TennCare Episodes of Care: Detailed description of episode risk adjustment for Wave 5 episodes

Breast biopsy, tonsillectomy, otitis media

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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 3 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 3 bundles. This earlier document may provide useful background to those new to bundled payment.

The present document provides details on the approach used by UnitedHealthcare to compute episode risk and to risk-adjust episode costs for 3 care bundles: Breast biopsy, tonsillectomy and otitis media. It describes the general approach used to measure risk across all 6 bundle types, followed by a description of the specific risk markers used for each type of bundle.

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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 2 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, therisk 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.

When assigning a risk score to a bundle, 5 major steps are followed:

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 served as the quarterback for 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 have a 10% 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 program.

II. Assigning clinical risk markers to an episode

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

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

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 durable medical equipment (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.

2. Identify initial risk markers

Based on the diagnoses observed on qualified services, 2 sets of clinical risk markers are considered for use in risk-adjusting episodes. 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.)

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.
- *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.

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. All bundle types include 2 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.

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 1–3. 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 help ensure that the average risk score for each episode was equal to 1.00 for UnitedHealthcare. Risk neutrality factors are calculated at the beginning of each performance period. These values are held constant through the performance period to help 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 help ensure that the average risk score for UnitedHealthcare 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 1–3 below
- For example, if the risk neutrality factor for a tonsillectomy episode was 0.987, then a 17-year-old female without other clinical risk factors would have a final risk score of 0.6321 (0.987 * 0.6404= 0.6321)

Please go to the UnitedHealthcare Provider Portal at **UHCprovider.com**. Click Sign In in the top-right corner to find the most recent TennCare Episodes of Care risk neutrality factors.

Tables 1–3 below show the risk weights for breast biopsy, tonsillectomy and otitis media. 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
Breast biopsy risk markers and weights

Description of risk marker	Risk weight
All ages, 13–15	1.30936
All ages, 16 and above	0.95913
Abnormal breast symptoms (comorbidity risk marker, full window)	0.10586

* In 2023, the BCBX risk model was updated to test new risk markers and incorporate 2023 episode design and configuration file maintenance changes

Table 2
Tonsillectomy risk markers and weights

Description of risk marker	Risk weight
Under 2 years	0.8403
Ages 2–4	0.8158
Ages 5–10	0.7868
Ages 11–20	0.6404
Trauma to ear/nose/throat (comorbidity risk marker, full window)	0.0607
Asthma (comorbidity risk marker, full window)	0.0984
Obstructive sleep apnea (during 365 days prior to trigger or during episode window)	0.2822
Obesity (comorbidity risk marker, full window)	0.0334
Dehydration (episode risk marker window)	0.0666
Congenital and acquired anomalies of ear/nose/throat (comorbidity risk marker, full window)	0.0844
Hearing disorders (comorbidity risk marker, full window)	0.0326
Other disorders of ear/nose/throat (comorbidity risk marker, prior window)	0.0830

Table 3 Otitis media risk markers and weights	
Description of risk marker	**Risk weight**
Age 6 months to 1 year	0.8515
Ages 2–10	0.6055
Ages 11–20	0.5253
Hearing disorders (comorbidity risk marker, full window)	0.4852
Tonsillitis, adenoiditis or pharyngitis (episode risk marker window)	0.1933
Chromosomal anomalies (comorbidity risk marker, full window)	0.2311
Risk factor – dysphagia (during 365 days prior to trigger or during episode window)	0.2109
Risk-factor – prior otitis media (otitis media 6 months before episode window) and Risk-factor – recurrent otitis media (recurrent acute otitis media: 3 episodes in 6 months or 4 episodes in 1 year)	0.1021
Gastrointestinal disorders: Gastritis and/or duodenitis (comorbidity risk marker, full window)	0.0460
Acute bronchitis (comorbidity risk marker, full window) or risk factor – bronchitis (during 365 days prior to trigger or during trigger window)	0.0267
Asthma (comorbidity risk marker, full window) or risk factor – asthma (during 365 days prior to trigger or during episode window)	0.0512
Other infectious diseases (comorbidity risk marker, full window)	0.0733
Autism and child psychoses (comorbidity risk marker, full window)	0.2527
Development disorder (comorbidity risk marker, full window)	0.4411
Migraine headache (comorbidity risk marker, full window)	0.0922
Cardiac congenital disorder (comorbidity risk marker, full window)	0.0907
Infections of oral cavity (comorbidity risk marker, full window)	0.0639
Inflammation of oral cavity (comorbidity risk marker, full window)	0.0333
Allergic rhinitis (comorbidity risk marker, full window)	0.0304
Acute sinusitis (episode risk marker window)	0.0738
Chronic sinusitis (comorbidity risk marker, prior window)	0.0427
Other infections of ear/nose/throat (episode risk marker window)	0.2596
Congenital and acquired anomalies of ear/nose/throat (comorbidity risk marker, full window)	0.0533
Otolaryngology diseases signs and symptoms (comorbidity risk marker, prior window)	0.0230
Viral pneumonia (comorbidity risk marker, full window)	0.0254
Acute bronchitis (episode risk marker window)	0.1316
Pulmonary congenital anomalies (comorbidity risk marker, full window)	0.2057
Infection of lower genitourinary system, not sexually transmitted (comorbidity risk marker, full window)	0.0271
Fungal skin infection (comorbidity risk marker, full window)	0.0473
Other inflammation of skin (comorbidity risk marker, full window)	0.0407
Other skin disorders (comorbidity risk marker, full window)	0.0407
Uncomplicated neonatal management (comorbidity risk marker, full window)	0.0305
Other neonatal disorders, perinatal origin (comorbidity risk marker, full window)	0.1114
Non-routine inoculation (comorbidity risk marker, full window)	0.0160

[1] The methodology described here uses the clinical constructs of Episode Treatment Groups® (ETGs®) to categorize diagnosis code 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.

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