CARE Award patient acuity: Analysis of selection effects

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This document was sponsored and commissioned by the Children's Hospital Association.[1]

The method for selecting members to participate in a medical intervention program can have an effect not only on the average level of claims, but also on the claims volatility. Therefore, when pairing a medical intervention program with a new payment model, it is important to consider the impact of reversion to the mean and risk adjustment.

Background

The authors provide actuarial support for the Children's Hospital Association (CHA) on behalf of 10 of its Coordinating All Resources Effectively (CARE) Award hospitals as part of the CARE Award. The CARE Award is a Health Care Innovation Award from the Center for Medicare and Medicaid Innovation (CMMI) to test the coordination of care for children with complex medical conditions.[2] One of the goals of the CARE Award is to assist CARE Award hospitals (sites) with the implementation of new payment models for the care of these children.

Children with complex medical conditions are defined as children with significant chronic conditions in two or more body systems or those with a single dominant chronic condition.[3] Complex medical conditions are identified in the claims data using the 3M Clinical Risk Groups (CRG) algorithm, which stratifies members into a hierarchy of risk groups. For the purposes of the CARE Award,

children with complex medical conditions are defined as those with CRGs 5b to 9. For abbreviated definitions of CRGs 5b to 9, see Figure 3 below. Other pediatric CMMI awardees have defined the term "children with complex medical conditions" differently.

According to CHA, approximately two-thirds of children with complex medical conditions are covered by Medicaid.[4] CHA estimates that while children with complex medical conditions make up only 6% of Medicaid beneficiaries, they represent 40% of the total Medicaid and Children's Health Insurance Program (CHIP) expenditure for children.

Each site has its own program that enrolls children with medical complexity in the CARE Award in order to better coordinate their care. The CARE Award did not enroll all children with medical complexity in a state or region. These children are typically enrolled in Medicaid. As part of the CARE Award, IBM Watson processed Medicaid claims data for children eligible for the CARE Award. The claims data also includes children enrolled in the CARE Award, who are a subset of the eligible members. Members enrolled in the CARE Award were chosen by each site from the children who visited the hospital or complex care clinic for treatment for complex medical conditions. This paper provides an analysis of the relative acuity of the members enrolled in the CARE Award.

The number of members enrolled in the project for a given site is relatively small, and therefore the experience for the enrolled membership is usually not fully credible. The "acuity factor" allows us to approximate the average level of claims for the enrolled members when performing projections. We define the acuity factor for a particular site as the ratio of claims cost per member per month (PMPM) for members enrolled in the site's project divided by the claims cost PMPM for members who are eligible. For

[2] For more information on the CARE Award, see https://www.childrenshospitals.org/careaward.

[3] CHA (October 11, 2013). Defining Children With Medical Complexities. Issue Brief. Retrieved December 7, 2016, from https://www.childrenshospitals.org/Issues-and-Advocacy/Children-With-Medical-Complexity/Fact-Sheets/Defining-Children-With-Medical-Complexities.

[4] CHA (2016). CARE Award. Programs and Services. Retrieved December 7, 2016, from https://www.childrenshospitals.org/careaward.

example, if the average PMPM for enrolled members is $4,000, and the average PMPM for eligible members is $2,000, then the acuity factor is 2.0 (= $4,000 / $2,000).

Although the experience data for the enrolled members is typically not fully credible, the eligible experience data is often fully credible. The eligible population is typically in the range of 50,000 to 200,000 member months, which varies significantly by site. The eligible population may be distributed across the entire state or only a portion of the state, and it may also be limited to the membership in a single payer; for example, a Medicaid managed care organization. Therefore, the eligible data we received may not represent the entire eligible population in a given state or region.

The enrolled membership is typically a small subset of the eligible membership, around 5% to 10%. The claims data we received is typically for claims incurred prior to the enrollment in the CARE Award. In analyzing the claims data available and creating projections, we typically use fully credible eligible data in concert with the acuity factor, keeping in mind that the acuity factor is an approximation and is not always based on fully credible data.

Acuity factor analysis

We analyze the acuity factor for each site using the claims and enrollment data provided. In Figure 1, we present acuity factors for four de-identified sites. We show the number of eligible member months on the X axis and the site's acuity factor for each site on the Y axis.

FIGURE 1: ACUITY FACTOR AND ELIGIBLE MEMBER MONTHS
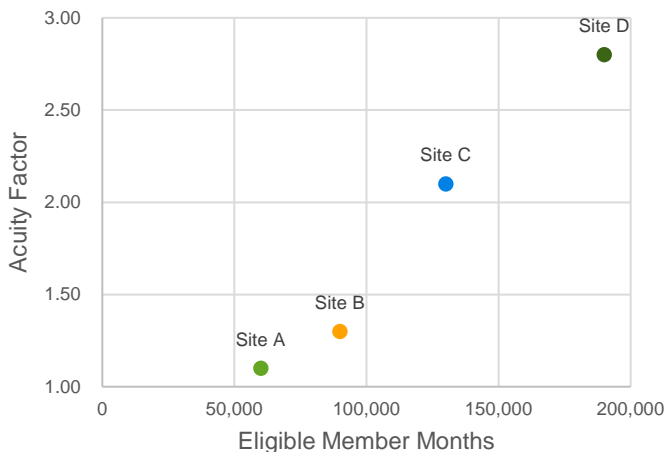
The acuity factors for these sites fall in a very broad range, approximately 1.0 to 3.0. While the acuity factor in Figure 1 may appear to be a roughly linear function of the eligible member months, that relationship is purely coincidental. The sites shown

are in four different states, so differences between the states' Medicaid programs makes the sites' acuity factors not directly comparable. Additionally, each site's enrolled and eligible members have a different distribution of membership by CRG.

To show how the distribution by CRG can affect the acuity factors, we also normalized the acuity factors using the composite distribution of enrolled members by CRG. Although we do not use normalized acuity factors to determine the expected claims for the enrolled members, the normalized acuity factor helps illustrate the degree to which the acuity factor is not explainable by CRG distribution.

Figure 2 shows that even after controlling for differences in the enrollees' CRG distribution, the acuity factor for all sites is greater than 1.0. This suggests that even within each CRG, higher-acuity members were selected for the program.

FIGURE 2: NORMALIZED ACUITY FACTOR AND ELIGIBLE MEMBER MONTHS
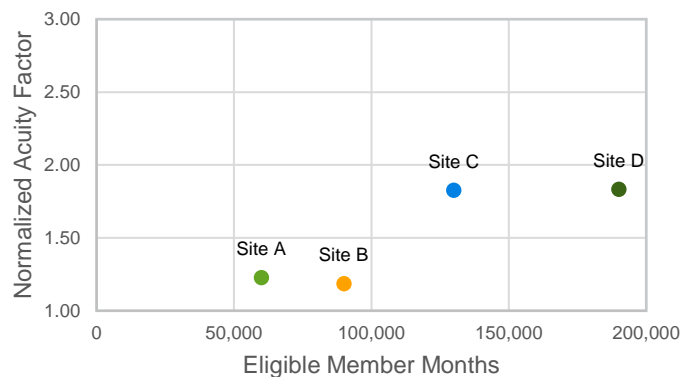
Some sites' enrolled membership shows a higher proportion of CRG 9 (Catastrophic) relative to their eligible members, which can be a significant driver of those sites' acuity factors. The costs for children with CRG 9 are substantially higher than the other CRGs, as can be seen in Figure 3. An example calculation of a normalized acuity factor is shown in Figure 3. The illustrative non-normalized acuity factor is 2.5 (= 4,971 / 2,012). The normalized acuity factor is 1.8 (= 4,276 / 2,356), which uses the total enrolled distribution across all sites to calculate both composite PMPMs.

The difference between the acuity factor and the normalized acuity factor highlights the presence of distribution risk, which is important to consider when developing a payment model for these members. The claims PMPM is sensitive to the distribution of members by CRG, which could change over time as members disenroll or as new members are enrolled. In a shared savings model, changes in the claims PMPM have a significant effect on the payments. Adequate risk adjustment in a payment model can mitigate this distribution risk.

FIGURE 3: NORMALIZED ACUITY FACTOR, ILLUSTRATIVE CALCULATION

CRG	PERCENT OF MEMBERS BY CRG					
	ELIGIBLE SITE X	ENROLLED SITE X	ENROLLED ALL SITES	ELIGIBLE PMPM	ENROLLED PMPM	ACUITY FACTOR
5B SIGNIFICANT LIFELONG CHRONIC DISEASE	30%	10%	25%	$ 800	$ 1,900	
6 SIGNIFICANT CHRONIC DISEASES IN MULTIPLE ORGAN SYSTEMS	50%	55%	48%	1,400	3,300	
7 DOMINANT CHRONIC DISEASES IN 3 OR MORE ORGAN SYSTEMS	5%	3%	5%	4,400	7,300	
8 DOMINANT/METASTATIC MALIGNANCY	3%	5%	4%	2,800	3,100	
9 CATASTROPHIC	12%	27%	18%	6,400	9,600	
			AVERAGE	2,012	4,971	**2.5**
			NORMALIZED AVERAGE	$2,356	$4,276	**1.8**

All numbers in Figure 3 are purely illustrative.

The acuity factor also varies significantly when we stratify the experience by claims PMPM. Figure 4 shows the acuity factor at varying claims percentiles for one site. We calculate the acuity factors in Figure 4 by dividing the percentile claims PMPM for the enrolled members by the percentile claims PMPM for the eligible members. This is one way of analyzing the volatility of the claims PMPM, although there are other approaches to analyzing volatility which we have also used. The horizontal line in Figure 4 represents the average acuity factor for this site.

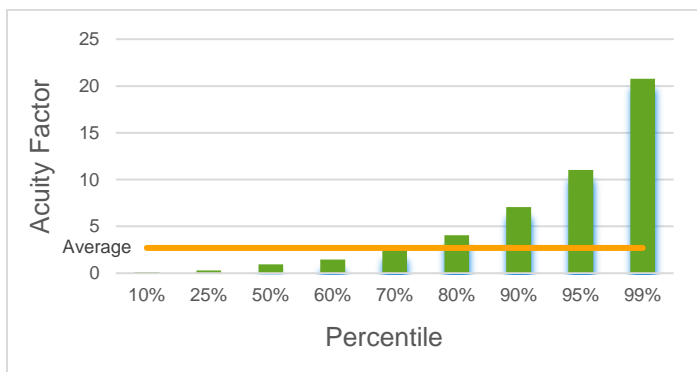**FIGURE 4: ACUITY FACTOR DISTRIBUTION**

Figure 4 shows that the acuity factor increases significantly as the percentile increases. In other words, the claims PMPM for enrolled members rises much more quickly than the claims PMPM for eligible members as the percentile increases. We conclude the enrolled members' claims PMPM therefore not only are much higher on average, but also exhibit a significantly higher degree of claims volatility than the eligible members.

Selection and reversion to the mean

The method of selection of CARE enrollees drives many of the results analyzed in this paper. CARE enrollees were selected by each CARE site from the patients as they visited the hospital. Enrollees are therefore likely to be higher acuity, because eligible members who visit the hospital less frequently are less likely to be selected for participation.

Because the members chosen for the program exhibited higher acuity to start with, there may be a potential for reversion to the mean for the enrolled members' claims. The members enrolled in the project may have been selected to enroll during an acute phase of their chronic illness which, for some, may have subsequently passed. Reversion to the mean is a common occurrence in disease management programs like the CARE Award, and should be taken into account when measuring savings in the enrolled population.

The CARE Award did not enroll all children with medical complexity in a state or region. For a larger population, if a similar care transformation model is implemented, acuity levels may vary from the levels summarized in this paper.

Conclusion

In this paper we have explored the following for the enrolled members:

- The potential for higher claims than the eligible members
- The potential for more volatile claims than the eligible members
- The potential for reversion to the mean

These aspects of the enrolled members have been considered in the exploration of new payment models for the enrolled population. Reversion to the mean may act as a confounding variable in measuring savings, which can be a crucial component of some payment models such as a shared savings model. In addition, there is significant distribution risk in this population, as the claims PMPM is sensitive to the distribution of members by CRG. Adequate and accurate risk adjustment is needed as part of a payment model for these members. The effects explored in this paper should be carefully considered when pairing a medical intervention such as care coordination with a new payment model.

Limitations

The authors are consulting actuaries for Milliman, Inc. The authors are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The figures presented in this report are purely illustrative. The average claims cost PMPM for children with complex medical conditions can vary greatly and the numbers in this report should not be considered to be representative of average claims costs.

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