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CENTER FOR MEDICARE

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TO: All Medicare Advantage Organizations, PACE Organizations, Medicare-
             Medicaid Plans, and Demonstrations

FROM: Cheri Rice, Director
             Medicare Plan Payment Group

SUBJECT: Proposed Changes to the CMS-HCC Risk Adjustment Model for Payment Year
             2017

In response to concerns about the accuracy of the CMS-Hierarchical Condition Category (HCC) risk adjustment model for predicting costs of dual eligible beneficiaries, CMS has undertaken an evaluation to assess how well the model performs for these beneficiaries. As we stated in our 2016 Rate Announcement, "we take very seriously the concerns raised by commenters that the model may disproportionately affect specific populations, particularly dual eligibles. We will evaluate the impact of the model on these populations (including exploring ideas raised by MedPAC and others such as whether partial duals and full duals should be treated differently). In the coming months, we will share our analysis with stakeholders and, if appropriate, propose modifications to the model to improve predictive accuracy in a future year's process."

This memo serves the following purposes: it lays out findings from our analysis to date, describes model development work we have been conducting in response to these findings, and provides an early update on our plans for a revised model to be proposed for Payment Year 2017. We invite public comment on this early update; all comments should be submitted by **November 25, 2015** to RiskAdjustment@cms.hhs.gov. CMS will post comments on its Website. CMS will consider these comments as we finalize proposed changes to CMS-HCC model for inclusion in the Payment Year 2017 Advance Notice, which we will release in February, 2016.

Background:
The CMS-HCC risk adjustment model is used to calculate risk scores to adjust capitated payments made for aged and disabled beneficiaries enrolled in Medicare Advantage (MA) plans and certain demonstrations. The CMS-HCC model has been calibrated using two full risk segments with separate coefficients to reflect the unique cost patterns of beneficiaries in the community and beneficiaries residing in long term care institutional facilities. The community segment of the model predicts costs for beneficiaries who reside in the community or have been in an institution for fewer than 90 days. The institutional segment of the model predicts costs for beneficiaries who have been in an institution for 90 days or longer.

The CMS-HCC risk adjustment model is prospective: it uses health status in a base year to predict costs in the following year. In addition to diagnoses, base year factors include Medicaid status. There are different Medicaid factors by gender, aged/disabled status, and whether a beneficiary lives in the community or in an institution. These Medicaid factors complement the diagnoses in the model as prospective predictors of costs. The coefficients for the Medicaid factors reflect that, on average, dual eligible beneficiaries cost more than non-dual eligible beneficiaries with otherwise similar disease profiles. Medicaid status is defined as having at least one month of Medicaid eligibility during the base year.

Research and Findings:
In recent years, there has been an increased focus among some plans on exclusively serving the dual eligible population and CMS feels it is an appropriate time to revisit the model. Given this increase in dual-focused plans in the Medicare market, CMS' research and model development work has focused on determining the accuracy of the CMS-HCC model introduced in 2014 ("2014 model") for paying for dual eligible beneficiaries and identifying model changes that will improve payment accuracy. Specifically, CMS has studied how well the model predicts costs based on beneficiaries' dual eligible statuses in the payment year, which is when beneficiaries are enrolled in the health plan that is being paid for them.

To measure model performance, CMS calculates predictive ratios for key subgroups of beneficiaries. A predictive ratio—the ratio of a group's predicted cost to its actual cost—measures the accuracy of the model in predicting the average cost of a group. A predictive ratio close to 1.0 indicates that the model is accurately predicting that group's average cost. A ratio greater than 1.0 indicates over-prediction, while a ratio less than 1.0 indicates under-prediction. The model predicts accurately overall, as well as for diseases and characteristics included in the model. We note that we calculate predictive ratios using the Fee-For-Service (FFS) population, because we do not have expenditures for the MA-enrolled population.

CMS measured the predictive ratios (PR) for the beneficiaries based on dual status, aged/disabled status, and community/institutional status.

Institutional Segment. Since the long-term institutionalized population is predominantly dual eligible (83.5%) – and specifically, full benefit dual eligible (83.3%) – the institutional segment of the model predicts very well for dual eligible beneficiaries (the predictive ratio for all dual eligible beneficiaries is 0.998; the predictive ratio for full benefit dual eligible beneficiaries is 0.999).

Community Segment. Our findings show that the community segment of the 2014 model predicts fairly accurately for non-dual eligible beneficiaries (PR=1.015) and somewhat over-predicts for partial benefit dual eligible beneficiaries (PR=1.092), while it somewhat under-predicts for full benefit dual eligible beneficiaries (PR=0.914) (see Table 1). Based on these findings, we focused our model development efforts on the community segment of the CMS-HCC model.

Table 1: Predictive Ratios for Community Population, 2014 Model

FFS population	1.000
Non-dual	1.015
Dual	0.957
Full benefit duals	0.914
Partial benefit duals	1.092

Notes: Predictive ratios are the ratio of predicted cost to actual cost for the applicable subgroup.
Dual status is defined in the payment year.
Source: RTI International analysis of 2010-2011 Medicare 100% data.

Model Development:

In order to improve the predictive ratios for full benefit and partial benefit dual eligible beneficiaries in the community, CMS is considering changes to the structure of the model. Specifically, rather than using a single segment for all community beneficiaries that includes factors for Medicaid status, we are developing a model that includes separate community segments for the following six populations:

1) Full benefit dual aged;
2) Full benefit dual disabled;
3) Partial benefit dual aged;
4) Partial benefit dual disabled;
5) Non-dual aged; and
6) Non-dual disabled.

Full benefit dual eligibles are those who are eligible for full Medicaid benefits under title XIX of the Social Security Act. Partial benefit duals include those who are Qualified Medicare Beneficiaries (QMBs), Specified Low Income Medicare Beneficiaries (SLMBs), and other categories of beneficiaries who are not eligible for full Medicaid benefits under title XIX. QMBs and SLMBs who are eligible for full Medicaid benefits (i.e., QMB Plus and SLMB Plus) are considered full benefit duals.

We are considering separate model segments for these six subgroups of dual eligibles because our analysis indicates that these subgroups have distinct cost profiles. We determined that full benefit (FB) duals have higher costs than partial benefit duals, and partial benefit (PB) duals have higher costs than non-duals (see Table 2 for average costs by subgroup). In addition, the cost profiles of the non-dual, FB dual, and PB dual aged versus disabled segments were very distinct, both within the dual type (e.g. FB dual aged versus FB dual disabled) and between the dual types (e.g. FB dual disabled versus PB dual disabled). The differences in cost patterns varied significantly both overall and by HCC disease category. The significant differences in regression coefficients both within and between the non-dual aged, non-dual disabled, PB dual aged, PB dual disabled, FB dual aged, and FB dual disabled populations indicate that these subgroups have distinct disease and cost profiles.

Table 2: Costs and Percent of Community Model Sample of the Six Subgroups (2012)

	Mean actual costs	Proportion of model sample
Full benefit dual – aged	$15,147	7.7%
Full benefit dual – disabled	$10,418	7.4%
Partial benefit dual – aged	$10,635	3.6%
Partial benefit dual – disabled	$9,239	2.9%
Non-dual – aged	$8,932	70.9%
Non-dual –disabled	$7,829	7.6%

Source: RTI International analysis of 2011-2012 Medicare 100% data.

CMS is currently calibrating a revised CMS-HCC model using 2013-2014 data. Specifically, 2013 diagnoses are used to predict 2014 expenditures. We are not conducting a clinical revision of the hierarchical condition categories (HCCs) for the contemplated model revision. Each of the six model segments (non-dual aged, non-dual disabled, FB dual aged, FB dual disabled, PB dual aged, PB dual disabled) would have the same HCCs as the 2014 model, while the relative factors would differ by segment to reflect the specific relative costs for an HCC for that subgroup. We are exploring whether the disease interaction terms should differ by model segment. As in all model calibrations, the denominator will be the average predicted cost across the FFS Medicare population and will be used to convert model coefficients in each segment into relative factors.

In the contemplated revision to the model, dual status in the community segments would be concurrent (i.e., based on the payment year status). For each segment, model coefficients for hierarchical condition categories (HCCs) are estimated by regressing the total annualized expenditure for Medicare Parts A and B benefits for each beneficiary onto their demographic factors and hierarchical condition categories, as indicated by their diagnoses. Expenditures are based on annualized costs of community months that a beneficiary is in for each relevant dual status (aged and disabled are mutually exclusive—a beneficiary is either aged or disabled for a year based on age as of February 1). Therefore, beneficiaries could have months in one or more of these subpopulation statuses in the payment year. In payment, we would determine the appropriate risk score for each monthly payment, based on a beneficiary's status in the payment month. This is similar to how we determine which risk score segment to use in payment today: we determine Part C community and institutional status on a monthly basis, as well as the Part C ESRD model scores and the Part D RxHCC model scores.

We are planning to maintain a single institutional segment, since it is predicting well today. We are exploring whether changing the Medicaid factors in the institutional segment to make them concurrent (based on payment year status) will improve the predictive power of the model. We will also determine if it is statistically appropriate to distinguish between full and partial benefit duals. Similarly, we will explore the feasibility of revising the new enrollee model to distinguish between full and partial benefit duals. (See Table 3 for a comparison of the 2014 model and what CMS is envisioning for a revised model.)

Table 3: Comparison of the 2014 Model and Revised CMS-HCC Model

	2014 Model	**Revised Model**
Segments	Two Full Risk segments: • Institutional • Community	Seven Full Risk Segments • Institutional • Community: Full benefit dual aged • Community: Full benefit dual disabled • Community: Partial benefit dual aged • Community: Partial benefit dual disabled • Community: Non-dual aged • Community: Non-dual disabled
Dual status for full risk beneficiaries identified in:	Base year	Payment year
Hierarchical condition categories	79 HCCs	Same HCCs as 2014 model

Initial Results of Revised Model:

Predictive ratios for each of the six community subgroups, defined by dual eligible status and aged/disabled status, are 1.0 for the revised model, indicating that the six segment model predicts costs more accurately than the 2014 model (see Table 4). The non-dual and partial benefit dual aged and disabled subgroups are no longer over-predicted, and the full benefit dual subgroups are no longer under-predicted. Furthermore, the revised model improves prediction for each of the six subgroups across deciles of predicted costs. The deciles were created by sorting the predicted expenditures in ascending order, then equally dividing each subpopulation amongst the ten groups. For the non-dual aged, FB dual aged, and PB dual aged segments, the predictive ratios for the revised model are closer to 1.0 compared to those for the 2014 model across most deciles (see Table 4).

We note that the CMS-HCC model has typically under-predicted expenditures for low risk beneficiaries. The majority of beneficiaries in the lowest predicted groups have no HCCs included in the model. The predicted costs for beneficiaries without model HCCs are determined by CMS-HCC model demographic factors only, and the values for these demographic factors are the same for both beneficiaries without HCCs and those with model HCCs. For those beneficiaries with HCCs, the age-sex factors have modest importance in explaining costs. The actual effect in dollars of the under-prediction in the lower deciles is quite small, as it is a percentage of a relatively small expenditure level.

For beneficiaries in the highest decile of predicted costs for all six model segments, the revised model effectively eliminates the over-prediction for non-dual and PB dual beneficiaries, while it also effectively eliminates the under-prediction for FB dual beneficiaries.

For the non-dual disabled and PB dual disabled segments, the revised model predicts costs more accurately than the 2014 model does for deciles four through ten and, for the FB dual disabled segment, the revised model's predictive ratios are generally closer to 1.0 for deciles five through

ten. However, for the lower risk deciles in all three dual disabled segments, the under-prediction for costs observed under the 2014 model is not fully eliminated by the revised model. We note the majority of beneficiaries in these lowest deciles have few or no HCCs that are included in the model.

We also explored a risk adjustment model that had only three community segments – FB dual, PB dual, and non-dual – that produces predictive ratios of 1.0 for the six subgroups. However, the model with six community segments produces predictive ratios that are substantially similar or closer to 1.0 at the decile level and also predicts costs more accurately at the HCC level for the six dual subgroups.

Table 4: Comparison of Predictive Ratios by Deciles of Predicted Expenditures, Community Beneficiaries – 2014 Model and Revised CMS-HCC Model:

Decile	Non-Dual Aged		Full Benefit Dual Aged		Partial Benefit Dual Aged	
	2014 model	Revised model	2014 model	Revised model	2014 model	Revised model
Overall	1.012	1.000	0.892	1.000	1.123	1.000
1st	0.904	0.935	0.814	0.961	1.043	0.933
2nd	0.925	0.952	0.862	0.954	1.206	0.968
3rd	0.950	0.970	0.952	0.987	1.234	0.966
4th	0.968	0.977	0.906	0.993	1.174	0.977
5th	1.006	1.007	0.920	1.005	1.152	0.994
6th	1.001	1.003	0.908	0.999	1.146	0.997
7th	1.021	1.015	0.908	1.014	1.138	1.022
8th	1.026	1.014	0.901	1.014	1.133	1.022
9th	1.040	1.019	0.892	1.013	1.103	1.022
10th	1.036	1.000	0.868	0.995	1.074	0.997
Decile	Non-Dual Disabled		Full Benefit Dual Disabled		Partial Benefit Dual Disabled	
	2014 model	Revised model	2014 model	Revised model	2014 model	Revised model
Overall	1.042	1.000	0.947	1.000	1.072	1.000
1st	0.787	0.928	0.860	0.949	0.799	0.912
2nd	0.886	0.910	0.888	0.880	0.865	0.884
3rd	1.012	0.952	0.837	0.873	0.950	0.891
4th	0.905	0.953	1.061	0.904	1.069	0.978
5th	1.033	0.969	1.009	0.993	1.165	1.030
6th	1.061	0.989	1.036	1.024	1.120	1.014
7th	1.072	1.004	1.024	1.029	1.133	1.025
8th	1.092	1.032	1.004	1.053	1.140	1.041
9th	1.114	1.053	0.968	1.050	1.114	1.039
10th	1.039	0.997	0.877	0.991	1.049	0.991

Source: RTI International analysis of 2011-2012 Medicare 100% data.

Summary of Current Model Development Work:

We are developing a revised CMS-HCC model that creates up to six separate community segments based on dual and aged/disabled status in the payment year. Our analyses indicate that this revised model would improve predictive performance for aged and disabled full benefit dual, partial benefit dual, and non-dual beneficiaries in the community. The updated model results in more appropriate relative weights for the HCCs because the relative weights reflect the disease and expenditure patterns of each of the six community segments.

In addition, we are exploring minor updates to the institutional and new enrollee segments of the model to distinguish between full and partial benefit duals. We will also explore whether updating the Medicaid factors to reflect concurrent (payment year) dual status improves the predictive ratios of the institutional segment of the model.

We are not including the relative factors of the revised model in this solicitation for comment, since we have not completed our development work. We plan to include the factors in the 2017 Advance Notice and accept public comment on them through that vehicle.

We currently use a different version of the CMS-HCC model to pay Programs of All-Inclusive Care for the Elderly (PACE) organizations. We are soliciting comments on whether we should apply the revised CMS-HCC model to PACE organizations in 2017, in addition to Medicare Advantage plans.

We will be releasing separate guidance to Medicare-Medicaid Plans on the implications of these findings for the Medicare-Medicaid capitated financial alignment model demonstrations.

Comments:

CMS is soliciting feedback on our approach to revising the CMS-HCC risk adjustment model to better predict costs for beneficiaries based on their dual status and aged/disabled status for PY 2017. If you wish to submit comments, please submit them to RiskAdjustment@cms.hhs.gov, with the subject heading "Proposed Updates to the CMS-HCC Risk Adjustment Model," by **November 25, 2015**.