

Episode of Care Risk Adjustment Methodology

Summary

The following methodology describes how BlueCross BlueShield of Tennessee adjusts cost for a given episode of care by calculating expected cost per unique member-episode of care occurrence. This method utilizes a risk score derived from internally developed regression models at the episode of care level. Cost-standardized episodes of care from the following lines-of-business are included in modeling: Commercial, Medicaid (BlueCare) and TennCare Select/CoverKids.

These models estimate the expected cost of a particular episode of care given:

- Member demographics (age and gender)
- Clinical information* for the 12 months prior to the beginning date of the episode of care

*Here, clinical information is derived using the presence or absence of specific Clinical Classifications Software (CCS) groups as the level of clinical aggregation.

Study Period

The study period for all episodes of care models starts 12 months prior to the beginning date of the episode of care in question and stops on the end date of the episode of care.

Clinical Classifications Software (CCS) groups

Developed at the Agency for Healthcare Research and Quality (AHRQ), the Clinical Classifications Software (CCS) is a tool for clustering patient diagnoses and procedures (ICD-9-CM codes) into a manageable number of clinically meaningful categories. A binary indicator of CCS presence or absence was assigned to each member by examining claims experience during the study period. Factors for consideration were provided by the State and are specific to each episode of care type. Only factors with at least five occurrences in the modeling dataset were retained for further analysis as potential candidate variables in the models.

Modeling

Regression models (GLM method) using stepwise selection algorithms were constructed with the response variable of episode of care cost and aforementioned explanatory variables (demographics and CCS factors). Models were built at the unique member-episode of care level. If a member had more than one episode of care in the same category, the most recent one was used for modeling. Outlier observations based on episode of care cost were winsorized, where outliers are defined as any observation where the actual episode of care cost fell above the 99th percentile. For this phase of the project, all variables were considered candidates with an inclusion p-value less than 1.0 and an exit p-value of 0.10.

Clinical review was implemented to filter out factors that may not make clinical sense in risk adjustment. Attempts were made to eliminate negative effects in order to obtain a purely additive risk score. All remaining factors were significant at the 0.10 level.

Weight Calculation

Risk factor weights are calculated by dividing the regression coefficient (estimate) by the mean episode of care allowed amount (for only those episodes of care used in modeling).

Results by line of business populations were then compared, and a line of business factor was added if needed.

Model Production

Once weights have been developed, they are applied to all new data when needed for reporting purposes. A risk factor is calculated for each member-episode of care by summing the respective risk weights present for that member's episode of care. The actual episode of care cost is then adjusted by dividing the original actual episode of care amount by the risk factor.

Example: Member has the following demographic and clinical attributes (with respective weights) for a TJR episode of care (in a Commercial line-of-business):

- 36 years of age (0.072)
- Female (0.743)
- Chronic rheumatic disease of the heart valves (0.109)
- Bypass of three coronary arteries (.221)
- Congenital hip deformity (0.126)

Therefore, this episode of care has an expected total cost 1.271 times that of the average TJR episode of care.

Table 1. Example of adjusting episode of care cost based on expected episode of care cost

A	B	C	D	E
MEMBER ID	EPISODE OF CARE	ACTUAL EPISODE OF CARE COST	RISK FACTOR	ADJUSTED COST AMOUNT
12345	TJR	\$17,498.23	1.271	\$13,767.29
54321	TJR	\$15,321.12	0.98	\$15,633.80
49123	TJR	\$18,167.97	1.02	\$17,811.73

NOTE:

Adjusted Cost Amount (E) = C / D