

# TennCare Episodes of Care: Detailed description of episode risk adjustment for Wave 3 episodes

## **Respiratory infection, pneumonia, inpatient urinary tract infection, outpatient urinary tract infection, esophagogastroduodenoscopy, gastrointestinal hemorrhage**

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, which 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 6 care bundles:

- Respiratory infection (RI)
- Pneumonia (PNA)
- Inpatient urinary tract infection (UTI-I)
- Outpatient urinary tract infection (UTI-O)
- Esophagogastroduodenoscopy (EGD)
- Gastrointestinal hemorrhage (GIH)

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.

## **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, 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.

When assigning a risk score to a bundle, follow these 5 major steps:

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:**

### **EGD episode risk adjustment**

- A gastroenterologist serves as the quarterback for 15 EGD episodes during calendar year 2019
- The total cost for each of each episode is calculated using costs for all services included in the episode (for example medications, imaging and testing, evaluation and management, etc.)
- The characteristics of the 15 patients and their episode are used to assign a risk score to each 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 EGD 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 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:

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. Nonqualified services include services such as lab or radiology or services delivered by a durable medical equipment 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.<sup>1</sup> 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:

- 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)
  - Risk marker occurred in the 30 days prior to the episode start through end of the episode (episode risk marker window)
  - 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. In the final risk model, 3 of the 6 bundle types include 2 or more demographic risk markers – 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 respiratory infection (RI), outpatient urinary tract infection (UTI-O) or gastrointestinal hemorrhage (GIH) bundles, 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 1–6. 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**

If you’ve selected and received approval for one of the UnitedHealthcare Cancer Therapy Pathway regimens as part of the chemotherapy prior authorization process, you’re participating in the program.

### **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 1–6 below
- For example, if the risk neutrality factor of an EGD episode was 0.987, then a 27-year-old woman without other clinical risk factors would have a final risk score of 0.8811 ( $0.987 * 89266 = 0.8811$ )

Please go to the UnitedHealthcare Provider Portal at [UHCprovider.com](https://UHCprovider.com). Click Sign In in the top-right corner to find the most recent TennCare Episodes of Care risk neutrality factors.

**Tables 1–6** below show the risk weights for respiratory infection (RI), pneumonia (PNA), inpatient urinary tract infection (UTI-I), outpatient urinary tract infection (UTI-O) esophagogastroduodenoscopy (EGD) and gastrointestinal hemorrhage (GIH). The 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**  
**RI bundle risk markers and weights**

Description of risk marker	Risk weight
All male and female, all ages	0.70534
Nutritional deficiency (comorbidity risk marker, full window)	0.03417
Dehydration (comorbidity risk marker, full window)	0.21554
Other metabolic disorders (comorbidity risk marker, full window)	0.06571
Cardiovascular disease signs and symptoms (episode risk marker window)	0.52933
Otitis media (episode risk marker window)	0.06427
Tonsillitis, adenoiditis or pharyngitis (comorbidity risk marker, full window)	0.08791
Allergic rhinitis (comorbidity risk marker, full window)	0.03592
Acute sinusitis (episode risk marker window)	0.03612
Chronic sinusitis (comorbidity risk marker, full window)	0.08608
Other infections of ear/nose/throat (comorbidity risk marker, full window)	0.02217
Otolaryngology diseases signs and symptoms (comorbidity risk marker, prior window)	0.01661
Acute bronchitis (episode risk marker window)	0.37056

**Table 1 (cont.)  
RI bundle risk markers and weights**

Description of risk marker	Risk weight
Asthma (episode risk marker window)	0.12531
Chronic obstructive pulmonary disease (comorbidity risk marker, full window)	0.17505
Inflammation of esophagus (comorbidity risk marker, full window)	0.06543
Other infectious diseases of intestines and abdomen (comorbidity risk marker, full window)	0.02166
Gastroenterology disease signs and symptoms (episode risk marker window)	0.22746
Risk factor – gram negative infection (during episode window)	0.26704
Risk factor – gram positive infection (during episode window)	0.09980
Septicemia (episode risk marker window)	0.83973
Immunodeficiencies (comorbidity risk marker, full window)	0.15996
Ischemic heart disease (comorbidity risk marker, full window)	0.16959
Inflammation of oral cavity (comorbidity risk marker, prior window)	0.05527
Congenital and acquired anomalies of ear/nose/throat (comorbidity risk marker, full window)	0.13478
Nonroutine inoculation (comorbidity risk marker, full window)	0.02520

**Table 2  
PNA bundle risk markers and weights**

Description of risk marker	Risk weight
Females, ages 22-54	0.43026
Females, ages 55-64	0.67393
Males, ages 22-54	0.36160
Males, ages 55-64	0.68422
All males and females, ages 1-21	0.27227
Chronic obstructive pulmonary disease (comorbidity risk marker, prior window)	0.10932
Septicemia (episode risk marker window)	1.92418
Dehydration (episode risk marker window)	0.21680
Cardiovascular disease signs and symptoms (episode risk marker window)	0.19966
Acute renal failure (episode risk marker window)	0.30057
Other metabolic disorders (comorbidity risk marker, full window)	0.46021
Congestive heart failure (comorbidity risk marker, full window)	0.43480
Cirrhosis (comorbidity risk marker, full window)	0.79999

**Table 3**  
**UTI-I bundle risk markers and weights**

Description of risk marker	Risk weight
Females, all ages	0.13591
Males, all ages	0.52946
Septicemia (episode risk marker window)	0.42250
Other infectious diseases (episode risk marker window)	0.23038
Acute renal failure (comorbidity risk marker, full window)	0.46459
Dehydration (comorbidity risk marker, prior window)	0.09024
Bacterial lung infections (episode risk marker window)	0.73991
Pulmonology diseases signs and symptoms (episode risk marker window)	0.50644
Infection of upper genitourinary system (episode risk marker window)	0.09458
Inflammation of genitourinary system, except kidney stones (episode risk marker window)	0.23594

\*In 2023, the EGD, GIH and UTI-I risk models were updated to test new risk markers and incorporate 2023 episode design and configuration file maintenance changes.

**Table 4**  
**UTI-O bundle risk markers and weights**

Description of risk marker	Risk weight
All ages	0.77292
Dehydration (episode risk marker window)	0.15314
Infection of upper genitourinary system (episode risk marker window)	0.48665
Kidney stones (episode risk marker window)	0.54013
Substance abuse: Cocaine or amphetamine dependence (comorbidity risk marker, full window), opioid or barbiturate dependence (comorbidity risk marker, full window) or alcohol dependence (comorbidity risk marker, full window)	0.08534
GI conditions: Gastroenterology diseases signs and symptoms (episode risk marker window), diverticulitis and diverticulosis (comorbidity risk marker, full window) or ulcer (comorbidity risk marker, full window)	0.29350
GU conditions: Inflammation of genitourinary system, except kidney stones (episode risk marker window), acute renal failure (episode risk marker window), acute renal inflammation (episode risk marker window) or urinary incontinence (episode risk marker window)	0.09713
Gynecological conditions: Infection of ovary and/or fallopian tubes (comorbidity risk marker, full window) non-malignant neoplasm of female genital tract (episode risk marker window), or infection of uterus (comorbidity risk marker, full window)	0.13454

**Table 5\***  
**EGD bundle risk markers and weights**

Description of risk marker	Risk weight
Females, ages 1-21	1.03625
Female, ages 22-64	0.94013
All male	0.96705
Inflammation of esophagus (episode risk marker window)	0.05267
Other metabolic disorders (episode risk marker window)	0.15973
Tonsillitis, adenoiditis or pharyngitis (episode risk marker window)	0.03027
Pulmonology disease signs and symptoms (episode risk marker window)	0.05998
Cirrhosis (comorbidity risk marker, prior window)	0.15651
Acute renal failure (comorbidity risk marker, full window)	0.10659
Bowel obstruction (comorbidity risk marker, full window)	0.11633

\*In 2023, the EGD, GIH and UTI-I risk models were updated to test new risk markers and incorporate 2023 episode design and configuration file maintenance changes.

**Table 6\***  
**GIH bundle risk markers and weights**

Description of risk marker	Risk weight
All males and females, all ages	0.15278
Nutritional deficiency (episode risk marker window)	0.24574
Dehydration (episode risk marker window)	0.19693
Other metabolic disorders (episode risk marker window)	0.53919
Iron deficiency anemia (episode risk marker window)	0.38607
Hematology signs and symptoms (episode risk marker window)	0.52769
Alcohol dependence (episode risk marker window)	0.17576
Ischemic heart disease (episode risk marker window)	0.34350
Ulcer (episode risk marker window)	0.40305
Non-malignant neoplasm of intestines and abdomen (episode risk marker window)	0.55833
Other diseases of hepatobiliary system (episode risk marker window)	0.22100
Acute renal failure (episode risk marker window)	0.32307
Acute respiratory distress syndrome (comorbidity risk marker, full window)	0.20818
Cirrhosis (comorbidity risk marker, full window)	0.16530
Hepatology diseases signs and symptoms (episode risk marker window)	0.27508

\*In 2023, the EGD, GIH and UTI-I risk models were updated to test new risk markers and incorporate 2023 episode design and configuration file maintenance changes.

<sup>1</sup>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.