TennCare Episodes of Care: Detailed description of episode risk adjustment for Wave 1 episodes

Asthma acute exacerbation, perinatal, total joint replacement.

Updated August 2022

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 first wave of this new payment initiative included 3 episode types: (i) asthma acute exacerbation (asthma); (ii) perinatal and (iii) total joint replacement (TJR).

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.

This document provides details on the approach used by UnitedHealthcare to compute episode risk and to risk-adjusted episode costs. The first section describes the general approach used to measure risk across all episode types, followed by a description of the risk methodology for each episode type. The final section provides examples on how a risk score is calculated for an episode and how that score is used to risk-adjust total episode costs.

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 – 1 model each for asthma, perinatal and TJR. 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, 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*

Example 1: TJR episode risk adjustment

- An orthopedic surgeon served as the quarterback for 15 TJR episodes during calendar year 2019
- The total cost for each of those episodes 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 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 TJR 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.

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:

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.)

The assignment of a service to an initial risk marker is based on 2 important features (i) how a service maps to a condition status or *comorbidity group* and (ii) 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-10 diagnosis codes. Note that episodes can have more than 1 condition status factor. An examples of condition status factors for asthma episode is status asthmaticus.
- *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 1 episode type. As an example, for congestive heart failure, relevant diagnosis codes are assigned to a comorbidity group (congestive heart failure). This comorbidity group is eligible for multiple episode types, including asthma, perinatal and TJR.

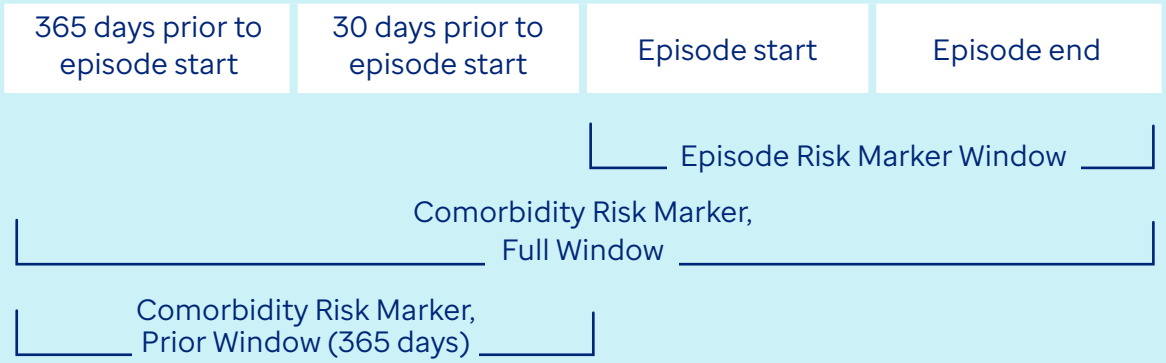
Each diagnosis on a qualified service is searched to determine whether it can be mapped to a condition status or comorbidity group. These groups define the initial risk markers for the episode. A clinical risk marker map is used to assign diagnoses to an initial risk marker. This mapping is implemented in the form of a table that includes 1 row per ICD10-CM diagnosis. For each diagnosis in the table, an initial clinical risk marker, if any, is noted. The groupings of diagnoses used to support the clinical risk marker map are derived from Optum's Symmetry Clinical Knowledge Base – the same source mapping tables used to support the clinical concepts around Optum's 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.

The 3 risk marker windows are summarized graphically below.



The risk marker codes in the tables and appendix[2] follow a convention that relates to the clinical condition described and the timing of the initial risk marker:

- *Episode risk marker window:* Includes the prefix "F_ETG30" or "F_CS30." The "ETG" segment of the code indicates the use of the ETG base condition grouping of diagnoses to support the risk marker. The "CS" segment of the code indicates the use of the ETG condition status grouping of diagnoses. The number "30" indicates that the risk marker relates to the episode risk marker window (30 days prior to episode start and extends through the end of the episode).
- *Comorbidity risk marker, full window:* Includes the prefix "F_ETG" or "F_CS," without a number indicating a risk window. These risk markers relate to the risk marker window spanning 365 days prior to the episode risk marker window through the end of the episode.
- *Comorbidity risk marker, prior window:* Includes the prefix "F_ETG365" or "F_CS365." The number "365" indicates that the risk marker relates to the comorbidity risk marker, prior window (365 days prior to 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. Then it is determined which risk markers can be grouped together into combination factors that better explain the impact on cost. These combination factors are detailed out in the appendix. 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, 2 of the 3 bundle types (asthma and perinatal) 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 cost of TJR, 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 1–3. 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.

Example 2: Calculating preliminary risk scores for an asthma episode

Episode has the following attributes:

- Patient is a 25-year-old male
- A diagnosis for status asthmaticus is observed within the episode risk window
- Diagnoses for hypertension and morbid obesity are observed

The risk score for the episode would be the sum of the following risk weights or 1.949*:

✓ 0.921 (male, 19–64 years)
✓ 0.921 (status asthmaticus, episode risk window)
✓ 0.056 (hypertension)
✓ 0.072 (obesity, morbid)

This episode has an expected total cost 1.949 times that of the average episode included in the development of the risk model.*

*The risk score neutrality factor would also be applied.

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 3: 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 of a perinatal episode was 0.987, then a 27-year-old woman without other clinical risk factors would have a final risk score of 0.6911 (0.987 * 0.8269 = 0.8162)

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.

Table 1*: Episode risk model for acute exacerbation of asthma	
Description of risk marker	**Risk weight**
Age risk markers	
Up to 18 years	0.7125
19–64 years	0.8263
Clinical risk markers observed during asthma episode risk window	
Status asthmaticus, also prior history with acute exacerbation (F_ETG_ASTHMATICUS_ACUTE_EXACERB)	1.7160
Bacterial pneumonia (F_ETG30_437400)	0.7188
Acute respiratory distress (F_ETG30_441200)	1.1771
Viral and fungal pneumonia (OPNEUMTB)	0.1996
Acute bronchitis (F_ETG30_438300)	0.0741
Comorbidity risk markers observed before or during the asthma episode risk window	
Morbid obesity (F_CS_70364)	0.1012
Dehydration (F_ETG_164900)	0.1247
Hypertension (F_ETG_388100)	0.0671
Inflammation of esophagus (F_ETG_473300)	0.1804
Endocrine disease signs and symptoms (F_ETG_169900)	0.0972
Other moderate-cost endocrinology, including metabolic disorders (F_ETG_METADIS)	0.2272
Other moderate- and high-cost cardiology, including signs and symptooms (F_ETG_OTHCARD)	0.0785
Conduction disorders including artial fibrillation (F_ETG_CONDDIS)	0.1358

* In 2022, the ASTH risk model was updated to test new risk marketers and incorporate 2022 episode design and configuration file maintenance changes.

Table 2: Episode risk model for perinatal	
Description of risk marker	**Risk weight**
Age risk markers	
Female, 12–34	0.7754
Female, 35–64	0.8296
Clinical risk markers observed during pregnancy	
Hemorrhage in pregnancy (F_CS30_504_70247)	0.0870
Abnormalities of genital tract in pregnancy (F_CS30_504_70253)	0.0304
Habitual aborter (F_CS30_504_70260)	0.0751

Table 2: Episode risk model for perinatal (cont.)	
Description of risk marker	**Risk weight**
Clinical risk markers observed during pregnancy (cont.)	
Fetal complication in pregnancy (F_CS30_504_70264)	0.0765
Hyperemesis gravidarum (F_CS30_504_70272)	0.0778
Other high-cost risk factors during pregnancy (OTH_HI_COST)	0.1123
Other moderate-cost risk factors during pregnancy (OTH_MOD_COST)	0.0309
Pregnancy with preeclampsia, eclampsia (F_CS30_PRE_ECLAMP)	0.0649
Threatened labor, pre-term labor (F_CS30_PRE_THREAT)	0.0761
Comorbidity risk markers observed before or during pregnancy	
Risk factor – Related to genetic testing	0.0306
Risk factor – MFM utilization or breech pregnancy	0.0405
Other infectious diseases (F_ETG_130600)	0.0529
Obesity (F_ETG_164800)	0.0626
Dehydration (F_ETG_164900)	0.0645
Diabetes (F_ETG_163000)	0.1313
Other moderate-cost endocrinology, including metabolic disorders (F_ETG_METADIS)	0.0166
Bipolar_psychotic and schizophrenic disorders (F_BIPOLAR_PSYCHOTIC_SCHIZOPHRENIC)	0.0160
Mood disorder, depressed (F_ETG_238800)	0.0180
Anxiety disorder or phobias (F_ETG_239800)	0.0145
Epilepsy (F_ETG_315200)	0.0600
Other neurological diseases, including signs and symptoms (F_ETG_OTHNEUR)	0.0305
Higher-cost cardio, including HF, cardiomyopathy, aneurysm (F_ETG_CARDIOHI)	0.0495
Conduction disorders including atrial fibrillation (F_ETG_CONDDIS)	0.0257
Thyroid dysfunction	0.0602
Hypertension (F_ETG_388100)	0.0356
Higher-risk asthma, including status asthmaticus, asthma exacerbation (F_CS_AsthmaCC)	0.0585
Asthma, other (F_ETG_438800)	0.0364
Viral and fungal pneumonia and TB (F_ETG_OPNEUMTB)	0.0272
Higher-cost liver conditions, including hepatitis and cirrhosis (F_ETG_LIVHEP)	0.0435
Other diseases of hepatobiliary system (F_ETG_523200)	0.0323
Oth hematol conds, including thrombocytopenia, anemia (F_ETG_OTH_HEMATOLOGY)	0.0307

Table 2: Episode risk model for perinatal (cont.)	
Description of risk marker	**Risk weight**
Comorbidity risk markers observed before or during pregnancy (cont.)	
Infection of upper genitourinary system (F_ETG_587100)	0.0525
Inflammation of genitourinary system, including kidney stones (F_ETG_INFLGU)	0.0223
Inflammatory condition of female genital tract, including endometriosis (F_ETG_ENDOME)	0.0132
Infection of ovary, fallopian tubes, uterus and cervix (F_ETG_INFGYN)	0.0604
Rare high-cost chronic conds, including sickle cell anemia and Gaucher's (F_ETG_RHCC)	0.0886
Migraine headache (F_ETG_316900)	0.0149
Drug dependence in pregnancy (F_CS30_504_70248)	0.0108
STDs in pregnancy (F_CS30_504_70261)	0.0548

Table 3: Episode risk model for TJR	
Description of risk marker	**Risk weight**
Comorbidity risk markers observed before or during the TJR episode risk window	
Diabetes (F_ETG_163000)	0.1098
Joint degeneration, localized – knee and lower leg or thigh, hip pelvis (F_ETG_712202_712203)	0.0523
Osteoporosis (F_ETG_712000)	0.0810
Cardiac conditions: Cardiovascular diseases signs and symptoms (F_ETG_399900), higher-cost cardiology, including HF, cardiomyopathy, aneurysm (F_ETG_CARDIOHI), other cardiac diseases (F_ETG_388700), valvular disorder (F_ETG_387400	0.0482
Orthopedic symptoms: Orthopedic deformity – foot and ankle (F_ETG_715101), orthopedic deformity – thigh, hip and pelvis (F_ETG_715103), Orthopedic signs and symptoms – knee and lower leg (F_ETG_719902)	0.0541

Appendix

I. Asthma episode

A. Pneumonia

/* Combine viral and fungal*/

_ETG30_437200=1 or F_ETG30_437600=1 then OPNEUMTB=1;

/*437600 Fungal and other pneumonia*/
/*437200 Viral pneumonia*/

B. Cardiac

/* Other cardio */

if sum (F_ETG_386800, F_ETG_386900, F_ETG_387000, F_ETG_388300, F_ETG_387100, F_ETG_388700 F_ETG_399900)>=1 then F_ETG_OTHCARD=1;

/*386800 Congestive heart failure*/
/*386900 Cardiomyopathy*/
/*387000 Aortic aneurysm*/
/*388300 Cardiac congenital disorder*/
/*387100 Heart failure, diastolic
/*388700 Other cardiac diseases*/
/*399900 Cardiovascular diseases signs and symptoms*/

C. Status asthmaticus

/* Status asthmaticus, also prior history, with acute exacerbation*/

F_70157_BOTH= F_CS30_503_70157*F_CS365_503_70157: if sum (F_70157_BOTH, F_CS30_70157_70158) >= 1 then F_ETG_ASTHMATICUS_ACUTE_EXACERB = 1;

/*F_70157_BOTH Status asthmaticus, also prior history*/
/* F_CS30_70157_70158 Status asthmaticus and acute exacerbation*/

D. Conduction disorders

/* Conduction disorders */

if sum (F_ETG_387500, F_ETG_387600, F_ETG_387700, F_ETG_387800) >=1 then F_ETG_CONDDIS=1;

/*387500 Severe ventricular rhythms*/
/*387600 Severe heart block*/
/*387700 Other conduction disorders*/Atrial fibrillation and flutter*/
/*387800 Atrial fibrillation and flutter*/

F. Other metabolic disorders

/* Other metabolic disorders */

I. Asthma episode (cont.)

if sum (F_ETG_165100, F_ETG_239100, F_ETG_165300)>= then F_ETG_METADIS=1

/*165100 Other metabolic disorders*/
/*239100 Organic drug or metabolic disorders*/
/*165300 Other diseases of endocrine glands*/

Endocrine hierarchies

If selected endocrine clinical markers are present, turn off risk marker for endocrine signs and symptoms risk marker.

if sum (F_ETG_164900,/* Dehydration */
F_ETG_165100, F_ETG_239100, F_ETG_165300/* Other metabolic disorders */
>=1 then F_ETG_169900=0;/* Endocrine S and S */

II. Perinatal episode

A. Other high-cost factors
/*Other high-cost risk factors during pregnancy*/

if sum (F_CS30_504_70246, F_CS30_504_70257)>=1 then OTH_HI_COST=1;

/*70246 Rupture of uterus during pregnancy*/
/*70257 Multiple gestation */

D. Other moderate-cost factors
/*Other moderate-cost risk factors during pregnancy*/

if sum(F_CS30_504_70249, F_CS30_504_70250, F_CS30_504_70255, F_CS30_504_70262)>=1
then OTH_MOD_COST = 1

/*F_CS30_504_70249 Maternal distress during pregnancy*/
/*F_CS30_504_70250 Pregnancy, with severe perineal injury*/
/*F_CS30_504_70255 Orthopedic problems in pregnancy*/
/*F_CS30_504_70262 Minor complication of pregnancy*/

E. Pregnancy with preeclampsia and eclampsia
/*Pregnancy with preeclampsia and eclampsia*/

if sum (F_CS30_504_70273, F_CS30_504_70274)>=1 then F_CS30_PRE_ECLAMP=1; /*
combining severe and mild preeclampsia */

/* F_CS30_504_70273 Pregnancy, with severe preeclampsia and eclampsia */
/* F_CS30_504_70273 Pregnancy, with mild preeclampsia*/

F. Threatened labor and pre-term labor
/*Threatened labor and pre-term labor*/

II. Perinatal episode (cont.)

if sum (F_CS30_504_70263, F_CS30_504_70275)>=1 then F_CS30_PRE_THREAT=1; F.

/* combining threatened and pre-term labor */
/* F_CS30_504_70263 Pre-term labor*/
/* F_CS30_504_70275 Threatened labor*/

G. Other moderate-cost endocrinology
/* Other metabolic disorders */

if sum (F_ETG 165100, F_ETG_239100, F_ETG_165300, F_ETG_169900)>=1 then F_ETG_METADIS=1;

/*165100 Other metabolic disorders*/
/*239100 Organic drug or metabolic disorders*/
/*165300 Other diseases of endocrine glands*/

H. Other neurological diseases
/*Other neurological diseases*/

if sum (F_ETG_318600, F_ETG_319900)>=1 then F_ETG_OTHNEUR=1;

/* Other neurological diseases*/
/* Neurological diseases signs and symptoms*/

I. Higher-cost cardiology
/* High-cost cardiology */ if sum (

F_ETG_386800, /* Congestive heart failure*/
F_ETG_386900, /* Cardiomyopathy
F_ETG_387000, /* Aortic aneurysm
F_ETG_388300, /* Cardiac congenital disorder*/
F_ETG_387100)>=1 /* Heart failure, diastolic
then F_ETG_CARDIOHI=1;

J. Conduction disorders
/* Conduction disorders*/

if sum (F_ETG_387500, F_ETG_387600, F_ETG_387700, F_ETG_387800) >=1 then F_ETG_CONDDIS=1;

/*387500 Severe ventricular rhythms*/
/*387600 Severe heart block*/
/*387700 Other conduction disorders*/
/*387800 Atrial fibrillation and flutter*/

II. Perinatal episode (cont.)

K. Thyroid dysfunction

/* Thyroid dysfunction*/

if sum (F_CS30_504_70258, Hyper_functioning_thyroid_gland, Hyper_functioning_thyroid_gland, Hypo_functioning_thyroid_gland) = 1 then thyroid_dysfunction_hyper_hypo = 1;

L. Higher-risk asthma

/* Higher risk asthma */
/*F_CS_70157 Status asthmaticus */
/*F_CS_70158 Asthma, with acute exacerbation */
if sum (F_CS_70157, F_CS_70158)>=1 then F_CS_AsthmaCC=1;

M. Viral and fungal pneumonia

/* Viral and fungal pneumonia and TB */

if F_ETG_437200=1 or F_ETG_437600=1 or F_ETG_437800=1 or F_ETG_438000=1 then F_ETG_OPNEUMTB=1;

/*437600 Fungal and other pneumonia*/
/*437800 Pulmonary tuberculosis*/
/*438000 Disseminated tuberculosis*/

N. Higher-cost liver conditions

/*Higher-cost liver conditions, including hepatitis and cirrhosis*/

if sum (F_ETG_521400, F_ETG_521600, F_ETG_521800) >=1 then F_ETG_LIVHEP=1;

F_ETG_521400 Infectious hepatitis
F_ETG_521600 Non-infectious hepatitis
F_ETG_521800 Cirrhosis

O. Other hematology

/* Other Hematology */

if sum (F_ETG_206800,F_ETG_206900,F_ETG_207600,F_ETG_208000,F_ETG_208200, F_ETG_208900,F_ETG_209900)>=1 then F_ETG_OTH_HEMATOLOGY=1;

/*F_ETG_206800 Agranulocytosis*/
/*F_ETG_206900 Thrombocytopenia*/
/*F_ETG_207600 Myelodysplastic syndromes*/
/*F_ETG_208000 Anemia of chronic diseases*/
/*F_ETG_208200 Iron deficiency anemia*/
/*F_ETG_208900 Other hematologic diseases*/
/*F_ETG_209900 Hematology signs and symptoms*/

P. Gastritis, duodenitis and ulcer

/*Gastritis, duodenitis and ulcer*/
if sum (F_ETG_473500, F_ETG_473800)>=1 then F_ETG_GIULCER=1;

II. Perinatal episode (cont.)

Q. Inflammation of genitourinary system

```
/* Inflammation of genitourinary system, including kidney stones */ if sum (F_ETG_587800,/*
Kidney stones*/
F_ETG_588000)      /* Inflammation of genitourinary system, except kidney stones*/
>=1 then F_ETG_INFLGU=1;
```

R. Inflammatory condition of female genital tract

```
/* Inflammatory cond of female genital tract, including endometriosis */ if sum (F_ETG_634200,
/* Endometriosis */
F_ETG_634300)      /* Inflammatory condition of female genital tract, except endometriosis*/
>=1 then F_ETG_ENDOME=1;
```

S. Infection of ovary, fallopian tubes, uterus and cervix

```
/*Infection of ovary, fallopian tubes, uterus and cervix */
if sum (F_ETG_633200,      /* Infection of ovary &/or fallopian tubes */ F_ETG_633500,      /*
Infection of uterus */
F_ETG_633700)      /* Infection of cervix */
>=1 then F_ETG_INFGYN=1;
```

T. Rare high-cost chronic

```
/* Rare high-cost chronic*/
if sum(F_CS_70062, /* Myasthenia gravis */ F_ETG_162000,      /* Gaucher's, lipidoses, Fabry's */
F_ETG_207000,      /* Hemophilia */
F_ETG_207400,      /* Sickle cell anemia */
F_ETG_315100,      /* MS */
F_ETG_316800,      /* Parkinson's disease */
F_ETG_165200,      /* Cystic fibrosis */
F_CS_70388,        /* Muscular dystrophy */
F_ETG_316600)      /* ALS */
>=1 then F_ETG_RHCC=1;
```

U. Psychology

```
/* Psychology – bipolar, psychotic, schizophrenic*/
if sum (F_238900,    /*Mood disorder, bipolar*/
F_239300,    /*Psychotic and schizophrenic disorders*/
>= 1 then F_BIPOLAR_PSYCHOTIC_SCHIZOPHRENIC = 1
```

III. TJR episode

A. TJR episode

Higher-cost cardiology

```
/* High-cost cardiology */
if sum (
F_ETG_386800,    /* Congestive heart failure*/
F_ETG_386900,    /* Cardiomyopathy
F_ETG_387000,    /* Aortic aneurysm
F_ETG_388300,    /* Cardiac congenital disorder*/
F_ETG_387100)>=1          /* Heart failure, diastolic
then F_ETG_CARDIOHI=1;
```