

TENNCARE Bundled Payment Initiative: Description of Bundle Risk Adjustment for Wave 2 Episodes

Acute COPD exacerbation (COPD); Screening and surveillance colonoscopy (COL); and Outpatient and non-acute inpatient cholecystectomy (CHOLY); Acute PCI (APCI); and Non-acute PCI (NPCI)

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The State of Tennessee has implemented a bundle-based approach to reimburse providers for the care delivered to patients enrolled in the State's Medicaid program. Bundled payments cover all of the services provided to a patient for treatment of a specific condition during a defined episode of care, including services related to diagnosing, managing and treating that condition. The actual provision of services to a specific patient for a specific condition is herein called an "episode" while the grouping for payment of episode-related services normally used to treat the condition is called a "bundle." For each of these patients and episodes, a provider will be determined to have overall responsibility (the episode "quarterback"). The total cost of care for each quarterback in delivering all bundled services will be measured and compared with targets and thresholds to determine overall performance.

The comparison of bundle costs with the targets and benchmarks for a provider is based on the *risk-adjusted* costs for the provider's episodes. The health care services required to deliver a bundle of care can vary greatly across patient episodes. Bundle risk defines that part of this variation in cost that can be explained by clinical factors such as disease progression, comorbidities, and other patient attributes that correlate with clinical need, including age and gender. A higher risk score for an episode means a higher expected cost relative to other episodes of the same type. Risk adjusting bundle costs enables more equitable comparisons across providers and with targets and thresholds.

The first phase of this new payment initiative included three bundle types: Asthma, Acute Exacerbation; Perinatal; and Total Joint Replacement. An earlier document, that includes several detailed examples of episode risk adjustment, describes the risk adjustment approach used for these three bundles. This earlier document may provide useful background to those new to bundled payment.

The present document provides details on the approach used by Amerigroup to compute episode risk and to risk-adjust episode costs for five additional care bundles: Acute COPD exacerbation (COPD); Screening and surveillance colonoscopy (COL); Outpatient and non-acute inpatient cholecystectomy (CHOLY); Acute PCI (APCI); and Non-acute PCI (NPCI). It describes the general approach used to measure risk across all five bundle types, followed by a description of the specific risk markers used for each type of bundle.

I. Overview: Measuring Episode Risk

Episode risk models are designed to predict the total *expected cost* for an episode of care – those costs that are expected given the clinical characteristics of the patient and the episode. These costs include the payments for all services received by a patient during the course of an episode. Given a measure of the expected cost, or relative risk, for an episode, actual episode costs can be risk-adjusted. Risk-adjusted costs can then be compared across all quarterbacks and combined with targets to determine performance under the program. Example 1 illustrates this concept:

As shown in Example 1, all episodes for the quarterback are assessed to determine their relative risk and the quarterback's average risk-adjusted costs are computed.

A *risk model* was developed for each bundle type. Each risk model is represented as a formula that can be used to assign a risk score to each episode.

The episode risk models use two key features: episode *risk markers* and episode *risk weights*. *Risk markers* describe those unique clinical characteristics of an episode that were found to impact episode costs. *Risk weights* describe a risk marker's incremental contribution to expected episode costs, or risk.

As noted above, a separate risk model was developed for each bundle type. As a result, the risk markers and risk weights included in the models differ by bundle type. This is to be expected, given that different clinical factors will have a different impact on bundle costs.

Four major steps are used to assign a risk score to a bundle:

1. Assign clinical risk markers using clinical input;
2. Assign demographic risk markers;
3. Apply risk weights to each risk marker;
4. Adjust final risk weights for *risk score neutrality*
5. Compute an episode risk score;

Each of these steps is described below.

Example 1: CHOLY Episode Risk Adjustment

- A surgeon serves as the quarterback for fifteen (15) CHOLY episodes during calendar year 2015;
- The total cost for each of those episodes is calculated – the costs for all services included in the episode (facility services, surgical procedure, anesthesia, visits, etc);
- The characteristics of the 15 patients and their episodes are used to assign a risk score to each individual episode. This risk score represents the relative expected costs of each episode based on clinical and patient factors such as age, gender, diagnoses, and disease comorbidities.
- Episode risk is expressed as a relative score. A risk score of 1.000 represents the average risk episode included in the program. An individual CHOLY episode that, based on its clinical and patient factors, is expected to be 10 percent higher cost than average would be assigned a risk score of 1.100.
- The actual total cost for each of the surgeon's episodes is risk-adjusted to compute risk adjusted total cost. Actual cost is divided by episode risk score, so that higher risk episodes will have costs adjusted down while lower risk episodes will have costs adjusted up, allowing episodes with different risk to be fairly compared. For example, an episode with a total cost of \$33,000 and a risk score of 1.100 would have a risk-adjusted total cost of \$30,000.
- The quarterback's overall performance is based on average risk adjusted cost for the 15 episodes. This amount can be compared with that of other providers and with targets to determine performance under the program.

II. Assigning Clinical Risk Markers to an Episode

The following steps are used to assign clinical risk markers to an episode:

- II.1. Identify qualified services that can contribute diagnoses to risk marker identification
- II.2. Identify the set of initial risk markers using clinical criteria
- II.3. Assign clinically appropriate service timing to risk markers
- II.4. Reduce to a minimum necessary set of risk markers per bundle using statistical criteria

II.1 Identify Qualified Services

Only diagnoses from *qualified* service records are considered when identifying risk markers. Qualified services include services such as office visits, consultations, ER visits, surgeries and inpatient stays. Non-qualified services include services such as lab or radiology or services delivered by a DME or ambulance provider. In this way, the methodology does not consider diagnoses from ancillary services or “rule-out” tests. Only services with diagnoses confirmed and assigned by a clinician or facility are used. Qualified services are determined by examining the procedure and revenue codes on an individual service record.

II.2 Identify Initial Risk Markers

Clinical episode risk markers are based on the diagnoses observed on qualified services. The assignment of a service to an *initial risk marker* is based on two important features: how a service maps to a *condition status* or *comorbidity group*; and service timing.

Condition status factors and *comorbidity groups* describe classes of diagnoses that describe the clinical characteristics of the episode or the patient. Condition status factors relate to the clinical condition that is the focus of the episode and describe disease progression, variations of disease, and complications of disease. These factors are defined by groupings of ICD-9 diagnosis codes.¹ For example, “pneumonia” is a condition status factor for the COPD bundle. Note that episodes can have more than one condition status factor.

Comorbidity groups define other conditions not part of the episode that increase the complexity and risk associated with its delivery. Comorbidity groups are often eligible for more than one episode type. As an example, relevant diagnosis codes are assigned to a comorbidity group “congestive heart failure.” This comorbidity group is included in the risk models for multiple episode types.

Each diagnosis on a qualified service is searched to determine whether it can be mapped to a condition status or comorbidity group. These groups define the initial risk markers for the episode.

II.3 Assign Service Timing

Service timing is also important when setting initial risk markers. Three windows of service timing, based on clinical appropriateness, were specified for all risk markers: (1) risk marker occurred in the 365 days prior to the trigger date; (2) risk marker occurred during the trigger window; (3) risk marker

¹ The methodology described here often uses the clinical constructs of Episode Treatment Groups® (ETGs®) to categorize diagnosis codes into clinically meaningful groups.

occurred in the 30 days after the service date of the triggering claim. Any or all of these windows can apply to a single risk marker.

Following this step, all initial clinical risk markers have been assigned to the episode. Note that only one diagnosis code for a specific condition is required to trigger an initial risk marker. Additional diagnosis codes for the same initial risk marker have no impact on risk marker assignment.

II.3 Reduce to the Minimum Necessary Set of Risk Markers per Bundle

All of the possible risk markers initially assigned to each bundle were evaluated statistically to determine the core set of risk markers for each bundle. Certain clinically important risk markers were retained even if they did not meet statistical criteria.

III. Assigning Demographic Risk Markers to a Bundle

Each of the five bundle types include demographic risk markers in the final risk model – based on an individual’s age and gender at bundle start.

IV. Apply Risk Weights to each Marker

Each risk marker is assigned a *risk weight*. This risk weight describes a marker’s incremental contribution to bundle risk for that bundle type. Model risk weights were estimated using historical data describing a large number of bundles.

V. Adjust Final Risk Weights for Risk Score Neutrality. The risk weights produced by each model for a bundle were multiplied by a constant factor (one per bundle type). This factor was based on the adjustment needed to insure that the average risk score across all episodes for a managed care organization (MCO) was equal to 1.00. These factors were:

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Acute COPD exacerbation	1.084
Screening and surveillance colonoscopy	1.000
Outpatient and non-acute inpatient cholecystectomy	1.000
Acute PCI	1.000
Non-acute PCI	1.000

The risk weights for each risk model by bundle type are shown in Tables 1 – 5 below. Note that these tables include the risk weights for each of the final markers included in the models.

Please go to the Amerigroup Portal at <https://www.hospitalbenchmarks.com/amg/Login.aspx> to find the most recent TENNCARE Bundled Payment Initiative Risk Neutrality Factors.

VI. Risk Score. A final risk scoring formula was applied following the identification of risk markers and the assignment of risk weights. These formulas are used to compute a risk score for each episode.

Tables 1 – 5 below show the final risk weights for Acute COPD exacerbation, Screening and surveillance colonoscopy, Outpatient and non-acute inpatient cholecystectomy , Acute PCI, and Non-acute PCI. The final risk weights shown in these Tables were used to risk adjust the cost of the individual episodes. The risk score for each episode is the sum of the risk weights for all risk markers observed.

Table 1 COPD Bundle Risk Markers and Weights	
Risk Marker	Risk Weight
Female, Age 00-44	0.112
Female, Age 45-54	0.269
Female, Age 55-64	0.391
Male, Age 00-44	0.238
Male, Age 45-54	0.222
Male, Age 55-64	0.323
Severe Presentation of COPD	0.313
Deficiency & Other Anemia	0.120
Cardiac Dysrhythmias	0.045
Obesity	0.081
Pneumonia	0.279
Respiratory Failure	0.425
Respiratory Failure, Insufficiency, & Arrest ²	0.241
Substance Abuse	0.062
Metabolic Diseases	0.173
Heart Failure ETGs	0.111
Diabetes	0.098
Dehydration	0.099
Mood Disorder, Depressed	0.084
Mood Disorder, Bipolar	0.053
Psychotic & Schizophrenic Disorders	0.178
Inflammation of Esophagus	0.042

² In the event an episode has both Respiratory Failure and Respiratory Failure, Insufficiency and Arrest risk markers only the weight for Respiratory Failure will be reported.

Table 2 COL Bundle Risk Markers and Weights	
Risk Marker	Risk Weight
Female, Age 00-44	0.934
Female, Age 45-54	0.924
Female, Age 55-64	0.928
Male, Age 0-44	0.969
Male, Age 45-54	0.892
Male, Age 55-64	0.940
Lower GI Malignancies	0.117
Diverticulitis & Diverticulosis	0.033
Hemorrhoids	0.059
Anal & Rectal Diseases	0.072
Anticoagulants	0.048
Mood Disorder, Depressed	0.029
Alcohol & Drug Addiction	0.044

Table 3 CHOLY Bundle Risk Markers and Weights	
Risk Marker	Risk Weight
Female, Age 00-44	0.928
Female, Age 45-54	0.938
Female, Age 55-64	0.929
Male, Age 0-44	0.986
Male, Age 45-54	0.969
Male, Age 55-64	0.999
Infectious Diseases of Intestines & Abdomen	0.043
Hypotension	0.154
Biliary Obstruction	0.038
Cholecystitis	0.047
Septicemia	0.214
Inflammatory Bowel Disease	0.167
Diabetes	0.039
Alcohol & Drug Addiction	0.019
Rare & High Cost Chronic Diseases	0.187
Epilepsy	0.039

Table 4 PCI Bundle Risk Markers and Weights	
Risk Marker	Risk Weight
Female, Age 0-44	0.908
Female, Age 45-54	0.906
Female, Age 55-64	0.912
Male, Age 0-44	0.874
Male, Age 45-54	0.901
Male, Age 55-64	0.909
Cerebral vascular disease	0.091
Complex Hypertension	0.070
Diabetes	0.067
Fluid And Electrolyte Disorders	0.040
Heart Failure	0.091
Immunodeficiencies	0.244
Inflammation of esophagus	0.035
Metabolic Diseases	0.033
Mood disorder, depressed	0.028
Multiple Vessel Or Staged PCI	0.094
Obesity, morbid	0.079
Pleurisy Pneumothorax And Pulmonary Collapse	0.097
Respiratory Failure, Insufficiency, And Arrest	0.151
STEMI Trigger	(0.137)

Table 5 Non-Acute PCI Bundle Risk Markers and Weights	
Risk Marker	Risk Weight
Female, Age 00-44	0.873
Female, Age 45-54	0.975
Female, Age 55-64	0.874
Male, Age 0-44	0.993
Male, Age 45-54	0.896
Male, Age 55-64	0.859
Cerebral vascular disease	0.034
Complex Hypertension	0.049
Diabetes	0.035
Fluid And Electrolyte Disorders	0.081
Heart Failure	0.195
Immunodeficiencies	0.074
Inflammation of esophagus	0.065
Metabolic Diseases	0.026
Mood disorder, depressed	(0.089)
Multiple Vessel Or Staged PCI	0.090
Obesity, morbid	0.147
Pleurisy Pneumothorax And Pulmonary Collapse	0.130
Respiratory Failure, Insufficiency, And Arrest	0.072
STEMI Trigger	0.078