Risk adjustment

**Important considerations for global payments
to providers**

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OVERVIEW

Risk adjustment has become an important tool in setting global payments in provider payment reforms. It is used by private health insurers such as Blue Cross Blue Shield of Massachusetts in the Alternative Quality Contract (AQC). The U.S. Department of Health and Human Services (HHS) issued proposed rules in April 2011 on Medicare accountable care organizations (ACOs), and discussed different approaches to using risk adjustment to set benchmarks for savings calculations.

This paper is prepared for the Massachusetts Medical Society for educational purposes. It discusses principles and important considerations when using risk adjustment in provider payment reforms. Specifically, it discusses:

- The key principles of risk adjustment—in addition to clinical and statistical rigor, the design of a risk adjustment model should also be transparent and meaningful with regard to data and patient assignment

- Risk adjustment should be practical with respect to imperfect coding

- Risk adjustment may never be perfect but can always be improved with better design, richer data, and more advanced modeling techniques

Readers should be familiar with the concepts of risk adjustment models and process. For more information, please refer to the Milliman white paper "Risk Adjustment and Its Application in Global Payments to Providers."

ACCOUNTABLE CARE IN THE PRIVATE AND PUBLIC SECTORS

In an accountable care organization (ACO), a group of providers and hospital workers assume joint responsibility for providing high quality health outcomes among their patients and work together to take advantage of economic efficiencies. In the private sector, ACOs have already been piloted by a number of health insurers. They have received much attention as a potential alternative to the existing fee-for-service payment system. The payment structure of a commercial ACO typically includes both a risk-adjusted global payment and a performance-based payment. For instance, Blue Cross Blue Shield of Massachusetts has an Alternative Quality Contract (AQC). Provider organizations that participate in the AQC receive a risk-adjusted global capitation payment rate, and the performance payments are not risk-adjusted.[1]

The Patient Protection and Affordable Care Act (PPACA) sets up Medicare shared savings programs through ACOs, with the goal of encouraging care coordination, integrated care delivery, and population health management. Provider organizations will be paid on a fee-for-service basis, with additional payments based on a set of benchmarks for healthcare costs, outcomes, and quality. These payments will be adjusted for beneficiary-specific characteristics and other factors that the Secretary of the U.S. Department of Health and Human Services (HHS) determines appropriate.[2] A number of provider associations suggested risk adjustment to the Secretary as a tool to account for such beneficiary-specific characteristics. Since risk adjustment is not perfect, they have urged the Secretary to evaluate the accuracy and utility of risk adjustment tools and adopt effective risk adjustment.[3],[4] The HHS released the proposed rule on Medicare ACOs on April 7, 2011, in which risk adjustment was discussed in great detail. The proposed model to serve risk adjustment purposes is the CMS-HCC model, the

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[1] BlueCross BlueShield Association. Blue Cross Blue Shield of Massachusetts—Changing incentives to promote better care. Retrieved June 20, 2011, from http://www.bcbs.com/issues/uninsured/blue-cross-blue-shield-of-mass.html.

[2] Section 1899, Patient Protection and Affordable Care Act.

[3] Letter to Donald Berwick, Administrator, Centers for Medicare and Medicaid Services (CMS), American Academy of Otolaryngology-Head and Neck Surgery, American Association of Neurological Surgeons, American Orthopaedic Surgeons, et al. (December 3, 2010).

[4] Letter to Donald Berwick, Administrator, Centers for Medicare and Medicaid Services, American Medical Association (August 12, 2010).

model that is currently used to set program payment rates for Medicare Advantage plans. The HHS laid out different options and concerns with regard to establishing the benchmark statistics and risk scores. The open comment period ended on June 7, and the timing for the final ruling is not yet announced.

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RISK ADJUSTMENT DESIGN ISSUES

Under global payment, provider organizations face two types of risks—systemic risks and nonsystemic risks. Systemic risks are events such as accidents and pandemics. The risk is evenly spread out across the entire system, and is not specifically concentrated on any provider organization. They can be addressed by traditional insurance mechanisms.

Nonsystemic risks, on the other hand, may be concentrated on a provider organization because of geographic location, facility types, clinical specialty, and/or contract history with payors. These risks need to be well understood because they affect how population health management can be done, and what resources are needed, etc. For instance, a general pediatric practice attracts a different patient mix than a diabetes clinic. A children's hospital is different than a general hospital. Each faces different clinical challenges, and the financial outcomes of each may also be different. Risk adjustment can be used to address, to a certain extent, the unevenly distributed risks, and align healthcare payments with the relative health status of different patient cohorts, thereby leveling the playing field for all provider organizations participating in the same global payment program. In this section, we discuss the key design issues relating to risk adjustment that the insurer and the provider organization both should consider.

1. RISK ADJUSTMENT PRINCIPLES

The selection of an appropriate risk adjustment model should be based on sound principles that are agreed upon by both the insurer and the ACOs.

When used to set payment rates, a risk adjustment methodology needs to strike a balance between predictive accuracy and incentives issues. Data elements such as procedure codes, prior cost, and prior utilization are predictive of a future year's cost, but are usually intentionally excluded in a risk adjustment payment formula, which is due to the concern that a payment formula that included such information might lead to higher payments for potential overuse and overtreatment.

The development of the Medicare Advantage risk adjustment process followed a set of research design principles.[5] Of these, we consider the following principles to be applicable to global payments to providers:

- The groupings of medical conditions in a risk adjustment model should be clinically meaningful and reasonably specific, in order to minimize opportunities for gaming or discretionary coding.

- Diagnoses within the same condition category should be reasonably homogeneous with respect to healthcare cost and utilization, in order to optimize predictive accuracy and robustness of the model.

- Condition categories should have adequate sample sizes, to permit accuracy and stability of model predictions.

- The risk adjustment model design should encourage specific coding and discourage vague coding. Vague codes and nonspecific diagnoses should be excluded from the risk adjustment model

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[5] Pope, G.C., Kautter, M.S., Ellis, R.P., Ash, A.S., et al. (Summer 2004). Risk adjustment of Medicare capitation payments using the CMS-HCC model. *Health Care Financing Review* Vol.25(4).

- The risk adjustment model should not reward coding proliferation. Providers should not be penalized for recording additional diagnoses. In other words, coding more diagnoses should not reduce the risk scores.

In an ACO environment, the following ACO-specific principles should also be considered:

- **The risk adjustment model needs to accurately predict the healthcare resource use for which ACOs are responsible.**

  There have been comparative studies on different risk adjustment systems and how well they predict. For instance, the Society of Actuaries had led three evaluation studies on risk adjustment models. The most recent one was released in 2007[6]. Vendors also publish model performance statistics on their own. While these statistics are helpful, they cannot answer with full confidence the question, "But how accurate is the model for my ACO?" Knowing that risk adjustment models are imperfect and have prediction biases, provider organizations should be concerned that their specific characteristics—such as having large teaching hospitals, or cancer centers, or diabetes centers, etc.—may adversely affect their budgets in combination with an imperfect risk adjustment. To address these concerns, a study of "dry runs." using actual historical data, may be needed.

  Additionally, there may be services that are carved out from the ACOs, such as behavioral health and substance abuse. Risk adjustment models developed for general purposes may not fit the ACO-responsible services with carve-outs. Additional studies would be indicated here as well.

  If the results from studies show serious biases in predictions, new and customized risk adjustment models would be needed to address those biases.

- **The risk adjustment model needs to coordinate with the patient assignment logic, so that consistent and credible risk scoring can be done for all patients and all provider organizations.**

  In healthcare, the patient-provider-insurer trilateral relationship is both dynamic and complex. A member may stay with the same insurer but change providers, or stay with the same providers but switch insurers. A provider or hospital can be part of multiple ACOs at the same time.

  Patient assignment logic is required for assigning members to an ACO.[7] It is preferable to calculate individual risk scores using all data available, regardless of how the trilateral relationship works.

- **The risk adjustment process should take into account partial-year members and set up appropriate credibility requirements for scoring.**

  Risk adjustment models are based on observed medical conditions that are coded in standard healthcare claims. For patients who are moving in and out of an ACO, or members who are joining and leaving a health plan, information on their medical conditions will be missing for part of the year, leading to underestimation of their illness burden and healthcare resource use.

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1. [6] www.**soa**.org/files/pdf/07-Washington-MehmudWinkelman-128.pdf

    [7] For more information on ACO patient attribution, see the Milliman paper "Whose Patient Is it? Patient Attribution in ACOs," available at http://insight.milliman.com/article.php?cntid=7492&utm_medium=web&utm_content=7492&utm_campaign=Milliman%20On%20Healthcare.

In Medicare Advantage, members with less than 12-months' experience are viewed as "new enrollees" and scored by a model that is based on age and gender only. Members with full 12 months' experience are scored using the full risk adjustment model that accounts for age, gender, and medical diagnoses. In Medicaid and commercial health insurance, the criterion for new enrollees is less stringent, typically six or seven months, because enrolled members have shorter periods of experience than Medicare members. These decisions are made based on statistical and actuarial rigor. Specifically, the predictive accuracy and the credibility of the risk scores would be evaluated for members with fewer months of experience, until a minimum accuracy and credibility requirement is met. The same methodology can be applied to determine the new enrollee cutoff threshold for ACOs.

- **The predictive accuracy and stability of risk adjustment at provider group should be evaluated when selecting a risk adjuster.**

Risk adjustment models have been compared and evaluated at the individual level and at large population group levels. The accuracy and stability of the risk scores for a provider group have not been studied extensively, mostly because the results are sensitive to patient counts, provider specialty, practice setup, and other patient- or provider-specific characteristics, making it hard to drive a standard set of benchmark statistics. In other words, we know that a concurrent risk adjustment model can explain roughly 50% to 60% of variability in total cost at the individual level (i.e., individual R-Squared is about 50%-60%). We do not have such a standard answer to the question of how much variability the model can explain for a primary care provider group of 1,200 patients, nor could we provide a standard answer to the question of whether the average risk scores for two provider groups are statistically significant (i.e., the confidence interval around an average risk score at the group level). However, the methodologies to calculate these metrics are mature and established. To allocate healthcare budget across provider organizations and evaluate the group-level risks and performance, it is important to compute the group-level accuracy and stability measures using actual patient claims data, and select the best model accordingly.

- **Without violating other principles of risk adjustment, especially with regard to gaming of the system and incentive issues, include additional factors in the risk adjustment process to improve the accuracy and fairness of risk adjustment.**

Risk adjustment models so far only use age, gender, and diagnoses and/or pharmacy information to equalize the risks among different patient populations. Factors that also influence the cost, utilization, and health outcomes of patients, such as benefit level, patients' disability status, lack of family and social support, education level, and language barrier, etc., are usually not included in the risk adjustment models because they are not systematically collected in the large datasets used in the development. However, it is possible to incorporate those that are more commonly available—benefit level and disability status—as additional factors in the risk adjustment process, and thereby improve the risk adjuster.

2. RISK ADJUSTMENT MODEL SELECTION

The selection of a risk adjustment model needs to follow the principles of risk adjustment for ACO global payment. The key points for the decision maker are: predictive accuracy, utility of the tool, pricing, and support.

Risk adjustment models are not all created equal. While they share some similarities in the grouping of medical codes and software output design, the detailed modeling technique and overall research methodology vary greatly from model to model and from vendor to vendor, and so does predictive accuracy. Standard measures of predictive accuracy are R-Squared, mean absolute prediction error (MAPE), predictive ratio, sensitivity and specificity, etc. For more information on these statistics, please refer to the Milliman white paper, "Risk Adjustment and Its Applications in Provider Payment Reform."

Risk adjustment models are available as software tools from different vendors. The utility of the tool, such as flexibility with regard to input data formats and data imperfections, processing speed and scalability, reporting capabilities, integration with existing health informatics infrastructure, and customizability, is almost as important as its predictive accuracy. Vendors typically provide this information and some of them may also provide evaluation or test copies of the software.

RISK ADJUSTMENT OPERATIONAL ISSUES

Risk adjustment is a two-step process. The first step is the application of a risk adjustment model and assignment of risk scores to each individual. The second step is fund allocation, based on risk scores and perhaps other factors such as geography or plan design. The success of risk adjustment relies on both steps being accurate, robust to data imperfections, and operationally practical.

In this section, we focus on the operational considerations.

1. THE IMPORTANCE OF CODING

As mentioned previously, risk scoring is based on the age, gender, and coded medical conditions (or prescriptions) in healthcare claims. In the case of diagnosis-based risk adjustment, the accuracy of risk scoring relies heavily on providers' coding. Coding of diagnoses needs to be accurate, self-consistent, and clinically specific.

Take, for example, a chronic condition such as diabetes. To get the correct risk score for the patient, under the current Medicare Advantage risk adjustment design, a diabetes diagnosis needs to be coded in a claim at least once in the prior 12 months. In practice, some providers may miss some codes, although there may be prescription medicines, procedures, or durable medical equipment that can be directly linked to the missed diagnosis codes.

In the ICD-9-CM coding system there are three-, four-, and five-digit codes. Generally speaking, the first three digits represent the body system or etiology of a medical condition, and the fourth and fifth digits provide details on the location and manifestation of the condition. For instance, "250" is diabetes mellitus, "250.6" is diabetes with neurological manifestations, and "250.61" is diabetes with gastroparalysis, or paralysis of the muscular coat of the stomach. To a risk adjustment model, a "250" code is less severe than "250.6" or "250.61." In other words, providers treating diabetes with neurological manifestations coded "250" would receive lower payments than for those coded "250.6" or "250.61."

Providers need to understand the importance of coding. Not all provider organizations have the same level of coding specificity and consistency. The uneven data quality may cause unintended consequences and unfair payments.

2. USING RISK ADJUSTMENT TOOLS TO INFORM MEDICAL MANAGEMENT

Risk scores are correlated with healthcare utilization in general, and can be converted into dollar-value predictions of healthcare costs. Some risk adjustment tools' output contains medical condition markers. Some provide the risk contributions of specific conditions as a percentage of the overall score, so that providers can more easily identify

areas for clinical intervention and estimate the cost-saving opportunities. For an example of how a risk adjustment tool may provide useful information for medical management, see "Risk Adjustment and Its Applications in Provider Payment Reform."that is posted on the Massachusetts Medical Society's website.

RISK ADJUSTMENT AND OTHER RISK MITIGATION TOOLS

The risk adjustment process can level the playing field between provider organizations, and enables fairer comparison of financial and quality information. There are other risk mitigation programs that an ACO may find useful, including risk sharing through reinsurance or a risk corridor. Readers can refer to the Milliman white paper "Risk Adjustment and Its Applications in Provider Payment Reform"for more information on reinsurance and risk corridors. Generally speaking, reinsurance protects an ACO financially from catastrophic cases. Risk corridors limit variability in risk scores, so that payment to an ACO is more accurate. Together they are important tools for risk mitigation. Some ACO programs, including the AQC by Blue Cross Blue Shield of Massachusetts, use both techniques.

Risk adjustment needs to be coordinated with other risk mitigation tools, so that an appropriate amount of protection is provided without discouraging ACOs from taking on sicker patients. For instance, a risk adjustment model can be tailored such that it only predicts total cost below the reinsurance attachment point. The bandwidth, of a risk corridor, or the allowable movement of the risk scores, should reflect the actual fluctuation and distribution of the risk scores for a patient population.

RISK ADJUSTMENT LONGER-TERM CONSIDERATIONS

Risk adjustment is an important tool in healthcare financing. It will remain important going forward. In this section we discuss some of the important long-term considerations relating to risk adjustment.

1. MODEL UPDATES, ICD-10-CM CONVERSION, AND RECALIBRATION

Risk adjustment models are developed using historical data. The patterns recognized in the models represent the most recent past experience in healthcare. The clinical classification needs to be updated periodically to incorporate new codes, and the model's cost weights need to be refreshed using more recent data as they become available.

Generally speaking, a diagnosis-based model tends to be able to be applied over a longer period of time (without needing to be revised) than a pharmacy-based model, because treatment cost patterns by diagnosis tend to be more stable than the quickly changing pharmaceutical treatment options. Additionally, thousands of new drug codes are added throughout each year, and only a small number of new diagnosis codes are added by the Centers for Disease Control and Prevention (CDC) every October. As such, the code set and cost weights of diagnosis models are usually updated every two to three years, whereas pharmacy models are usually updated every year or more frequently by vendors.

Starting on October 1, 2013, all HIPAA-covered entities will be required to use the ICD-10-CM system for diagnosis coding. The ICD-10-CM system has more than three times the codes of the ICD-9-CM system. There are more signs and symptoms codes, more specific codes, more injury codes, and more post-procedural codes. Additionally, the new coding system has laterality (left or right side of body), combination codes for comorbid conditions that would have required more than one code under the old system, and new codes for lifestyle and socioeconomic factors that affect patients' health statuses.

Conceivably, risk adjustment models will need to be ready to work on ICD-10-CM data on or before the conversion deadline, allowing for test runs and impact studies. For ACOs that have entered into a multiyear

agreement with an insurer, 2013 may be within the contract term. The risk adjustment vendor, the insurer, and the ACOs all need to have their own ICD-10-CM conversion strategies. For the year 2013, a risk adjustment model should be able to work with both the ICD-9-CM data and the ICD-10-CM data.

With a more expansive code set and much larger number of diagnosis codes, more efforts will be required for updating and maintaining the clinical classifications. Additionally, coding patterns may be more variable during the initial years of ICD-10-CM adoption, which will require more frequent updates of the clinical classifications and model cost weights.

2. MORE ACCURATE MODELS

Risk adjustment models may never be perfect but can always be improved. Higher predictive accuracy comes mainly from better clinical classification, richer data, more accurate coding, and better modeling techniques.

Healthcare data is multidimensional and the patterns are complex. Risk adjustment models start by summarizing the data using clinical classifications. Theoretically, the finer the classification, the more accurate the model is. In practice, there is a tradeoff between how fine the classification system can be without losing statistical credibility in a finite data set. Because research data sets have grown in size significantly in recent years, finer classifications are now available.

Risk adjustment models so far have used (mainly but not exclusively) age, gender, and diagnoses or pharmacy codes. Other individual characteristics, such as functional status, education, and family history of diseases, also influence healthcare outcomes but have not been included in risk adjustment because they have not been collected consistently in a standard format for all patients. However, with advancements in health information technology and wider adoption of electronic health records (EHRs), these data elements are more likely to be collected consistently for the patients, and would ultimately be available to be used in risk adjustment.

Better modeling techniques are available and some have been adopted by risk adjustment vendors. Vendors have also invested in improving the classification systems and other data sources. Insurers and providers do not need to accept the status quo, and should have real expectations for better models in the future.

3. MORE TRANSPARENT MODELS

While risk adjustment has been widely published, risk adjustment models are still not very well understood by many providers. Many view risk adjustment as a "black box." Coupled with less than ideal predictive accuracy, the validity and effectiveness of this "black box" can be called into question by providers contemplating whether or not to participate in ACOs. As such, it would be desirable to have a transparent risk adjustment model.

There are different levels of transparency. The highest level would require full disclosure of the clinical classification system, which groups medical codes into condition categories, the model coefficients or cost weights, and the formula used to calculate risk scores. The Medicare Advantage and Part D risk adjustment models have full transparency.

Full transparency may not be feasible if the chosen risk adjustment model is proprietary. However, the insurer can provide educational materials to the providers in an ACO, and be available to answer their questions, helping to improve providers' understanding of risk adjustment. Education and communication about risk adjustment needs to be a constant effort.

Taking it one step further, if the proprietary risk adjustment model can output information that supports the scoring of patients, such as risk drivers and clinical risk contributions, providers would be able to interpret the results more easily and have less concern about a "black box."

4.   MORE PRACTICAL RISK ADJUSTMENT PROCESS WITH RESPECT TO CODING

The accuracy of coding affects the accuracy of risk scores and payment allocation. Knowing that coding may never be perfect, the risk adjustment process needs to be more flexible to address this. For instance, if a chronic condition is allowed to be portable with the patient, it will reduce the chance of missed codes for chronic conditions. Or claim audit rules can be built into the risk adjustment process, so that even though the actual diagnoses are missing, there will be supporting evidence to validate their existence. With more flexibility, practical risk adjustment modifications are more likely to be successful.

5.   RISK ADJUSTMENT FOR PERFORMANCE MEASURES

Patients' medical conditions and health status affect the cost, utilization, and efficacy of healthcare management. Risk adjustment has been primarily used to set global budgets. Utilization measures such as counts of hospital admissions, readmissions, emergency department visits, and use of advanced imaging tests should also be risk-adjusted to be fairer in setting performance-based payments. Measurements of providers' efficacy in managing patients' health, such as blood pressure, weight loss, and hemoglobin A1C levels, are often part of the incentive payments. They should also be risk-adjusted, because medical care becomes more complex as patients get sicker and more resources are required to prevent patients from deterioration, and even more to reverse disease progression, if at all possible.

Risk adjustment models so far have focused on predicting total cost, or sometimes a subset of cost, and most of the models were developed using linear regression techniques. (Continuous variables, which healthcare cost is treated as, lend themselves to these techniques.) Healthcare utilization and outcome measures are mostly discrete variables. For instance, the count of hospitalizations is a discrete variable, with a highly skewed distribution and very long tail. In analyzing such variables, linear regression techniques are not appropriate, as they would seriously overpredict for healthy patients and underpredict for sicker patients. More advanced techniques will be required for modeling, such as nonlinear estimations and nonparametric modeling.

CLOSING REMARKS

Risk adjustment has strengths and limitations. It can be designed differently by different vendors, and therefore presents different pros and cons. It can be improved over time but may never be perfect. Provider organizations and insurers should have realistic expectations of risk adjustment, and work collaboratively to ensure the success of a risk-adjusted global payment program.

OTHER CONSIDERATIONS

This white paper was prepared for the Massachusetts Medical Society (the Society) under the consulting services agreement of January 6, 2011, between the Society and Milliman. The Society intends to distribute this paper to its member physicians as educational material. Under the consulting service agreement, this paper must be presented in its entirety. Milliman does not intend to benefit any third-party recipient of its work product, even if Milliman consents to the release of its work product to such third party. Any third party is advised to have their own appropriate professional review the work.