

TENNCARE Bundled Payment Initiative: Description of Bundle Risk Adjustment for Wave 5 Episodes

**Mastectomy, Breast Cancer Medical Oncology, Breast Biopsy, Tonsillectomy, Otitis media, Anxiety,
Non-emergent Depression**

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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." This distinction is useful because the State may choose as a matter of policy to exclude from the bundle some of the services in an episode. 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 for a provider is based on the average *risk-adjusted* cost of the provider's episodes with the targets and thresholds established by the State for payment purposes. The health care services required to deliver a bundle of care can vary greatly across patient episodes. Risk adjustment quantifies the 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 due to the clinical or demographic factors. 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 seven care bundles: Mastectomy, Breast Cancer Medical Oncology, Breast Biopsy, Tonsillectomy, Otitis media, Anxiety, Non-emergent Depression. It describes the general approach used to measure risk across all six 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 cost is computed.

A unique *risk model* was developed for each bundle type based on clinical and demographic variables that would influence the potential cost of those specific episodes.

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 statistically to affect episode costs. *Risk weights* describe a risk marker's incremental relative 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, depending upon the type of episode.

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

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

Each of these steps is described below.

Example 1: Breast Biopsy Episode Risk Adjustment

- A surgeon serves as the quarterback for ten (10) breast biopsy episodes during calendar year 2018;
- The total cost for each of those episodes is calculated using costs for all services included in the episode (for example anesthesia, imaging and testing, evaluation and management, etc.);
- The characteristics of the 10 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 of episodes for a given set of covered lives. An individual breast biopsy 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 10 episodes. This amount can be compared with that of other providers and with targets to determine performance under the

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

Two sets of clinical risk markers are considered for use in risk-adjusting episodes based on the diagnoses observed on qualified services. First, the diagnoses associated with qualified services are grouped into Episode Treatment Groups® (ETGs®). ETGs are then selected for evaluation as a risk marker based on their clinical relevance to the episode and their prevalence in the episodes.¹ In addition, the State of Tennessee defines risk makers using both Clinical Classifications Software (CCS) groups and their own specific definitions. The second set of risk makers consists of those markers that are specified by the State that meet minimum requirements regarding frequency of occurrence. (The CCS groups are not used since they tend to duplicate information captured by ETGs.)

II.3 Assign Service Timing

Service timing is also important when setting initial clinical risk markers. Three windows of service timing, based on clinical appropriateness, were specified for all ETG-based risk markers: (1) risk marker occurred in the 365 days prior to the episode start through 30 days prior to the episode start (*Comorbidity risk marker, prior window*); (2) risk marker occurred in the 30 days prior to the episode start through end of the episode (*Episode risk marker window*); (3) risk marker occurred in the 365 days prior to the episode start through the episode end (*Comorbidity risk marker, full window*).

- *Episode risk marker window* – used to identify risk markers that occurred in the context of the episode itself. The episode risk marker window begins 30 days prior to episode start and extends through the end of the episode.
- *Comorbidity risk marker, full window* – used to identify risk markers for other conditions not directly related to the episode that increase the complexity and risk associated with its delivery. This window includes a longer period of time – 365 days prior to the episode start through the episode end.

¹ The methodology described here uses the clinical constructs of Episode Treatment Groups® (ETGs®) to categorize diagnosis codes into clinically meaningful groups. The clinical constructs within the ETG methodology are defined in terms of both ICD-9-CM and ICD-10-CM/PCS, which means that the risk models described here do not depend upon the underlying coding system used to populate claims.

- *Comorbidity risk marker, prior window* – used to identify risk markers for other conditions not directly related to the episode that increase the complexity and risk associated with its delivery. This window covers the 365 days prior to the episode start through 30 days prior to the episode start. This approach allows for recognition of patient comorbidities that might be considered complications of the episode itself, if first observed during the episode risk marker window.

In general, risk markers defined by the State include their own criteria with regard to service timing.

Following this step, all initial clinical risk markers have been assigned to the episode.

II.4 Reduce to the Minimum Necessary Set of Risk Markers per Bundle

After the initial clinical review, the selected set of clinical risk markers are analyzed statistically to determine their impact on costs for the episode being evaluated. Risk factors for inclusion in the final model are determined based on their clinical relevance to the episode and their impact on costs.

III. Assigning Demographic Risk Markers to a Bundle

Demographic characteristics of patients can also affect risk, either because age and gender can affect coverage decisions or because they serve as proxies for unmeasured clinical attributes. For this reason, the statistical evaluation of potential risk markers also evaluates the extent to which the models should distinguish among patients based on age and gender. Six of the seven bundle types include two or more demographic risk markers in the final risk model – based on an individual’s age and gender at the time of the trigger event. Age and gender did not have a statistically meaningful effect on the costs of Breast Cancer Medical Oncology, which means that all individuals are assigned the same base risk weight that corresponds to an uncomplicated episode.

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. The risk weights for each risk model, by episode type are described below, in tables 1-7. For each episode all of the demographic and clinical risk markers are captured along with the corresponding *risk weights*. All identified *risk weight* values are then added together to achieve the preliminary risk score for that individual episode.

V. Preliminary Risk Score. The preliminary risk score for each individual episode is calculated as the sum of individual risk weight values that apply to that episode. Preliminary risk scores for each episode are then adjusted to achieve risk score neutrality across all episodes.

VI. Adjust Preliminary Risk for Risk Score Neutrality. The preliminary risk score for an episode is multiplied by an episode specific risk neutrality factor. This factor was based on the adjustment needed to insure that the average risk score for each episode was equal to 1.00 for Amerigroup. Risk neutrality factors are calculated at the beginning of each performance period. These values are held constant through the performance period to ensure that providers are measured against constant risk-adjusted thresholds. The final risk score after this adjustment is then used to risk adjust the cost of the individual episode.

Example 2: Applying risk neutrality factors

- All risk factors associated with an episode are identified and the corresponding risk weight values (clinical and demographic) are added together to achieve the preliminary risk score for an individual episode.
- Preliminary risk scores are then multiplied by a risk neutrality factor to ensure that the average risk score for Amerigroup is 1.00.
- The application of the risk neutrality factor will make the final risk score different than the sum of risk weights listed in tables 1-7 below
- For example, if the risk neutrality factor for breast cancer surgery was 0.987 then a 47 year old woman without other clinical risk factors would have a final risk score of $(0.987 * 0.9196 = 0.9076)$.

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.

Tables 1 – 7 below show the risk weights for Mastectomy, Breast Cancer Medical Oncology, Breast Biopsy, Tonsillectomy, Otitis media, Anxiety, Non-emergent Depression. The risk weights shown in these Tables were used to risk-adjust the cost of the individual episodes. The preliminary risk score for each episode is the sum of the risk weights for all risk markers observed. The final risk score will be the preliminary risk score for an episode multiplied by an episode specific risk neutrality factor.

Table 1 Mastectomy Risk Markers and Weights	
Risk Marker	Risk Weight
All ages 39 and above	0.9619
All ages 13 to 38	0.8081
Diabetes (Comorbidity risk marker, full window)	0.1748
Chronic obstructive pulmonary disease (Comorbidity risk marker, full window)	0.1384
Non-partial Mastectomy (During trigger window)	0.1803
Bilateral Procedure (During trigger window)	0.2456

Table 2 Breast Cancer Medical Oncology Risk Markers and Weights	
Risk Marker	Risk Weight
All ages	1.0141
Malignant bone metastases (Comorbidity risk marker, full window)	0.3783
Malignant central nervous system metastases (Comorbidity risk marker, full window)	0.5683
Malignant liver metastases (Comorbidity risk marker, full window)	0.4152
Bacterial lung infections (Episode risk marker window)	0.6509

Table 3 Breast Biopsy Risk Markers and Weights	
Risk Marker	Risk Weight
All ages 16 and above	0.8762
All ages 13 to 15	1.1706
Acute Bronchitis (Episode risk marker window)	0.0994
Abnormal Breast Symptoms(Comorbidity risk marker, full window)	0.1077

Table 4 Tonsillectomy Risk Markers and Weights	
Risk Marker	Risk Weight
Ages 6 months to 1 year	1.2756
Age 2 years	1.1087
Ages 3 to 4	0.9923
Ages 5 to 10	0.9298
Ages 11 to 20	0.9175
Congenital & acquired anomalies of ear/nose/throat (Comorbidity risk marker, full window)	0.0390
Hearing disorders (Comorbidity risk marker, full window)	0.0223
Other disorders of ear/nose/throat (Comorbidity risk marker, prior window)	0.0217
Dehydration (Episode risk marker window)	0.0355
Asthma (Comorbidity risk marker, full window)	0.0192
Otitis Media (During 365 days prior to trigger)	0.0176
Coagulation Disorder (During 365 days prior to trigger)	0.1033

**Table 5
Otitis media Risk Markers and Weights**

Risk Marker	Risk Weight
Ages 11 and above	0.6953
Age 6 months to 1 year	1.0569
Ages 2 to 5	0.8368
Ages 6 to 10	0.7885
Hearing disorders (Comorbidity risk marker, full window)	0.2787
Tonsillitis, adenoiditis or pharyngitis (Episode risk marker window)	0.1555
Acute bronchitis (Episode risk marker window)	0.2335
Facial Nerve Disorders (Comorbidity risk marker, full window)	0.3760
Language disorders (Comorbidity risk marker, full window)	0.3896
Cognitive disorders (Comorbidity risk marker, full window)	0.2762
Down Syndrome (Comorbidity risk marker, full window)	0.3681
Craniofacial abnormalities (Comorbidity risk marker, full window)	0.1215
Asthma (Comorbidity risk marker, full window)	0.1238
Dysphagia (Comorbidity risk marker, full window)	0.1753
Mastoiditis (Comorbidity risk marker, full window)	0.3726
<p data-bbox="266 982 613 1018">Other Low Cost Risk Factors:</p> <p data-bbox="266 1031 1058 1665">Infections of oral cavity, Inflammation of oral cavity, Other infectious diseases, Infectious diseases signs & symptoms, Other infections of ear/nose/throat, Trauma to ear/nose/throat , Other disorders of ear/nose/throat , GERD, Infection of lower genitourinary system, not sexually transmitted, - Inflammation of genitourinary system, except kidney stones, Allergic rhinitis, Viral pneumonia, Bacterial infection of skin, Fungal skin infection, Other inflammation of skin, Other neonatal disorders, perinatal origin, Chronic sinusitis, Bacterial lung infections, or Acute sinusitis</p>	0.0838

**Table 6
Anxiety Risk Markers and Weights**

Risk Marker	Risk Weight
Males ages 7 to 13	1.4662
Females ages 7 to 13	1.3734
Females ages 14 to 21	1.0328
Female ages 22 to 30	0.7408
Male ages 14 to 21	1.1056
Males ages 22 to 30	0.8280
All ages 31 to 64	0.6682
Obesity (Comorbidity risk marker, full window)	0.0887
Intellectual Disability (Comorbidity risk marker, full window)	0.2435
ADHD (Comorbidity risk marker, full window)	0.5469
Attempted Suicide/Suicidal Ideation (Comorbidity risk marker, full window)	0.1951
OCD (Comorbidity risk marker, full window)	0.1609
Panic Disorder With Agoraphobia (Comorbidity risk marker, full window)	0.2790
Personality Disorders (Comorbidity risk marker, full window)	0.2493
Substance Use - Prescription And Illicit (Comorbidity risk marker, full window)	0.2195

Table 7 Non-emergent Depression Risk Markers and Weights	
Risk Marker	Risk Weight
All ages 7 to 13	1.1310
Female ages 14 to 21	0.8632
Female ages 22 to 30	0.7073
Male ages 14 to 21	0.8390
Male ages 22 to 30	0.7605
All ages 31 to 64	0.7850
Obesity (Comorbidity risk marker, full window)	0.0436
Intellectual Disability (Comorbidity risk marker, full window)	0.2993
ADHD (Comorbidity risk marker, full window)	0.4299
Attempted Suicide/Suicidal Ideation (Comorbidity risk marker, full window)	0.2926
OCD (Comorbidity risk marker, full window)	0.1788
Substance Use (Comorbidity risk marker, full window)	0.0934
Diabetes (Comorbidity risk marker, full window)	0.0590
Nutritional Deficiency (Comorbidity risk marker, full window)	0.0588
Development Disorder (Comorbidity risk marker, full window)	0.1587
Recurrent Depression (Comorbidity risk marker, full window)	0.0935
Severe Depression (Comorbidity risk marker, full window)	0.0944
Cardiac Conditions (Comorbidity risk marker, full window)	0.1080
Other Mood Disorders (Comorbidity risk marker, full window)	0.1713