

INGENIX[®]

Leveraging the Power of ETG[®] 7.0:

New opportunities for health care information analysis

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Introduction

Ingenix Symmetry™ continues a history of innovation with the introduction of Version 7.0 of its Episode Treatment Groups® (ETG®) product. ETG is a software solution that creates clinical episodes of care to support health care analysis. ETG episodes describe unique clinical conditions and the services involved in their diagnosis, management, and treatment. Introduced in 1993, ETG quickly became the industry standard for episodes of care. Symmetry Suite products are now licensed by more than 300 U.S. health care organizations that serve hundreds of millions of individuals.

ETG is a basic condition classification methodology that combines related services into a medically relevant unit describing a complete episode of care. Approximately 450 base conditions are defined by ETG, describing conditions such as diabetes, congestive heart failure (CHF), acute bronchitis, and major trauma. The clinical richness of ETG, its reliance on readily available information such as medical and pharmacy claims, and its potential as a tool for describing relative patient morbidity make it a sound basis for measuring and understanding value in health care.

A number of factors differentiate ETG in the market, including strong clinical content, dynamic clean periods, capacity to support a more accurate assessment of episode completion, recognition of the different clinical factors that can impact an episode's costs, and seamless integration with other Symmetry engines for consistent analysis. Each of these strengths continues to serve as the core of the ETG methodology for Version 7.0. However, 7.0 introduced a number of enhancements that greatly add to the power of ETG and also provide new opportunities to leverage ETG outputs in health care information analysis.

This paper provides an overview of the enhancements introduced by ETG 7.0 (for more detail, see the white paper *ETG 7.0*), as well as detailed examples of how you can use ETG results to support analysis.

ETG Version 7.0

The 7.0 release of ETG introduces an enhanced classification structure that both increases clinical specificity and improves the resource homogeneity of the resulting

episodes. Version 7.0 also includes new outputs related to an episode's clinical details. In particular, ETG 7.0 introduces:

- Additional clinical detail to ETG base classes.
- Severity modeling within ETG base classes, reflecting relevant complications and comorbidities—the result represented by an episode severity score and severity level.
- Enhanced outputs. Beyond the ETG base class, Version 7.0 captures details on the specific complications, comorbidities, and treatments observed for the episode.
- New outlier trim points, reflecting more recent data and the new classification structure of base class, severity level, and treatment status.
- Flexible handling of annual chronic episodes, allowing the user to choose a method for parsing chronic episodes that exceed 365 days into yearlong episodes.

Improved Clinical Classification—The classification structure of ETG 7.0 introduces the two concepts of base ETGs and severity level. Base ETGs describe the general clinical condition for the episode. Diabetes, congestive heart failure, and asthma are examples. The base classes in 7.0 are quite similar to those groupings of conditions used in the prior versions of ETG, with the exception of enhanced detail for some conditions to improve clinical specificity, resource homogeneity, and consistency. For example, the former ETG, “Major inflammation, skin and subcutaneous tissue,” is split into five new base ETGs: psoriasis, chronic skin ulcers, acne, contact dermatitis, and other skin disorders.

Severity Score and Severity Level—The measurement of severity within an episode is the most significant enhancement introduced by ETG 7.0. A severity score and a discrete severity level are assigned to each episode of care, based on a patient's age and gender and the episode's observed mix of complications and comorbidities. The presence of treatment does not impact the assessment of relative severity, only complications and comorbidities. Further, the model used to assign severity level to each episode is unique to the base ETG. In this way, ETGs can take advantage of the unique relationships between complications and comorbidities and a clinical condition in determining levels of severity.

Enhanced ETG Outputs—In addition to the clinical structure described above, ETG 7.0 also provides additional detail and summary information for each episode of care. Similar to the current ETG outputs, detailed service records will include episode ID, record type, cluster ID, and other information. Further, for each episode, the base ETG will be noted, along with each of the observed complications and comorbidities and any relevant treatment indicators. A summary score describing the relative severity of the episode compared to the average severity of all episodes within the base ETG will be available along with a discrete severity level assigned using this score.

ETG 7.0 introduces more detailed information on the relevant complications, comorbidities, and treatment indicators for an episode. In comparison to previous versions that note an ETG “with complications,” “with comorbidities,” or “with surgery,” Version 7.0 includes new output tables that indicate the specific complications, comorbidities, and treatments observed. In particular, three new output tables will be a part of the standard ETG outputs:

- **Complications**—Complications, or condition status factors, are specific to an ETG, based solely on the diagnosis codes of anchor records linked to the episode. A new output file contains all of the specific condition status factors related to each episode. This can be used to analyze provider performance as it provides the specific condition status factors that may have affected the management of the patient’s condition. Examples of complications for a diabetes episode include diabetic ketoacidosis and diabetic coma.
- **Comorbidities**—Comorbidities are specific to an ETG, based solely on the diagnosis codes of services grouped to other episodes. Comorbidities have a time window during which they are considered active. These windows must overlap the timing of the episode to be considered as a comorbidity for the episode. A new output file contains all of the specific comorbidities related to each episode. This, along with episode complications output, can be used to assess the key conditions impacting the cost of an episode and the management of the

patient’s condition. Examples of comorbidities include hypertension, coronary artery disease (CAD), congestive heart failure (CHF), and depression.

- **Treatment Indicators**—Treatment indicators are based on the procedure and revenue codes for services grouped to an episode. This new output file contains all of the specific treatments related to each episode and can be used to assess the specific procedures performed during the course of an episode of care. Procedures such as coronary artery bypass graft, C-section delivery, shoulder arthrodesis, and arthroscopy knee with treatment are examples.

Measuring Severity—As noted above, the most significant change introduced by ETG 7.0 is how comorbidities, complications, and severity within an episode are handled—enhancements that provide significant value in how grouping results can be applied. ETG has always included a robust approach to assessing complications, comorbidities, and patient risk. Version 7.0 will improve on that approach and enhance the clinical and episode severity. In particular, Version 7.0 will introduce two new concepts, *severity score* and *severity level*. The scores and levels are specific to each base ETG and are modeled using the complications and comorbidities observed within an episode.

The severity measures used in ETG 7.0 were developed using experience from a large database of 66 million episodes. Severity models were created for each relevant base ETG accounting for member demographics, episode complications, episode comorbidities, and selected interactions between complications and between comorbidities. Procedure-based treatment indicators were not considered in these models and have no impact on the severity of an episode. Multiple regression techniques were then used to estimate the incremental contribution of each clinical and demographic factor on the overall cost per episode. These estimates describe the *severity weight* for each factor. For some base ETGs, separate models were indicated for episodes with elderly versus non-elderly patients.

Each episode’s score is the sum of the severity weights for all of the clinical and demographic factors observed for the

Table 1

Episode Severity—Comparison of Two Diabetes Episodes					
Male, age 60			Female, age 50		
Episode Number	Weight	Weight Category	Episode Number	Weight	Weight Category
000001	0.08	Demographics	000002	0.07	Demographics
000001	0.72	Condition Status	000002	0.72	Condition Status
000001	1.71	Condition Status			
000001	0.12	Comorbidity	000002	0.14	Comorbidity
000001	0.21	Comorbidity			
000001	0.22	Comorbidity			
000001	0.14	Interactions			
000001	1.04	Multiple Counts			
000001	4.24	Severity Score	000002	0.93	Severity Score
000001	4	Severity Level	000002	1	Severity Level

episode. Table 1 above depicts two diabetes episodes with severity scores of 4.24 and 0.93, corresponding to severity levels 4 and 1, respectively. The severity score further determines the severity level, which is defined by ranges of scores and has a value of 1, 2, 3, or 4. Not all base ETGs with severity scoring have four levels; some have two or three levels. Further, not all ETGs warrant severity scoring, based on clinical logic, very low episode prevalence, or the empirical results of the severity modeling. All episodes for ETGs without severity scoring are assigned a severity score of 1.00 and a severity level of 1.

Chronic ETG Episodes—ETG 7.0 provides increased flexibility in using the ETG software to parse chronic conditions into yearlong episodes. The user selects one of five options for the grouping:

- **Start Month**, where the chronic episodes will start at the month designated by the user in the configuration. This option is recommended for any financial analysis for a desired period of time.
- **Start Grouping Date**, where the episodes will start at the Grouping Start Date. This option is recommended when the earlier data being grouped is the most complete, or if the run-out is inconsistent or unreliable.
- **Start Eligibility Date**, where the episodes will start at the member's eligibility start date, and if not available, at the Start Grouping Date. This option is recommended when the earlier service data is the most complete and if members frequently enroll and/or disenroll.

- **End Grouping Date**, where the episodes will start building backward from the Grouping End Date. This option is recommended when the recent data is most complete. It is usually more desirable to use the most recent data possible to support analysis.
- **End Eligibility Date**, where the episodes will start building backward from the member's eligibility end date, and if not available, at the End Grouping Date. This option is recommended when the recent data is most complete and if members frequently enroll and/or disenroll.

Table 2 provides suggested options based on the characteristics of the data to be grouped. In some cases more than one option would be sufficient and could yield the same results. For example, if the data to be grouped describes a continuous 24 months of experience and all of the members are fully enrolled for that 24 months, the End Grouping Date and the End Eligibility Date options will yield the same grouping results.

Table 2

Suggested Options for Parsing Chronic Episodes Using ETG 7.0				
Option	Most Complete Data		Stable Member Enrollment	
	At Begin	At End	No	Yes
Start Month	X	X	X	X
Start Grouping Date	X			X
Start Eligibility Date	X		X	X
End Grouping Date		X		X
End Eligibility Date		X	X	X

New ETG Numbering System—The significant changes introduced by Version 7.0 led to the adoption of a new number system for ETG. In particular, the new number system was designed to achieve the following objectives:

- Capture the concepts of the base ETG, body system.
- Describe the general presence of one or more complications, comorbidities, or a significant surgery.
- Remove leading zeroes from ETG numbering.
- To avoid confusion with earlier versions, introduce a completely different numbering for each condition.

Table 3 provides examples of ETG numbers for selected episodes. As shown, the ETG numbers are characterized using a nine-digit number that represents:

- The ETG base class—the first six digits, with digits 1 through 4 representing the clinical condition and the 5th and 6th digits together representing the body system.
- The presence of one or more complications—if so, a “1” in the 7th digit, a “0” otherwise.
- The presence of one or more comorbidities—if so, a “1” in the 8th digit, a “0” otherwise.
- The presence of one or more treatment indicators—no treatment is indicated by a “0” in the 9th digit, otherwise a number is presented indicating the general presence of a treatment, active management, or a specific treatment—a 1, 2, 3, 4, 5, or 6.

Table 3

Examples of ETG Numbering	
ETG 7.0 Number	ETG Description
130100000	AIDS, w/o complication, w/o comorbidity, w/o surgery
163000110	Diabetes, with complication, with comorbidity, w/o surgery
351500001	Glaucoma, w/o complication, w/o comorbidity, with surgery
386500003	Ischemic heart disease, w/o complication, w/o comorbidity, with coronary artery bypass surgery

Note that the 7th and 8th digits in the numbering system were included to support a comparison with prior versions of ETG. In most applications, the combination of the base ETG,

episode severity level, and, in some cases, the treatment indicator, will provide the basic unit of analysis using ETG 7.0 outputs. Also note that the concept of sub ETG is now captured within the base ETG number. Further, the concept of a Super ETG is no longer required given the presence of the base ETG and the availability of episode severity level. Users can remove any distinction based on surgery or treatment by using these two concepts and ignoring the 9th digit of the ETG number.

Applying ETG 7.0

The ETG 7.0 release provides significant enhancements to how complications, comorbidities, and severity are handled in describing an episode of care. Disease progression, measured by an episode’s complications and comorbidities, influences episode severity, which further describes the episode’s expected costs and utilization. Differences in severity can then be used to improve the accuracy of health care analysis.

The statistical homogeneity of the cost of episodes within the base class, severity level, and treatment indicator structure can be summarized using analyses such as those described in Table 4 on page 6, which highlights three base ETGs with the available combinations of severity level and treatment indicator. The table describes results using a large database that includes episodes of care grouped with ETG 7.0. Average costs per episode are computed, along with the standard deviation and coefficient of variation. The coefficient of variation represents the ratio of the standard deviation and average cost.

For diabetes, the results in Table 4 are summarized by base ETG and severity levels. The findings show an appropriate rank order for the average cost per episode across the four severity levels for the condition. Further, the coefficient of variation (CoV) is smaller for each of the severity levels than for the combined (“All”) level, supporting the idea of severity adjustment within diabetes. A comparison of CoV estimates for diabetes episodes based on ETG version 6.0 showed, on average, an 18 percent decrease in CoV when moving to the new version (from 1.31 to 1.07).

For malignant neoplasm of thyroid gland, results by treatment indicator are presented. Four values for treatment

Table 4

Examples of Severity Level and Treatment Indicator Combinations						
Base ETG Condition	Severity	Treatment Indicator	# Episodes	Avg Cost per Episode	SD Cost per Episode	CoV
Diabetes	1	0	181,012	\$1,544	\$1,526	0.99
Diabetes	2	0	31,438	\$2,320	\$2,088	0.90
Diabetes	3	0	18,593	\$2,915	\$2,572	0.88
Diabetes	4	0	20,480	\$4,455	\$3,558	0.80
Diabetes	All	0	251,523	\$1,979	\$2,111	1.07
Malignant neoplasm of thyroid gland, w/o treatment, w/o active management (am)	1	0	4,866	\$1,278	\$1,341	1.05
Malignant neoplasm of thyroid gland, with treatment, w/o am	1	1	637	\$11,678	\$5,156	0.44
Malignant neoplasm of thyroid gland, w/o treatment, with am	1	2	612	\$5,565	\$4,537	0.82
Malignant neoplasm of thyroid gland, with treatment, with am	1	3	565	\$18,103	\$6,680	0.37
Malignant neoplasm of thyroid gland	1	All	6,680	\$4,086	\$6,128	1.50
Chronic sinusitis, severity level 1	1	All	235,927	\$543	\$989	1.82
Chronic sinusitis, severity level 2	2	All	40,353	\$946	\$1,522	1.61
Chronic sinusitis, severity level 3	3	All	35,049	\$2,402	\$3,330	1.39
Chronic sinusitis	1	0	226,353	\$427	\$500	1.17
Chronic sinusitis, with treatment	1	1	9,574	\$3,274	\$3,226	0.99
Chronic sinusitis	2	0	37,073	\$673	\$675	1.00
Chronic sinusitis, with treatment	2	1	3,462	\$3,863	\$3,598	0.93
Chronic sinusitis	3	0	22,051	\$686	\$668	0.97
Chronic sinusitis, with treatment	3	1	12,998	\$5,314	\$3,957	0.74
Chronic sinusitis	All	All	311,511	\$804	\$1,622	2.02

indicator are available: a 0 describes “without treatment,” a 1 describes “with surgery, without active management,” a 2 describes “without surgery, with active management,” and a 3 describes “with surgery, with active management.” As shown, significant differences in cost per episode exist between episodes grouped by treatment indicator.

For chronic sinusitis, results are presented using both severity level and treatment indicator. This example provides an opportunity to view differences across both severity levels and treatment. As shown, when comparing costs per episode based on severity level alone, costs increase with severity. Costs for severity level 3 are more than four times greater

than those for severity level 1 (\$2,402 vs. \$543). Looking at costs by the presence of surgery, costs for surgical episodes are significantly greater than those for nonsurgical for all severity levels—even at severity level 3, where costs for surgical episodes are almost eight times those for nonsurgical (\$5,314 vs. \$686). Finally, when comparing costs for surgical episodes, costs per episode increase with severity.

Applying ETG—Provider Performance Measurement Around Cost of Care

ETGs and episodes of care are a key methodology in measuring and comparing providers based on cost of care. Valid measures of provider performance demand recognition

of any differences between the underlying morbidity or case mix of a provider's patients and those of their peers. The enhanced severity information in ETG 7.0 will support more accurate adjustment of differences in case mix between providers and promote more valid comparisons.

To compare a provider's actual cost and utilization results with those of peers, risk-adjusted "expected values" (for cost and utilization measures) are typically created. The actual results are based on the experience measured from episodes attributed to that provider. The expected finding would be to see for the provider's peers if they had the same mix of episodes. The keys to accurate case mix adjustment and valid comparisons are the "mix of episodes" and how that mix is measured.

In prior versions of ETG, a provider's "mix of episodes" was defined as a mix of ETGs defined by "with or without complication" or "with or without comorbidity," or, in some cases, "with or without surgery." Consider an endocrinologist who treats only diabetes patients. In the prior versions of ETG, four ETGs were available to support measurement for that provider. Table 5 describes those episodes. The

observed costs per episode are those costs for the provider's attributed episodes. The expected costs are the average cost per episode, by ETG, for all endocrinologists in the provider's peer group. The OE ratio is the total observed costs divided by the total expected costs. The result for all diabetes episodes sums these costs across all diabetes ETGs, to create an overall result for the provider for diabetes.

Table 6 shows the mix of episodes for the same provider using ETG 7.0. As shown, this mix is now characterized by their episodes grouped by base ETG (diabetes), and the four severity levels defined for diabetes. Here, the case mix unit is base ETG and severity level. The observed and expected costs per episode and OE ratio are computed as before. Notice that for some providers, the OE ratio may change due to the more precise allocation of episodes based on severity. For this provider, the overall OE ratio for diabetes changed from 0.99 to 1.05, suggesting the provider is less efficient in the use of resources for diabetes episodes when using ETG 7.0.

Another feature supported by ETG 7.0 is the distinction between treatment and nontreatment episodes for the same base ETG. For some physicians such as surgeons, this

Table 5

Provider Measurement Under ETG Version 6.0						
Version 6.0 ETG	Number of Episodes	Observed Cost per Episode	Expected Cost per Episode	Total Observed Costs	Total Expected Costs	OE Ratio
Insulin-dependent diabetes, with comorbidity	25	\$4,344	\$4,561	\$108,600	\$114,025	0.95
Insulin-dependent diabetes, w/o comorbidity	75	\$2,842	\$2,849	\$213,150	\$213,675	1.00
Non-insulin-dependent diabetes, with comorbidity	100	\$2,262	\$2,268	\$226,200	\$226,800	1.00
Non-insulin-dependent diabetes, w/o comorbidity	200	\$1,505	\$1,504	\$301,000	\$300,800	1.00
Diabetes, All	400	\$2,122	\$2,138	\$848,800	\$855,200	0.99

Table 6

Provider Measurement Under ETG Version 7.0						
Version 7.0 ETG plus Severity Level	Number of Episodes	Observed Cost per Episode	Expected Cost per Episode	Total Observed Costs	Total Expected Costs	OE Ratio
Diabetes, Level 4	35	\$4,778	\$4,232	\$167,244	\$148,103	1.12
Diabetes, Level 3	80	\$3,126	\$2,847	\$250,096	\$227,760	1.10
Diabetes, Level 2	110	\$2,149	\$2,120	\$236,379	\$233,142	1.01
Diabetes, Level 1	175	\$1,115	\$1,156	\$195,081	\$202,298	0.96
Diabetes, All	400	\$2,122	\$2,028	\$848,800	\$811,302	1.05

approach may support more equitable comparisons. For those physicians, the surgery distinction is still supported in ETG 7.0, using the 9th digit of the episode number to denote episodes with a significant treatment. In this case, the case mix unit could be: (1) the base ETG and the treatment indicator; (2) the base ETG, severity level, and the treatment indicator; or even (3) the base ETG and severity level for episodes without surgery and the base ETG and treatment indicator for other episodes. The flexible approach in capturing the clinical condition, the severity level, and the treatment indicator provide a number of different options for users in applying ETG to provider measurement.

Provider Performance—Case Scenario:

- Peer group: cardiologists
- Case mix adjustment unit: base ETG, with severity level
- Base ETGs that might be considered for measurement for cardiologists:

Base ETG	Description
164700	Hyperlipidemia, other
386500	Ischemic heart disease
386600	Pulmonary heart disease
386800	Congestive heart failure
386900	Cardiomyopathy
387000	Aortic aneurysm
387100	Heart failure, diastolic
387400	Valvular disorder
387500	Severe ventricular rhythm
387600	Severe heart block
387800	Atrial fibrillation & flutter
388100	Hypertension

- Attribution method: episodes were attributed to a provider based on which one had the largest number of episode clusters and also owned at least 25 percent of all clusters for the episode

As with earlier versions of ETG, the key steps in provider measurement using episodes of care include:

- Selecting providers for a peer group, typically based on specialty designation and location.
- Selecting measures for comparison—cost of care is usually measured using resource costs or utilization.
- Selecting ETGs to support measurement—the approach used to select the episodes of care that are used in measurement can vary by peer group.
- Selecting only complete, non-outlier episodes for those selected ETGs.
- Attributing episodes to individual providers—usually based on the provider’s relative level of participation in the management or delivery of the episode (see the Symmetry white paper entitled *Issues and Best Practices in Physician Episode Attribution*).
- Computing observed and expected costs—using all services comprising these selected episodes, calculate observed and expected values for cost and utilization measures. Observed and expected amounts are computed for each case-mix unit, e.g., base ETG and severity level.
- Comparing the expected measures and actual measures for a provider to support comparisons of performance, using statistics such as the OE ratio described above (ratio of observed to expected). In this way, measures of relative “cost of care” can be computed by comparing directly the actual and expected measures at any level overall for a provider or by ETG for any measure.

Table 7 illustrates a more detailed example of providers and their respective “observed costs” and relative “expected costs” by the case mix unit. As shown, the case mix unit comprises base ETG and severity level. The relative cost of care (OE ratio) is simply the observed cost divided by the expected cost, at each case mix unit level. In the example on page 9, not all providers in the peer group are displayed, although the expected amounts were computed based on their experience. The results by ETG base category (family) are also shown below, followed by the overall OE ratio for the two physicians. The overall results for Dr. Smith and Dr. Jones are obtained by summing the observed and expected costs across all of their episodes and computing the OE ratio. For Dr. Smith, this result is 0.86. For Dr. Jones, the result is 0.71. Results are also presented by base ETG, aggregating findings across severity levels within the same condition.

Table 7

Relative Cost of Care Comparison Between Providers					
Provider	Base ETG and Severity Level	Number of Episodes	Observed Cost per Episode	Expected Cost per Episode	Relative Cost of Care (OE Ratio)
Dr. Smith	CHF, Level 1	5	\$1,020	\$985	1.04
Dr. Jones	CHF, Level 1	1	\$546	\$985	0.55
Dr. Jones	CHF, Level 2	2	\$205	\$1,295	0.16
Dr. Smith	CHF, Level 3	2	\$1,603	\$2,246	0.71
Dr. Jones	CHF, Level 3	1	\$129	\$2,246	0.06
Dr. Smith	Hyperlipidemia, other, Level 1	10	\$538	\$536	1.00
Dr. Jones	Hyperlipidemia, other, Level 1	3	\$104	\$536	0.19
Dr. Jones	Hypertension, Level 1	5	\$1,267	\$1,220	1.04
Dr. Smith	Hypertension, Level 2	28	\$908	\$1,030	0.88
Dr. Jones	Hypertension, Level 2	7	\$1,374	\$1,030	1.33
Dr. Smith	Hypertension, Level 3	7	\$911	\$1,155	0.79
Dr. Jones	Hypertension, Level 3	6	\$751	\$1,155	0.65
Dr. Smith	Hypertension, Level 4	1	\$504	\$1,229	0.41
Dr. Jones	Hypertension, Level 4	2	\$676	\$1,229	0.55
Dr. Smith	Ischemic heart disease, Level 1	47	\$2,921	\$2,769	1.05
Dr. Jones	Ischemic heart disease, Level 1	11	\$2,716	\$2,769	0.98
Dr. Smith	Ischemic heart disease, Level 2	28	\$2,849	\$4,651	0.61
Dr. Jones	Ischemic heart disease, Level 2	3	\$4,799	\$4,651	1.03
Dr. Smith	Ischemic heart disease, Level 3	2	\$1,607	\$10,385	0.15
Dr. Jones	Ischemic heart disease, Level 3	2	\$432	\$10,385	0.04
Dr. Smith	Ischemic heart disease, Level 4	1	\$39,242	\$16,804	2.34
Dr. Smith	Severe heart block, Level 1	1	\$585	\$5,529	0.11
Dr. Jones	Severe heart block, Level 1	1	\$3,644	\$5,529	0.66
Base ETG (family)					
Dr. Jones	CHF	4	\$271	\$1,455	0.19
Dr. Jones	Hyperlipidemia	3	\$104	\$536	0.19
Dr. Jones	Hypertension	20	\$1,091	\$1,135	0.96
Dr. Jones	Ischemic heart disease	16	\$2,821	\$4,074	0.69
Dr. Jones	Severe heart block	1	\$3,644	\$5,529	0.66
Dr. Smith	CHF	7	\$1,187	\$1,345	0.88
Dr. Smith	Hyperlipidemia	10	\$538	\$536	1.00
Dr. Smith	Hypertension	36	\$897	\$1,060	0.85
Dr. Smith	Ischemic heart disease	78	\$3,327	\$3,820	0.87
Dr. Smith	Severe heart block	1	\$585	\$5,529	0.11
Dr. Jones	Overall	44	\$1,636	\$2,292	0.71
Dr. Smith	Overall	132	\$2,319	\$2,700	0.86

Applying ETG—Disease Specific Risk for Targeted Care Management

The detailed information on the clinical characteristics of an episode in ETG 7.0 provides an improved understanding of the level, or stage, of risk related to a specific condition, supporting applications of ETGs for care and case management. The new output tables available with Version 7.0—describing indicators for complications, comorbidities, and treatments—help identify members with a targeted marker of risk.

For example, to identify members with ischemic heart disease with myocardial infarction, the key steps would be:

- Identify ischemic heart disease episodes (base ETG 386500), as shown in Table 8.
- For these episodes, identify those with an indicator in the “complications” output file with any of the following complication codes:

• Complication Code	• Complication Description
70083	Acute myocardial infarction
70084	Subendocardial infarction
- Identify the members for these episodes by using the “episode summary” output file.
- Compare the members with episodes of ischemic heart disease and a myocardial infarction complication with the remaining patient episodes. The episodes with myocardial infarction represent approximately 7 percent of all of these episodes and have considerably higher episode costs and severity.

A second example, depicted in Table 9, identifies members with CHF, with and without renal failure as a comorbidity.

Table 8

Ischemic Heart Disease					
	# Members	# Episodes	% Episodes	Average Episode Severity Score	Cost per Episode
w/o myocardial infarction	99,894	146,413	93.1%	0.79	\$4,834
with myocardial infarction	10,557	10,843	6.9%	3.69	\$23,756
Total	110,451	157,256	100.0%	0.99	\$6,151

Table 9

Congestive Heart Failure					
	# Members	% Members	# Episodes	Average Condition Severity Score	Cost per Episode
w/o CRF	17,153	86.6%	21,949	0.83	\$2,381
with CRF	2,610	13.2%	3,359	1.76	\$4,379
Total	19,763	100.0%	25,308	0.95	\$2,646

The key steps would be:

- Identify CHF episodes (first six digits of ETG number equal to 386800) from the ETG summary file.
- Identify whether or not the episodes have a chronic renal failure comorbidity (80377), using the “comorbidities, by episode” output file.
- Compare and potentially target for intervention the 87 percent of members who have CHF without chronic renal failure (CRF).

A third example depicted in Table 10, identifies higher-risk diabetics, those who have had three or more emergency room visits:

- Extract episodes for diabetes, based on base ETG 163000, from the ETG summary file.
- By member, using the diabetic episodes, calculate the member’s average severity score for their diabetes episodes.
- For the diabetics identified above, determine which have three or more ER visits using the claims detail for each of these episodes.
- Of the resultant population, compare and potentially target those members in the top percentile, based on their average severity score per diabetic episodes. The average severity score for these members at the 99th percentile is 4.72, compared to 3.26 for all members with a diabetic episode.

More than 6 percent of the members with a diabetes episode had at least three ER visits in the same year as the diabetic episode. This population has higher severity scores than the overall diabetic population.

Table 10

Higher-Risk Diabetics		
Severity Level	% of Total Diabetic Episodes	% of Total Diabetic Episodes for Members with 3+ ER visits
1	72.3%	55.7%
2	12.6%	16.5%
3	7.0%	9.4%
4	8.1%	18.4%
Total	100.0%	100.0%

Financial Performance and Trend

Users will benefit from an enhanced ability to track plan performance and trends around diseases and episodes.

For example, changes in the relative severity of a health plan's diabetes episodes over time can be monitored.

Using two years' worth of data grouped into yearlong diabetes episodes, the results in Table 11 show that although the cost per episode has increased across diabetes episodes, the underlying morbidity appears to be the same. The average severity score per episode is similar and there was no marked change in the distribution of the episodes at each severity level. Changes in costs per episode are likely due to changes in fee schedules and contracts, or even general trends in the mix of services used to treat diabetics.

Table 11

Example of Relationships Between Morbidity and Cost per Episode								
Severity Level	Year 1				Year 2			
	# Episodes	% of Total Episodes	Avg Cost per Episode	Avg Severity Score per Episode	# Episodes	% of Total Episodes	Avg Cost per Episode	Avg Severity Score per Episode
1	86,949	72%	\$1,531	0.76	94,063	72%	\$1,684	0.76
2	14,349	12%	\$2,316	1.18	17,089	13%	\$2,432	1.18
3	9,112	8%	\$2,883	1.49	9,481	7%	\$2,739	1.49
4	9,571	8%	\$4,419	2.38	10,909	8%	\$4,861	2.40
All	119,981	100%	\$1,958	1.00	131,542	100%	\$2,109	1.01

Table 12

Examination of Surgical Interventions		
Surgical Intervention	# of Episodes	% of Total Episodes
No intervention	132,496	75.8%
Surgery; cardiovascular; left heart catheterization; diagnostic	29,324	17%
Surgery; cardiovascular; angioplasty; coronary arteries	12,097	7%
Cardiac pacing and cardioversion	6,858	4%
Surgery; cardiovascular: CABG	3,748	2%

As another example, Table 12 assesses the number and mix of different surgical interventions for ischemic heart disease episodes. The analysis was constructed using the following steps:

- Extract episodes for ischemic heart disease, Base ETG 386500, from the ETG summary file.
- For these episodes, identify the corresponding treatment indicators using the treatment output file.
- Determine the number of episodes with each treatment or surgical procedure.
- For 168,819 ischemic heart disease episodes, Table 12 shows the four most common surgical procedures. This mix of surgical interventions and their trends over time, including costs, can be tracked using ETG 7.0 outputs.

As a third example, costs per episode trends for each base condition can be severity-adjusted to produce valid comparisons. In this way, differences in costs per episode over time due to underlying morbidity can be separated from changes due to other factors, such as service pricing, technology, and provider practice patterns.

- Using two years' worth of data, with static membership, grouped into yearlong diabetes episodes, the results in



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Table 13

How Severity Adjustments Illuminate Costs per Episode				
Severity Level	# Episodes	% of Total Episodes	Avg Cost per Episode	Avg Score per Episode
Year 1				
1	81,887	71.9%	\$1,597	0.76
2	13,929	12.2%	\$2,360	1.18
3	8,681	7.6%	\$2,997	1.49
4	9,372	8.3%	\$4,487	2.38
All	113,869	100%	\$2,035	1.00
Year 2				
1	80,363	69.9%	\$1,613	0.77
2	15,839	13.8%	\$2,336	1.18
3	8,589	7.5%	\$2,996	1.49
4	10,161	8.8%	\$4,577	2.38
All	114,952	100%	\$2,078	1.02
Year 3				
1	87,751	76.3%	\$1,602	0.76
2	10,351	9.0%	\$2,394	1.18
3	8,510	7.4%	\$3,030	1.49
4	8,396	7.3%	\$4,547	2.38
All	113,869	100%	\$2,035	1.00

Table 13 shows that the underlying morbidity appears to be the same

- Compared with the trend above, where the membership varied from year 1 to year 2, the results show that members with diabetic episodes in both years have more costly episodes, though the morbidity does not change.
- A noticeable shift in the severity levels of the episodes is seen in year 3, possibly due to a disease management program initiated earlier.

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Conclusion

ETG 7.0 introduces some exciting changes in both the clinical structure used to categorize episodes of care and the outputs available to users to support health care analysis. The introduction of severity modeling within each episode provides opportunities for increased accuracy in comparing providers and assessing trends.

The detailed description of an episode, including the specific complications, comorbidities, and treatments observed support a wide range of applications, including understanding the services provided to patients with different acute and chronic conditions and assessing the prevalence and impact of complications on treatment and cost of care. When combined with the other tools in the Ingenix Symmetry suite, including Episode Risk Groups®, Pharmacy Risk Groups™, Procedure Episode Groups, and our evidence-based medicine tool, EBM Connect®, ETG 7.0 provides a seamless and consistent approach for understanding patient severity and risk, assessing the quality and cost of care delivered, and measuring value in health care.

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