

Episode Treatment Groups (ETGs): A Patient Classification System for Measuring Outcomes Performance by Episode of Illness

The Episode Treatment Group™ (ETG™) methodology is a patented case-mix adjustment and episode-building system¹ that uses routinely collected inpatient and ambulatory claims data. The resulting clinically homogenous groups, of which there are approximately 600, adjust for severity by the presence of complicating conditions, comorbidities, and other characteristics of a patient's condition that affect resource utilization. Key words: *diagnosis clusters, DRGs, illness classification system*

M. Thane Forthman, MBA

*Managing Principal
The Delta Group, Inc.
Greenville, South Carolina*

Henry G. Dove, PhD

*Principal
Casemix Consulting, LLC
Hamden, Connecticut
Lecturer
Department of Health Policy and
Administration
Yale University
New Haven, Connecticut*

L. Dwight Wooster, MD, FCCP

*Medical Director
The Delta Group
Greenville, South Carolina*

INTRODUCTION

An illness classification system that identifies discretely occurring episodes of care has long been at the center of analytical demand for health care professionals responsible for the analysis and provision of health care services. Previous work in this area relied solely on the identification of discrete patient groups in either the inpatient setting² or the simple “bucketing” of diagnosis codes.²⁻⁶ Diagnosis-related groups (DRGs) provided an easily understood inpatient classification system that organized inpatient stays into one of approximately 500 groups. The DRG methodology was developed in the late 1970s at Yale University and subsequently adopted by Medicare as a prospective payment methodology. In short, this classification scheme provided a means to identify and measure inpatient confinements, and further, formed the

basis from which to identify and compare resource consumption in terms of gross charges.

DRGs have been widely used in the private sector by both purchasers and providers of health care services as a unit of analysis to quantify both clinical and financial performance. Unfortunately, DRGs do not create a unit of analysis based on a complete episode of care spanning both inpatient and outpatient settings.

Diagnosis clusters, originally developed by Schneeweiss and colleagues³ at the University of Washington for use in the ambulatory setting, essentially group diagnosis codes together into similar "clusters." Diagnosis clusters were not developed as a method to adjust for case mix, to account for resource use, or to establish a treatment episode.

Other classification methods have been developed as a basis for reimbursement,⁷ financing,⁸ or as a means to control for case mix but without the benefit of creating a clinically homogenous unit or an episode of care.^{9,10} Table 1 summarizes the essential characteristics of various pa-

tient classifications systems that extend beyond the inpatient setting.

The ETG methodology is similar to that of the DRGs, but with several important differences. Perhaps the most obvious is that ETGs identify and classify an entire episode of care regardless of whether the patient has received medical treatment as an inpatient, outpatient, or both.

Specifically, the characteristics of the ETG methodology are as follows:

- manageable number of groups—The ETG episode of illness patient classification system is composed of nearly 600 statistically stable clinical groups. The ETGs were constructed using a nationally representative 60 million record claims database representing all illness types.
- case-mix adjustment—ETGs adjust for patient severity, intensity, and complexity by accounting for differences in patient age, complicating conditions, comorbidities, and major surgeries.
- clinical homogeneity—ETGs are clinically homogeneous so that each patient's

Table 1. Characteristics of patient classification systems

Patient classification method	Developer	# of Terminal groups	Clinical homogeneity	Statistically stable	Severity (Casemix) adjustment	Episodic structure	Episodic shifting on acuity
ETGs	Symmetry Health Data Systems	600	Yes	Yes	Yes	Yes	Yes
MEGs	The MedStat Group	630	Yes	No	Yes	Yes	Yes
Diagnosis Clusters (DECs & PTEs)	Value Health Sciences & PPSI	1,800 & 125	Yes	No	Yes	No	No
CCI	HealthChex/HCIA	20	No	No	Yes	No	No
ACGs	Johns Hopkins/CSC	52	No	Yes	No	No	No
DxCGs, DCGs & HCCs	DxCG, Inc.	80	Yes	Yes	No	No	No

Source: Data from Casemix Consulting, LLC

illness and severity level are medically consistent with others belonging to the same ETG. Consequently, direct comparisons of treatment patterns can be made among providers within the same ETG.

- episode building—ETGs combine inpatient, ambulatory, and pharmaceutical claims to build a complete treatment episode from onset of symptoms until treatment is complete. Rather than relying on a fixed timeframe, each episode's treatment duration is flexibility determined based on its ETG-specific "clean period," or time period in which there is an absence of treatment. This ensures that all appropriate treatment and cost information has been collected and correctly assigned to one complete illness episode.
- concurrent and recurrent episodes—Using the service unit of an individual claim or encounter form as input, ETGs identify and track the treatment of different illnesses that may exist during a single patient encounter. As a result, ETGs separate and identify concurrently occurring illnesses and assign each health care service to the clinically appropriate episode. In addition, should a patient be successfully treated but suffer a recurrence of the same illness, the ETG software identifies the recurrent episodes.
- shifting episode assignment—ETGs account for changes in a patient's condition during the course of treatment. Once a change in condition has been identified, the patient's entire episode may shift from the initially defined ETG to the ETG that includes the change in condition. In this way, the progression of an illness is identified.
- pharmaceutical claims—Unique to the ETG methodology is its ability to assign pharmaceutical claims data to the appropriate illness episode using the eleven-digit National Drug Code (NDC) that contains highly specific information regarding

each drug type, its manufacturer, dosage, and route of administration. Using a sophisticated hierarchical approach, the ETG methodology evaluates each prescription drug claim against each of the concurrently occurring episodes for which the particular drug could be prescribed for and then assigns the drug claim to the most clinically appropriate episode.

GENERAL PHILOSOPHY

Like DRGs, ETGs were designed to provide a consistent and reliable measurement tool to measure the provision and financing of health care services. Specifically, the ETGs can serve as an analytical unit in which to measure and compare the utilization and financial performance of health care providers; as a clinically useful unit from which to measure health care demand; and as a basis to establish disease management strategies, especially with the inclusion of pharmaceutical claims.

ETGs were not intended to detect inappropriate diagnosis/procedure code combinations for the purposes of clinical or payment review or denial, identify potentially inappropriate health care services, provide the basis for a population rating mechanism, or be used as an encounter-based reimbursement method.

CASE-MIX ADJUSTMENT AND CLINICAL HOMOGENEITY

At the core of the ETG methodology are two concepts that are interrelated: case-mix adjustment and clinical homogeneity. In short, case-mix adjustment is a term used to describe the goal of a classification scheme that endeavors to explain—among other things—resource consumption. This is usually accomplished by

identifying discrete units of patients or illnesses that differ from one another with respect to resource consumption. Once these discrete groups of patients are identified, any subsequent analysis based on these discrete units can be said to be case-mix adjusted.

Of course, the ability to use these discrete units varies widely with the method used to define them. In general, the wider the definition of each group, the greater the variability of resource consumption among the members of the group and the greater the variability, the weaker the method's ability to distinguish real differences between and among populations. Toward the other end of the spectrum, as the definition of each group narrows, the explanation of resource consumption increases. At its most extreme, each patient or each patient's illness becomes its own group. The result is a perfect explanation of resource consumption, but given that each unit is unique with respect to the others, comparisons become impossible. A balance exists between a manageable number of uniquely defined groups and the explanation of resource consumption.

Clinical homogeneity is a term used to describe the extent to which those patients or patient's illnesses are similar from a clinical perspective. Illnesses that are clinically similar provide a natural basis (especially among clinicians) from which to identify differences among populations. A clinically homogeneous group of asthma cases, for example, provides a more intuitive unit of analysis than a group of patients with dissimilar diagnostic characteristics.

Additionally, a natural tendency exists to simply place all patients with the same diagnosis in a single group; however, other characteristics often exist that may further differentiate those patients with respect to their severity of illness. Patients with asthma, for example, generally differ in their level of illness, depending on their

age and whether a specific comorbid condition exists. Hence, adjusting for the patient's age and comorbidity increases clinical homogeneity.

ETGs adjust for case mix, initially, by grouping together clinically similar illnesses (e.g., the several diagnosis codes, which together are referred to as chronic bronchitis). Further differentiation of patient episodes may occur based on clinical complications, the existence of complicating comorbidities, patient age, and the significant use of surgery as treatment. Each is described below.

- *Complications*—Complications that develop during the evolution of an episode can influence the amount of resources used to treat the illness. In chronic bronchitis, for example, a patient who develops pneumonia will incur higher cost than a patient will without pneumonia. Therefore, the ETG grouper software makes a distinction between these two types of chronic bronchitis, i.e., chronic bronchitis with complication and chronic bronchitis without complication. Complications are ETG-specific: a complication of pneumonia for chronic bronchitis does not automatically affect another concurrent ETG episode with a complication distinction.
- *Comorbidities*—In some cases, a patient's previous medical history may affect the type and volume of resources required to treat an illness episode. Again, for chronic bronchitis, a patient with a history of asthma will generally require additional resources than a patient without asthma. Hence, the ETG methodology specifically identifies chronic bronchitis with complication and comorbidity from chronic bronchitis with complication, but without comorbidity. Importantly, only those comor-

bidities that affect the treatment of the particular illness episode are considered when determining the ETG assignment.

- *Age*—In other cases, the age of a patient may affect the extent of resource utilization for the treatment of a particular illness. Therefore, some ETGs are differentiated based on the age of an individual at the onset of an episode (e.g., acute bronchitis with comorbidity, age less than five years).
- *Defining surgeries*—In those instances in which a particular surgery is indicative of a more severely ill patient, ETGs account for the distinct differences in resource consumption between those patients with the surgical procedure from those without. The classification of a patient’s illness into the “with surgery” ETG does not occur unless a specific surgical procedure(s), called a defining surgery, has been provided. As a general rule, defining surgeries have the following characteristics:
 - Defining surgeries do not include purely diagnostic procedures or biopsies because they do not necessarily identify a “more severely ill” patient. For example, diagnostic esophagoscopy (CPT-4: 43200) is not a defining surgery for inflammation of the esophagus, with surgery. However, esophagoscopy with the removal of tumor(s), polyp(s), or other lesion(s) (CPT-4: 43216) is a defining surgery.
 - Defining surgeries are specific to an ETG. For instance, whereas a hip replacement procedure is a defining surgery for the treatment of a patient’s hip fracture, the surgery has no effect on any other currently occurring episodes for the patient, such as acute bronchitis.

STRUCTURE OF EPISODE TREATMENT GROUPS

Similar to the structure of DRGs, where each DRG belongs to one major diagnostic category defined by body system, each of the nearly 600 ETGs belong to a specific major practice category (MPC). Each MPC represents a body system and/or a particular physician specialty. In the flowchart example in Figure 1, a small portion of the gastroenterology MPC is displayed. Note that ETGs 430 and 431 correspond to gastroesophageal infection, with and without comorbidity, respectively. Inflammation of the gastroesophageal tract is further identified by site; esophagus and stomach/duodenum. Inflammation of the esophagus is further subdefined by defining surgery. Each of the 22 MPCs are similarly arranged.

CLINICAL LOGIC AND ETG SHIFTING

The basis of the clinical logic for the ETG methodology is a series of diagnosis and procedure code eligibility tables. Each ICD-9 and CPT-4/HCPCS code has been laboriously mapped to each of the ETGs. As each claim record is considered by the ETG grouper, the procedure and diagnosis codes are evaluated with respect to each other and in turn to each of the eligibility tables. Those matches are then considered with respect to the ETGs.

- *Diagnosis codes*—Every diagnosis code is accounted for by the ETG methodology, with the exception of the “E” codes. With respect to the diagnosis code eligibility table, each ICD-9 code is principally assigned to one and only ETG. This mapping forms the basis for initial ETG assignment—initial because subsequent diagnosis codes may affect final ETG

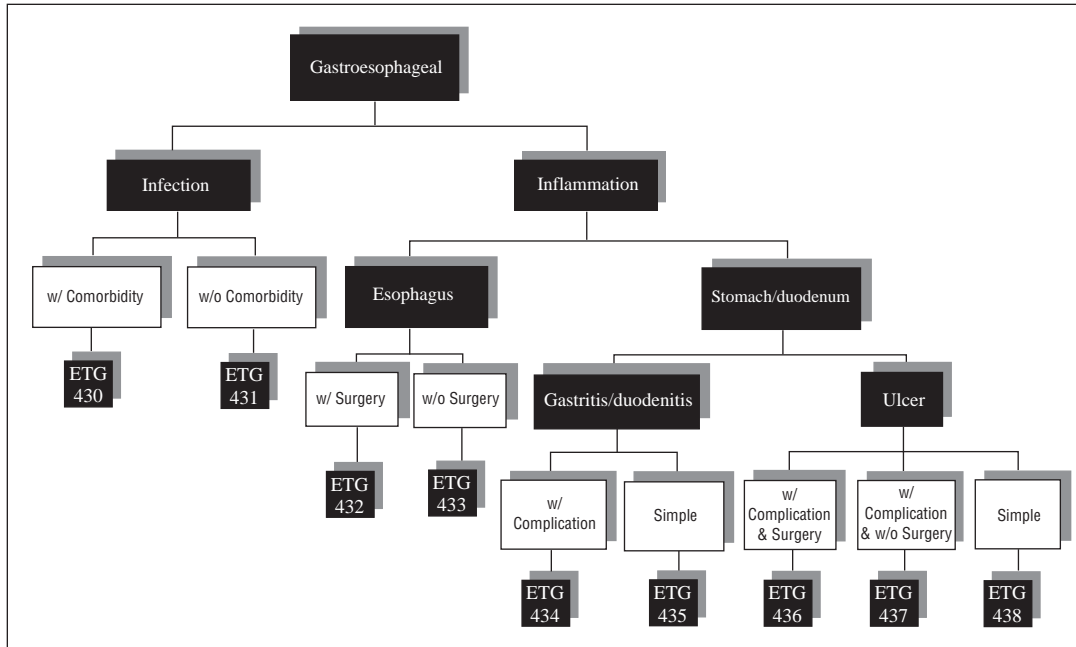


Figure 1. Major practice category for gastroenterology. Source: Adapted from D.K. Dang, J.M. Pont, and M.A. Portnay. *Medical Interface*, March 1996, Medicom.

assignment in a process called shifting. The way in which a diagnosis code shifts the assignment of an episode depends on the class of ICD-9 code with respect to the ETGs.

Primary diagnosis codes are the principal means of establishing initial ETG assignment. Each diagnosis code is mapped as primary to one and only one ETG.

Incidental diagnoses are those codes that represent an illness or condition that is present during the treatment of another related, but usually more serious illness or condition. Incidental diagnoses do not shift an ETG assignment. For example, if during the course of treatment for acute bronchitis a patient is treated for throat pain, the throat pain diagnosis is considered in-

cidental to acute bronchitis. Rather than begin a new episode with throat pain, this claim record and the information it contains will be considered part of the acute bronchitis episode. From a chronological perspective, the opposite is also true: if a throat pain claim was considered first, it would still group to the acute bronchitis episode.

Comorbid diagnoses represent ongoing chronic conditions that affect a patient's treatment for a given illness episode. Diagnosis codes in this class will shift an ETG assignment regardless of its chronological relationship to the episode. Only certain comorbid diagnoses will cause the ETG to shift if it is identified before, concurrent with, or after the treatment of the episode. For example, a patient receiving care

for arthritis would be considered to be more difficult and expensive to treat if the patient also had osteoporosis, a comorbid condition. Although the patient may not be concurrently receiving treatment for osteoporosis per se, the patient would generally require a more intensive treatment regimen for the arthritis than if this comorbid condition did not exist. Hence, the patient shifts into a more complicated episode of arthritis with comorbidity. In addition, the ETG software keeps track of each patient's comorbid conditions in a reference table. Therefore, a patient identified with certain comorbid conditions need not display a recent claim for, in this case, osteoporosis to shift into a more complicated ETG. Comorbidities are specific to an ETG. For example, osteoporosis would not be considered a comorbid diagnosis for an otolaryngology ETG.

Complicating diagnoses indicate that the patient treated for a current illness episode has developed a complication requiring a more intensive treatment protocol. Diagnosis codes in this class will shift an ETG assignment only when the complication is identified subsequent to the start of the episode. For example, should a patient receiving treatment for bronchitis develop pneumonia, a known complication of bronchitis and more severe condition, the entire illness episode is defined as an episode of bronchitis with complication. As with comorbidities, complications are specific to an ETG.

- *Procedure codes*—The procedure code eligibility table helps to identify the ETGs in which a particular claim record can be assigned. Only those CPT-4/HCPCS defined services that, from a clinical perspective, could conceivably group to a particular ETG will do so. For example, if both a chest x-ray and blood glucose test were provided to a patient during the same encounter and further, if the patient had active episodes of both chronic bronchitis

and diabetes, the chest x-ray will be assigned to the chronic bronchitis episode, whereas the blood glucose test is assigned to the diabetes episode. In other words, the blood glucose test is not eligible for assignment to the chronic bronchitis ETG.

- *Defining surgeries*—Similar to those comorbid and complicating diagnoses codes that affect the final assignment (shift) of an episode, specific surgeries also affect an episode's final ETG assignment. These are referred to as defining surgeries. As with the comorbid and complicating diagnoses, defining surgeries are ETG specific and the use of which is indicative of illnesses with higher severity. For example, a patient receiving care for eye trauma who requires surgery to repair a detached retina is considered a more severe condition and requires more intensive (and expensive) treatment than a patient who did not require detached retina repair.

EPISODE CREATION

Along with the clinical aspects, the method of episode creation is an important feature of the ETG methodology. The approach taken for the identification of a complete episode relies on a flexible, rather than a fixed length of time. In other words, there are no a priori definitions of an episode's chronological length. The ETG methodology will continue to identify and track all clinical activity for an episode for as long as an illness is actively treated.

ETGs accomplish this by the identification of discrete clean periods. A clean period is defined as the absence of treatment for a specified period of time. Each ETG has its own clean period. For example, the clean period for acute bronchitis with comorbidity, age less than five years, is

60 days. Once an episode has begun for this ETG, all clinically consistent claim activity for acute bronchitis will group to this episode until such time as 60 days passes without any corresponding clinically consistent treatment. For chronic bronchitis with comorbidity, the clean period is 180 days, consistent with an illness of greater and more chronic severity. In some obvious instances, for example, benign hypertension, there is no clean period. The condition is basically lifelong and all clinically consistent treatment will group to an episode of benign hypertension for as long as data are available.

ETG RELATIVE WEIGHTS

To assess the overall severity, intensity, and complexity of each ETG, relative weights were individually calculated based on gross charges per episode. Relative weights measure the relative clinical demand for resources associated with each ETG, where 1.000 represents the average demand across all ETGs. Hence, a relative weight of 1.2000 indicates a 20 percent greater demand for resources, whereas a relative weight of .8000 indicates a 20 percent lesser demand. The methodology used to develop the ETG charge weights was derived from the HCFA DRG relative weight methodology.¹¹ ETG relative weights were calculated using a nationally representative claims database covering more than five million covered lives representing all illness types.¹² The method for calculating the relative weights is as follows:

- All records were assigned to an ETG.
- Statistical outliers were eliminated by removing all episodes outside of three standard deviations from the mean of the log distribution of charges.
- The average normalized charge per ETG was calculated by summing the normalized charges for all episodes in the ETG

Table 2. Comparison of ETG relative weights

Major Practice Category (MPC) by Select Episode Treatment Groups (ETGs)	Charge relative weight
MPC: Pulmonology	
ETG 371: Viral pneumonia, w/ comorbidity	.0575
ETG 372: Viral pneumonia, w/o comorbidity	.0398
ETG 373: Bacterial lung infections, w/ comorbidity	.1595
ETG 374: Bacterial lung infections, w/o comorbidity	.0972
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Source: Data from The Delta Group, Inc.

and dividing that amount by the number of episodes classified in the ETG.

- The average normalized charge for each ETG was divided by the national average charge across all ETGs to determine the relative charge weight for each individual ETG.

The need of charge weights for patients in different ETGs is represented in Table 2. For example, whereas patients in ETG 373 (Bacterial lung infections, with comorbidity) and ETG 374 (Bacterial lung infections, without comorbidity) both represent lung infections, they are not directly comparable because of differences in the severity, intensity, and complexity associated with their ETG assignment. The ETG 373 charge weight of .1595 and the ETG 374 weight of .0972 provide an objective means to quantify the differences in resource requirements across the two ETGs. In this case, the resource requirement for treating ETG 373 patients is nearly twice as intensive as ETG 374. Moreover, the resource intensity of ETG 373 is shown to be four times as intensive as ETG 372 (Viral pneumonia without comorbidity) as evidenced by ETG 372's weight of .0398.

Table 3. ETG office charge comparison by employer/health plan

MPC: Pulmonology					
(1)	(2)	(4)	(5)	(6)	(7)
Employer/Plan	# of episodes	Clinical demand index (\$)	Actual charge per episode	Clinically adjusted (CA) charge per episode*	% of peer group charge (CA)
A	1921	1.872	\$232	\$124	100.6%
B	1356	0.845	\$119	\$140	113.8%
C	789	1.232	\$107	\$87	70.6%
D	661	0.852	\$88	\$103	83.7%
E	473	0.916	\$113	\$123	100.1
Peer Group	5,445	1,000	\$123	\$123	100.0%
National Benchmark				\$136	
				\$70	

*The calculation for column 6 is a result of dividing column 5 by column 4.
 Source: Data from The Delta Group, Inc., 1999 HCFA 1500 claims data.

These adjustments are particularly helpful at the MPC level as shown in Table 3 that compares pulmonology office charges across five employer/plans. Relative weights have been aggregated across ETGs to provide an overall relative weight, referred to as a clinical demand index. Data show that Employer/Plan A has the highest clinical demand index, 1.872, indicating that Employer/Plan A has the highest demand for resource consumption based on the severity, intensity, and complexity of its patients. Consequently, after adjusting for this higher clinical demand, Employer/Plan A’s average charge per episode decreases from \$232 to \$124 allowing for an accurate comparison of financial outcomes to be made across employer/plans.

A further application, displayed in Table 4, identifies the relative performance of physicians in ETG 333: Sinusitis and Rhinitis without surgery that has a relative weight of .0240. The analysis shows all charges incurred to treat ETG

333 across the complete continuum of care and indicates that physician A’s bundled charge of \$480 is 175.3 percent higher than that of his or her peers and is substantially higher than the national norm and best practice benchmark of \$80 and \$30 respectively.

CONCLUSION

The increased emphasis on comparing costs across the complete continuum of care has underscored the importance of using a valid episode of illness methodology for measuring outcomes performance. Whatever patient classification system is used, it must balance statistical stability with clinical coherence. It must be easily understood and explained. It also must be continually updated and enhanced to maintain consistency with changes in coding as well as changes in the delivery of health services.

Table 4. ETG continuum of care analysis by initial physician

ETG 333: Sinusitis & Rhinitis w/o Surgery, Relative Weight (Clinical Demand Index) - .0240 MPC: Otolaryngology													
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Initial physician	# of patients	---Office--- \$ Per patient	---Office--- % of peer	---Hospital--- \$ Per patient	---Hospital--- % of peer	-Misc. Facility- \$ Per patient	-Misc. Facility- % of peer	---Pharmacy--- \$ Per patient	---Pharmacy--- % of peer	---Other--- \$ Per patient	---Other--- % of peer	---Bundled--- \$ Per patient	---Bundled--- % of peer
A	33	\$236	221.5%	\$11	24.4%	—	—	233	203.2%	—	—	\$480	175.3%
B	29	\$78	72.9%	\$2	4.8%	—	—	\$114	99.2%	\$2	24.1%	\$196	71.5%
C	21	\$127	119%	\$10	21.9%	—	—	\$76	65.9%	\$1	15.3%	\$214	78%
D	17	\$132	123.8%	—	—	—	—	\$306	266.1%	\$3	32.5%	\$441	160.8%
E	15	\$62	58.2%	\$35	79.8%	—	—	\$176	153.1%	\$8	95%	\$281	102.6%
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Peer Group	789	\$107	100.0%	\$44	100.0%	—	—	\$115	100.0%	\$9	100.0%	\$274	100.0%
National		\$80		\$14				\$63		\$1		\$158	
Benchmark		\$30		\$5				\$24		\$0		\$60	

Source: Data from The Delta Group, Inc., 1999 HCFA 1500 Claims Data.

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