMS-HCCs is 82.

Modified Hierarchies: This CMMI-HCC model modifies the kidney hierarchy (HCCs 135–138) in the following ways:

1. HCC 134 Dialysis Status, which is normally included in V24 CMS-HCCs, is excluded from this model.
2. HCC 135 Acute Renal Failure, which is normally above HCCs 136–138 in the hierarchy and excludes those diagnoses, is separated from the rest of the hierarchy in this model. It is possible for an individual to have diagnoses for Acute Renal Failure and one of the Chronic Kidney Disease HCCs.
3. Also, as a policy decision, the model does not enforce the hierarchy constraint requiring the HCC 80 coefficient to be less than or equal to the HCC 27 coefficient. HCC 27 does still exclude an HCC 80 diagnosis, however.

HCC Groups: An HCC group is a set of HCCs that are effectively treated as a single HCC. For example, HCC group G1 is defined by HCCs 18 and 19. An HCC group variable is created that equals 1 if the person has HCC 18 or 19 and equals 0 otherwise. In the risk adjustment model regression, only the HCC group variable is included—variables for individual HCCs 18 and 19 are not included. However, in this table, we present the individual HCCs 18 and 19, each with the coefficient for the HCC group variable from the risk adjustment model regression. Whether an enrollee has only one HCC in an HCC group or has multiple HCCs in an HCC group, the enrollee's incremental predicted expenditures for the HCC group are the same.

[This page intentionally left blank.]

Appendix C: Example Application of Normalization, the Symmetric 3% Cap, and the CIF for Standard and New Entrant DCEs Using the CMS-HCC Prospective Risk Adjustment Model

The application of the symmetric 3% cap and the CIF follows multiple steps and requires multiple component elements which are defined in more detail below. An example calculation then presents the steps to derive a DCE's final normalized and coding-adjusted risk score from an unadjusted "raw" risk score. In this context, a "raw" risk score refers to the risk score obtained by summing the applicable relative factors estimated with the CMS-HCC prospective risk adjustment model (or for High Needs Population DCEs, the CMMI-HCC concurrent risk adjustment model) or the ESRD model. In other words, the raw risk score does not include any further adjustment, such as the application of normalization, the symmetric 3% cap or the CIF.

DC National Reference Population: The DC National Reference Population is defined in each calendar year by identifying all beneficiary months that meet all of the eligibility criteria for GPDC. The DC National Reference Population includes both aligned beneficiaries and alignment-eligible beneficiaries who are not actually aligned to a DCE in either a reference year (RY) or performance year (PY). The DC National Reference Population is divided into two sub-populations, which are characterized by beneficiary months accruing to either the Aged & Disabled (A&D) benchmark or the ESRD benchmark.

Performance Year (PY) versus the Reference Year (RY): The PY is the current performance year of GPDC (in the example provided, it is PY2021), while the RY is a comparison point for calculating the change in DCE mean normalized risk scores and is used to determine the symmetric 3% cap and CIF adjustments. For the same PY, the RY used for the purpose of calculating the symmetric 3% cap may differ from the RY used to calculate the CIF. See **Tables 4 and 5** in Section V.v for a summary of the RYs used in GPDC for the symmetric 3% cap and CIF, respectively.

Reference Year (RY) Populations: Beneficiaries aligned during the RY may be, but are not necessarily, present in the DCE's PY aligned population. The reference population for the symmetric 3% cap is the population of beneficiaries that would have been claims-aligned to the DCE in the symmetric 3% cap RY. The reference population for the CIF is the DC National Reference Population in the CIF RY.

Normalization Factor: This is the average beneficiary-month weighted risk score for the DC National Reference Population, which includes all beneficiary-months that meet the GPDC alignment eligibility criteria during each month in a calendar year. Normalization factors are calculated separately for both A&D and ESRD beneficiary months in each reference year and for the performance year. (Separate normalization factors are also calculated for the CMS-HCC prospective risk adjustment model and the CMMI-HCC concurrent risk adjustment model.) The 2021 PY normalization factor is "preliminary" since there is not yet final risk score data available for 2021. This "preliminary" normalization factor has been estimated using a projected linear trend and will be updated retrospectively after the close of the performance year, once final risk score data from 2021 is available. Shown below are the CMS-HCC prospective risk adjustment model normalization factors for the A&D DC National Reference Population. The preliminary PY 2022 factor has not yet been determined.

Table C-1. Preliminary Normalization Factors for the GPDC Eligible Aged & Disabled Population for the CMS-HCC Prospective Risk Adjustment Model

Year	Normalization Factor
2017	1.098
2018	1.118
2019	1.137
2021	1.176*
2022	TBD

* Projected using a linear trend. Projections based on 2017-2019 mean prospective risk scores for A&D beneficiary months.

DCE Mean Risk Score: This is the mean risk score for DCE-aligned beneficiaries during a RY or PY. This can be calculated as the sum of risk scores weighted by beneficiary months divided by total beneficiary months for a given year and benchmark population (A&D or ESRD). Beneficiaries aligned in the RY and PY may overlap, but do not necessarily maintain alignment in both periods. Alignment for the RY and the PY is based on the same list of DC Participant Providers but may include a different set of aligned beneficiaries in each period.

DCE Mean Normalized Risk Score: A normalized risk score is calculated by dividing a raw risk score by the normalization factor for the applicable year, benchmark (A&D or ESRD), and risk adjustment model. Normalization may equivalently be applied either to individual beneficiary risk scores or to a DCE's mean risk score. A DCE's mean normalized risk score is thus the DCE mean risk score divided by the normalization factor.

DCE Risk Score Growth Rate: A symmetric 3% cap is applied to the risk score growth rate for each DCE. This growth rate is calculated as the percentage change in DCE's mean normalized risk score between a base period (reference year) and performance year.

The growth rate, g, is calculated as:

$$g = \left(\frac{\text{Mean Norm. Risk Score}_{PY}}{\text{Mean Norm. Risk Score}_{RY}} - 1 \right) \times 100$$

The reference year is set in each PY according to **Table C.2**.

DCE Capped Mean Risk Score: If the calculated risk score growth rate is less than -3% or greater than +3%, then the DCE mean normalized risk score for the performance year is replaced with the DCE mean normalized risk score for the base period multiplied by 0.97 or 1.03, respectively. This is the DCE capped mean risk score. The symmetric 3% cap is applied separately for A&D and ESRD beneficiary months and risk scores.

This calculation is shown below, using a symmetric 3% cap:

$$\text{DCE Capped Mean Risk Score}_{PY} = \begin{cases} 1.03 \times \text{Mean Norm. Risk Score}_{BY} \text{ if } g > 3\% \\ \text{Mean Norm. Risk Score}_{PY} \text{ if } -3\% \leq g \leq 3\% \\ 0.97 \times \text{Mean Norm. Risk Score}_{BY} \text{ if } g < -3\% \end{cases}$$

Table C-2. Reference Population for Applying the Symmetric 3% cap

Performance Year	Reference Year
IP–2020	NA
PY2021	2019
PY2022	2020
PY2023	2021[a]
PY2024	2022
PY2025	2023
PY2026	2024

[a] Note that CMS is continuing to monitor the potential impact of COVID-19 on reference years for applying the symmetric 3% Cap. For example, CMS may determine that 2021 is not appropriate to use as a reference year for PY2023 and instead use 2020 to avoid biases introduced by claims with CY2020 dates of service.

GPDC Aligned (all DCEs) Population Mean Capped Risk Score: This is the average DCE Capped Mean Risk Score across all DCEs in a performance year weighted by beneficiary-months aligned to each DCE. This is calculated separately for A&D and ESRD beneficiary months for the CMS-HCC prospective risk adjustment model (and separately for the CMMI-HCC concurrent risk adjustment model).

The GPDC Aligned Population Mean Capped Risk Score, $\bar{C}_{PY}$ is defined as:

$$\bar{C}_{PY} = \frac{\sum_{d=1}^{D} \text{DCE capped mean risk score}_{d,PY} \times w_{d,PY}}{\sum_{d=1}^{D} w_{d,PY}}$$

Where $\text{DCE capped mean risk score}_{d,PY}$ is the capped performance year risk score for DCE *d* and $w_{d,PY}$ is the total aligned beneficiary months for DCE *d* during the performance year, for either the A&D or ESRD benchmark.

Coding Intensity Factor (CIF): The CIF adjustment is applied so that the model-wide DCE aligned population mean normalized risk score, after risk score growth rate caps are applied, remains constant from the CIF RY to the PY. The CIF ensures that DCE model-wide risk scores do not outpace the risk score growth observed in the DC National Reference Population. The CIF for each PY is calculated as the GPDC Aligned Population Mean Capped Risk Score in the PY divided by the DCE aligned population mean normalized risk score in the CIF RY. All DCE capped mean risk scores are divided by the CIF to calculate the final coding adjusted risk score.

The CIF is then defined as:

$$\text{CIF}_{PY} = \frac{\bar{C}_{PY}}{\text{GPDC-Aligned Mean Norm. Risk Score}_{RY}}$$

Example Normalization, Symmetric 3% Cap, and CIF Calculation: The following is an example calculation that presents the steps to derive the final normalized and coding adjusted risk score from an unadjusted "raw" risk score at the end of PY2021 (See **Table C.3**). In this hypothetical example, the three Standard DCEs, A, B, and C, comprise all model participants, and calculated mean risk scores reflect each

DCE's aligned A&D population in the RY (2019) and PY (2021) (note: for 2021, the RY for the symmetric 3% cap and the CIF are both 2019).

Table C-3. Example Calculation Adjusting Risk Scores for Normalization, the Symmetric 3% Cap, and the CIF

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DCE	RY DCE Mean Risk Score	PY DCE Mean Risk Score	RY Norm Factor	PY Norm Factor	RY DCE Mean Norm Risk Score (1) / (3)	PY DCE Mean Norm Risk Score (2) / (4)	DCE Risk Growth Rate [(6) - (5)] / (5)	PY DCE Capped Mean Risk Score**	Coding Intensity Factor Adjust-ment***	Final Coding Adjusted Risk Score (8) / (9)
A	1.137	1.211	1.137	1.176	1.000	1.030	3.00%	1.030	1.009	1.021
B	1.092	1.223	1.137	1.176	0.960	1.040	8.33%	0.989	1.009	0.980
C	1.194	1.141	1.137	1.176	1.050	0.970	−7.62%	1.019	1.009	1.009
Total DCE Aligned*	1.141	1.192	1.137	1.176	1.003	1.013	—	1.012	1.009	1.003

*Numbers shown in the total DCE Aligned row reflect the average across all individual DCEs. It is assumed that the three DCEs in this example all have the same size beneficiary population. In reality, the DCE-aligned population averages will be weighted by each DCE's number of beneficiary-months.

** Equals 1.03 X (5) if the DCE Risk Growth Rate (7) > 3%, equals (6) if (7) is between −3% and +3%, and equals 0.97 X (5) if (7) < −3%.

*** The CIF is calculated as (8) / (5) for the Total DCE Aligned population. An identical CIF adjustment is then applied to all DCEs in (10).

- DCE A's mean normalized risk score grows from 1.000 to 1.030, an increase of 3%. Since this falls within the symmetric 3% Cap, DCE A's capped risk score remains 1.030. This is then divided by the CIF of 1.009, resulting in a final coding intensity adjusted mean risk score of 1.21.
- DCE B exhibits an 8.33% change in mean normalized risk scores, from 0.96 to 1.04. DCE B's PY risk score is capped at 103% of the RY mean normalized risk score, 0.989 (0.960*1.030 = 0.9890), because the observed growth of 8.33% is greater than the symmetric 3% cap.
- The CIF is applied to DCE B's capped risk score; the final coding adjusted risk score is 0.980, which reflects a 2.07% increase in risk score over the RY.
- DCE C exhibits a 7.62% decline in mean normalized risk score from RY to PY. Because this is below the symmetric 3% cap, the decline is limited to 3%. The CIF is applied to the capped risk score, 1.019, and DCE C's final coding adjusted risk score is 1.009.
- DCE C's final coding adjusted risk score of 1.009 is 3.87% lower than the RY risk score, 1.050. Although the application of the CIF results in a risk score decline which is greater, in absolute value, than the symmetric 3% cap, the net result is still a reduction to the allowed decline in mean risk score versus no coding adjustments.
- The net result of the application of the symmetric 3% cap and the CIF is that individual DCE risk scores are allowed to vary within the ± 3% range, yet the model-wide mean risk score (1.003 in this example) remains constant from RY to PY. This means that, on average for DC Model-aligned beneficiaries, the change in observed risk score is constrained so that it does not outpace risk score growth in the DC National Reference Population.

Appendix D: Example Application of Normalization and the Symmetric Risk Score Growth Cap to Risk Scores for KCEs Using the CMS-HCC Prospective Risk Adjustment Model

The application of the ±3% and ±6% symmetric caps to risk score growth for the ESRD and CKD Stages 4 or 5 populations respectively follows multiple steps and requires multiple component elements, which are defined in more detail below. An example calculation then presents the steps to derive the final normalized and coding-adjusted risk score from an unadjusted "raw" risk score. In this context, a "raw" risk score refers to the beneficiary risk score obtained by summing the applicable relative factors estimated with the appropriate risk adjustment model. In other words, the raw risk score does not include any further adjustment, such as the application of normalization or the symmetric cap.

Performance Year versus the Reference Year: The performance year is the current performance year of the Kidney Care Choices Model (in the example provided, it is PY2021),[26] while the reference year is a comparison point for calculating the change in KCE mean normalized risk scores and is used to determine whether the KCE's risk score growth exceeds the symmetric cap. See **Table 11** in Section VII.v for a summary of the reference years used in KCC for the symmetric cap.

Reference Year Populations: Beneficiaries aligned during the reference year may be, but are not necessarily, present in the KCE's PY aligned population. The reference population for the symmetric cap is the population of beneficiaries that would have been claims-aligned to the KCE in the symmetric cap reference year.

Normalization Factor: This is the average beneficiary-month weighted risk score for the DC National Reference Population, which includes all beneficiary-months that meet the GPDC alignment eligibility criteria during each month in a calendar year[27]. Normalization factors are calculated separately for both A&D and ESRD beneficiary months in each reference year and for the performance year. The PY2021 normalization factor is "preliminary" since there is not yet risk score data available for 2021. This "preliminary" normalization factor has been estimated using a projected linear trend and will be updated retrospectively after the close of the performance year, once final risk score data from 2021 is available. PY 2022 normalization will follow this same pattern. Shown below are the CMS-HCC prospective risk adjustment model normalization factors for the A&D DC National Reference Population.

[26] Given the start of KCC was delayed to 1/1/2022, technically 2021 is not a performance year, it is an implementation period year.

[27] Please note, that for the normalization of risk scores, CMS uses the DC National Reference Population which includes a broader set of beneficiaries including those not eligible for the KCC model. The reference population used to normalize the risk scores does not meet the additional alignment criteria for the KCC model.

Table D-1. Preliminary Normalization Factors for the GPDC Eligible Aged & Disabled Population for the CMS-HCC Prospective Risk Adjustment Model

Year	Normalization Factor
2017	1.098
2018	1.118
2019	1.137
2021	1.176*
2022	TBD

* Projected using a linear trend. Projections based on 2017-2019 mean prospective risk scores for A&D beneficiary months.

KCE Mean Risk Score: This is the mean risk score for KCE-aligned beneficiaries during a RY or PY. This can be calculated as the sum of risk scores weighted by beneficiary months divided by total beneficiary months for a given year and benchmark population (A&D or ESRD). Beneficiaries aligned in the RY and PY may overlap, but do not necessarily maintain alignment in both periods. Alignment for the RY and the PY is based on the same list of KCE Participant Providers but may include a different set of aligned beneficiaries in each period.

KCE Mean Normalized Risk Score: A normalized risk score is calculated by dividing a raw risk score by the normalization factor for the applicable year, benchmark (A&D or ESRD), and risk adjustment model. Normalization may equivalently be applied either to individual beneficiary risk scores or to a KCE's mean risk score. A KCE's mean normalized risk score is thus the KCE mean risk score divided by the normalization factor.

KCE Risk Score Growth Rate: A symmetric cap is applied to the risk score growth rate for each KCE. This growth rate is calculated as the percentage change in KCE's mean normalized risk score between a base period (reference year) and performance year.

The growth rate, g, is calculated as:

$$g = \left(\frac{\text{Mean Norm. Risk Score}_{PY}}{\text{Mean Norm. Risk Score}_{RY}} - 1 \right) \times 100$$

The reference year is set in each PY according to **Table D.2**.

DCE Capped Mean Risk Score: For CKD Stages 4 or 5 risk scores, if the calculated risk score growth rate is less than −6% or greater than +6%, then the KCE mean normalized risk score for the performance year is replaced with the KCE mean normalized risk score for the base period multiplied by 0.94 or 1.06, respectively. Similarly, for ESRD risk scores, if the calculated risk score growth rate is less than −3% or greater than +3%, then the KCE mean normalized risk score for the performance year is replaced with the KCE mean normalized risk score for the base period multiplied by 0.97 or 1.03, respectively. This is the KCE capped mean risk score. The symmetric cap is applied separately for CKD Stages 4 or 5 and ESRD beneficiary months and risk scores.

This calculation is shown below, using the CKD Stages 4 or 5 population and its corresponding symmetric 6% cap:

$$\text{KCE Capped Mean Risk Score}_{PY} = \begin{cases} 1.06 \times \text{Mean Norm. Risk Score}_{BY} \text{ if } g > 6\% \\ \text{Mean Norm. Risk Score}_{PY} \text{ if } -6\% \leq g \leq 6\% \\ 0.94 \times \text{Mean Norm. Risk Score}_{BY} \text{ if } g < -6\% \end{cases}$$

Table D-2. Reference Population for Applying the Symmetric Cap

Performance Year	Reference Year
IP–2020	NA
IP–2021[a]	2019
PY2022	2020
PY2023	2020[b]
PY2024	2022
PY2025	2023

[a] Because the start of KCC was delayed to 1/1/2022, 2021 is now considered an implementation period year, not a performance year.

[b] Please note that CY2020 will be used as the reference year instead of CY2021 for PY2023 in order to avoid coding biases that may be introduced by Covid-19.

Example Application of Normalization and the Symmetric 6% Risk Score Growth Cap for A&D: The following is an example calculation that presents the steps to derive the final normalized and coding adjusted risk score from an unadjusted "raw" risk score at the end of IP2021.[28] In this hypothetical example, the three KCEs, A, B, and C, comprise all model participants, and calculated mean risk scores reflect each KCE's aligned aged-disabled population in the reference year (2019) and performance year (2021).

Table D-3. Example Calculation Adjusting Risk Scores for Normalization and the Risk Score Growth Cap

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KCE	**RY KCE Mean Risk Score**	**PY KCE Mean Risk Score**	**RY Norm Factor**	**PY Norm Factor**	**RY KCE Mean Norm Risk Score (1) / (3)**	**PY KCE Mean Norm Risk Score (2) / (4)**	**KCE Risk Growth Rate [(6) - (5)] / (5)**	**PY KCE Capped Mean Risk Score****
A	2.729	2.906	1.137	1.176	2.400	2.471	2.98%	2.471
B	2.621	2.935	1.137	1.176	2.305	2.496	8.28%	2.443
C	2.866	2.738	1.137	1.176	2.520	2.329	−7.61%	2.369
Total KCE Aligned*	2.738	2.860	1.137	1.176	2.408	2.432	—	2.428

[28] Because the start of KCC was delayed to 1/1/2022, 2021 is now considered an implementation period year, not a performance year.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KCE	RY KCE Mean Risk Score	PY KCE Mean Risk Score	RY Norm Factor	PY Norm Factor	RY KCE Mean Norm Risk Score (1) / (3)	PY KCE Mean Norm Risk Score (2) / (4)	KCE Risk Growth Rate [(6) - (5)] / (5)	PY KCE Capped Mean Risk Score**

*Numbers shown in the total KCE Aligned row reflect the average across all individual DCEs. It is assumed that the three KCEs in this example all have the same size beneficiary population. In general, the KCE-aligned population averages will be weighted by each KCE's number of beneficiary-months.

** Equals 1.06 X (5) if the KCE Risk Growth Rate (7) > 6%, equals (6) if (7) is between −6% and +6%, and equals 0.94 X (5) if (7) < −6%.

- KCE A's mean normalized risk score grows from 2.400 to 2.471, an increase of 2.98%. Since this falls within the 6% risk score growth rate cap, KCE A's capped risk score remains 2.471.
- KCE B exhibits an 8.28% change in mean normalized risk scores, from 2.305 to 2.496. KCE B's PY risk score is capped at 106% of the RY mean normalized risk score, 2.443 (2.305*1.060 = 0.2443), because the observed growth of 8.33% is greater than the 6% cap.
- KCE C exhibits a 7.61% decline in mean normalized risk score from RY to PY. Because this is below the -6% cap, the decline is limited to 6%.