TennCare's Episodes of Care: description of risk adjustment for Wave 6 episodes

Tennessee | Medicaid

Skin and soft tissue infection (SSTI); Human Immunodeficiency Virus infection (HIV); pancreatitis (PANC); diabetes acute exacerbation (DIAB)

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 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 healthcare 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, which included

TNWP-CD-080103-25-SRS78890 | 25-0422 | April 2025

several detailed examples of episode risk adjustment, described 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 Wellpoint to compute episode risk and to risk-adjust episode costs for four care bundles: skin and soft tissue infection, HIV, pancreatitis, and diabetes acute exacerbation. 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.

Example 1 — Pancreatitis episode risk adjustment:

- A surgeon serves as the quarterback for 10 pancreatitis episodes during calendar year 2018.
- The total cost for each of those episodes is calculated using costs for all services included in the episode (medications, imaging and testing, evaluation and management, and so on).
- 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 pancreatitis episode that, based on its clinical and patient factors, is expected to be 10% higher cost than average would be assigned a risk score of 1.100
- The actual total cost for each of the facility'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 facilities and with targets to determine performance under the program.

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.

II. Assigning clinical risk markers to an episode

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

- Identify qualified services that can contribute diagnoses to risk marker identification.
- Identify the set of initial risk markers using clinical criteria.
- Assign clinically appropriate service timing to risk markers.
- 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 such services as office visits, consultations, ER visits, surgeries, and inpatient stays. Nonqualified services include such services 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.
- *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. Assign 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. Three of the four 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 HIV, 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 to 4. For each episode all 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 ensure that the average risk score for each episode was equal to 1.00 for Wellpoint. 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 Wellpoint is 1.00.
- The application of the risk neutrality factor will make the final risk score different that the sum of risk weights listed in tables 1 to 6 below.
- For example, if the risk neutrality factor for an HIV episode were 0.987, then a 47- year-old woman without other clinical risk factors would have a final risk score of 0.3508 (0.987 multiplied by 0.3554 equals 0.3508).

Please go to Availity Essentials to find the most recent *TennCare's Episodes of Care: Risk Neutrality Factors* document.

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.

Tables

Tables 1 to 4 below show the risk weights for skin and soft tissue infection, HIV, pancreatitis, and diabetes acute exacerbation. 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. Skin and soft tissue infection (SSTI)

Risk marker description	Risk weight
Ages 0-5	0.8236
Ages 6-17	0.7805
Ages 18-64	0.9922
MRSA (during trigger window)	0.8916
Substance abuse: cocaine or amphetamine dependence (*Comorbidity risk marker, full* window), opioid or barbiturate dependence (*Comorbidity risk marker, full* window), acute alcohol intoxication (*Comorbidity risk marker, full* window), alcohol dependence (*Comorbidity risk marker, full* window)	0.3821
Superficial Injuries (during trigger window)	0.0644
Infection of rectum or anus (*Comorbidity risk marker, full* window)	0.3596
Lymph node presentation (during trigger window)	0.4623
Infectious hepatitis (*Comorbidity risk marker, full* window)	0.1785
Psoriasis (During 365 days prior to trigger or during episode window)	0.1114
Immunocompromised (during 365 days prior to trigger or during episode window)	0.3294
Embolism and thrombosis of veins (*Comorbidity risk marker, full* window)	0.5236
Vascular and nervous system conditions: cerebral vascular disease (*Comorbidity risk marker, full* window) or hereditary and degenerative diseases of central nervous system, other (*Comorbidity risk marker, full* window) or neurological diseases signs and symptoms (*Comorbidity risk marker, full* window)	0.1332

Risk marker description	Risk weight
Diabetes (during 365 days prior to trigger or during episode window)	0.1444
Acute renal failure (*Comorbidity risk marker, full* window)	0.4791
Chronic renal failure (*Comorbidity risk marker, full* window)	0.1881
Chronic skin ulcers (*Comorbidity risk marker, full* window)	0.5768
Cardiac infection (*Comorbidity risk marker, full* window)	1.2451
Congestive heart failure (*Comorbidity risk marker, full* window)	0.1643
Skin trauma, except burn and open wound — hand and forearm (*Comorbidity risk marker, full* window)	0.1649
Skin trauma, except burn and open wound — shoulder (*Comorbidity risk marker, full* window)	0.2840
Dehydration (*Episode risk marker* window)	0.7053
Septicemia (*Episode risk marker* window)	3.0911
Epilepsy (*Comorbidity risk marker, full* window)	0.1251
Non-cerebral, noncoronary atherosclerosis (*Comorbidity risk marker, full* window)	0.1363
Fungal skin infection (*Episode risk marker* window)	0.0929
Open wound: open wound — foot and ankle (*Episode risk marker* window), open wound — lower leg (*Episode risk marker* window), open wound — hip and thigh (*Episode risk marker* window), open wound — hand and forearm (*Episode risk marker* window), open wound — elbow and upper arm (*Episode risk marker* window), open wound — shoulder (*Episode risk marker* window), open wound — head and face (*Episode risk marker* window)	0.5805

Table 2. Human Immunodeficiency Virus infection (HIV)

Risk marker description	Risk weight
All ages	0.3554
Dehydration (*Comorbidity risk marker, full* window)	0.1469
Iron deficiency anemia (*Episode risk marker* window)	0.3545
Cardiovascular diseases signs and symptoms (*Comorbidity risk marker, full* window)	0.1805
Bacterial lung infections (*Episode risk marker* window)	0.5919
Acute bronchitis (*Episode risk marker* window)	0.1438
Infectious hepatitis (*Comorbidity risk marker, full* window)	0.2594
Sexually transmitted diseases, primary (*Episode risk marker* window)	0.2251
Infection of lower genitourinary system, not sexually transmitted (*Episode risk marker* window)	0.2054
Bacterial infection of skin (*Episode risk marker* window)	0.1554
Viral skin infection (*Episode risk marker* window)	0.5485
AIDS-Defining Illnesses (during 90 days prior to or 30 days after trigger)	0.7620
Gastrointestinal Disorders: Inflammation of esophagus (*Episode risk marker* window) or Gastritis and/or duodenitis (*Comorbidity risk marker, full* window)	0.1636
Metabolic disorders: other metabolic disorders (*Comorbidity risk marker, full* window) or organic drug or metabolic disorders (*Episode risk marker* window)	0.2458
Pregnancy: pregnancy, not yet delivered (*Comorbidity risk marker, full* window) or pregnancy, with delivery (*Comorbidity risk marker, full* window)	0.1459
Substance abuse: risk factor - substance use (during episode window), cocaine or amphetamine dependence (*Comorbidity risk marker, full* window), opioid or barbiturate dependence (*Comorbidity risk marker, full* window), acute alcohol intoxication (*Comorbidity risk marker, full* window), alcohol dependence (*Comorbidity risk marker, full* window) or Other drug dependence (*Comorbidity risk marker, full* window)	0.0478

Risk marker description	Risk weight
Behavioral health: risk factor — anxiety (during episode window), risk factor — bipolar (during episode window), risk factor — depression (during episode window), risk factor - homicidal ideation (during episode window), risk factor — PTSD (during episode window). risk factor — psychosis (during episode window), risk factor — schizophrenia (during episode window), risk factor - suicidal ideation, attempted suicide, or self-injury (during episode window), mood disorder, depressed (*Comorbidity risk marker, full* window) or anxiety disorder or phobias (*Comorbidity risk marker, full* window)	0.2462
Rare high-cost conditions: acute respiratory distress syndrome (*Episode risk marker* window), septicemia, infection of ovary and/or fallopian tubes (*Episode risk marker* window), sickle-cell anemia (*Episode risk marker* window), anemia of chronic diseases (*Episode risk marker* window), fungal and other pneumonia (*Episode risk marker* window), diverticulitis and diverticulosis (*Episode risk marker* window) or other infectious diseases of intestines and abdomen (*Episode risk marker* window)	1.1458
Other comorbid conditions, full window (*Comorbidity risk marker, full* window): congenital disorders of central nervous system, nondiabetic vascular retinopathy, cardiac infection, embolism and thrombosis of veins, Inflammation of oral cavity, infection of upper genitourinary system, valvular disorder, other conduction disorders or acute renal failure	0.1773
Other (*Comorbidity risk marker, prior* window): agranulocytosis, cirrhosis, or autoimmune rheumatologic diseases, except lupus	0.1773

Table 3. Pancreatitis (PANC)*

Risk marker description	Risk weight
Ages 0-64	0.6515
Active management of cancer (during 365 days prior to trigger or during episode window)	0.4333
Cholecystitis (during 7 days prior to trigger or during episode window) or gallstone (during 7 days prior to trigger or during episode window)	0.5445
Cirrhosis (during 365 days prior to trigger or during episode window)	0.0642
Malnutrition on day one (on the trigger start date)	0.1969
Pancreatic cyst/pseudocyst (during 7 days prior to trigger or during episode window)	0.3501

Risk marker description	Risk weight
Sepsis on day one (on the trigger start date)	0.1171
Dehydration (*Comorbidity risk marker, full* window)	0.0712
Bacterial lung infections (*Episode risk marker* window)	0.6151
Opioid or barbiturate dependence (*Comorbidity risk marker, prior* window)	0.2316
* In 2023, the PANC risk model was updated to test new risk markers and incorporate 2023 episode design and configuration file maintenance changes.	

Table 4. Diabetes acute exacerbation (DIAB)

Risk marker description	Risk weight
Ages 0-17	1.0660
Ages 18-55	0.8226
Ages 56-64	0.9716
Opioid or barbiturate dependence (*Comorbidity risk marker, full* window)	0.1001
Ulcer (*Comorbidity risk marker, full* window)	0.2362
Bacterial infection of skin (*Episode risk marker* window)	0.1432
Cirrhosis (during 365 days prior to trigger or during episode window)	0.0463
Gastroenteritis (during 7 days prior to trigger or during episode window)	0.0957
History of UTI (during 365 days prior to trigger)	0.0937
Pneumonia (during 365 days prior to trigger or during episode window)	0.1660
Sepsis on day one (on the trigger start date)	0.1029
Pancreatitis (during 7 days prior to trigger or during episode window) or acute pancreatitis (*Episode risk marker* window)	0.2846

Risk marker description	Risk weight
High-cost, low-incidence conditions: autism and child psychoses (*Comorbidity risk marker, full* window), hereditary and degenerative diseases of central nervous system (*Comorbidity risk marker, full* window), valvular disorder (*Comorbidity risk marker, full* window), malignant liver metastases (*Comorbidity risk marker, full* window), parasitic skin infection (*Episode risk marke*r window)	0.5601