



Measure Information

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item IM1.1 relates to sub criterion IM1).

Brief Measure Information

NQF #: 1611

De.2. Measure Title: ETG Based PNEUMONIA cost of care measure

Co.1.1. Measure Steward: Optum

De.3. Brief Description of Measure: The measure focuses on resources used to deliver episodes of care for patients with pneumonia. Pneumonia episodes are defined using the Episode Treatment Groups (ETG) methodology and describe the unique presence of the condition for a patient and the services involved in diagnosing, managing and treating pneumonia. A number of resource use measures are defined for pneumonia episodes, including overall cost of care, cost of care by type of service, and the utilization of specific types of services. Each resource use measure is expressed as a cost or a utilization count per episode and comparisons with internal and external benchmarks are made using risk adjustment to support valid comparisons. As requested by NQF, the focus of this submission is for pneumonia episodes and will cover both measures at the pneumonia base and severity level and also a pneumonia composite measure where pneumonia episode results are combined across pneumonia severity levels. At the most detailed level, the measure is defined as the base condition of pneumonia and an assigned level of severity (e.g., resources per episode for pneumonia, severity level 1 episodes). Composite measures can then be created using these measurement units to meet a specific need. For example, a composite measure for pneumonia is derived by combining pneumonia episode results across pneumonia severity levels. Appropriate risk adjustment is applied to support comparisons (e.g., for physician measurement, adjusting for a physician's mix of pneumonia episodes by severity level when supporting a pneumonia composite comparison).

The focus of this measure is on pneumonia. However, pneumonia episode results could also be included in a "pulmonary" or other clinical composite for a physician, combining episodes in clinical areas similar to pneumonia. Further, an "overall" composite for a physician can be created, again by aggregating episode results across appropriate conditions and severity levels and applying proper risk adjustment when making comparisons.

IM2.1. Developer Rationale: Benefits envisioned by this set of measures relates to identifying opportunities and measuring value. In particular, the measure and its components can support:

- The understanding of opportunities to improve the efficiency of healthcare, in particular for patients with selected conditions. Reducing unwarranted variation will provide an opportunity to decrease resources expended without a significant impact on quality of care and outcomes. In some cases, outcomes may improve due to the decrease in the provision of unnecessary services and
- Measurement of the value delivered by individual providers, provider groups, and delivery systems – in particular the resources expended in care delivery. A number of current initiatives require a valid and robust approach to resource measurement, including medical homes, value-based payment and accountable care organizations (ACOs). The ETG episode methodology described in this submission provides a solid foundation to support such measurements. The resource cost and use measures included in this submission provide actionable insights into relative performance and opportunities for improvement.

De.1. Measure Type: Cost/Resource Use

S.5. Data Source: Claims

Other

S.3. Level of Analysis: Clinician : Group/Practice, Clinician : Individual, Facility, Health Plan, Integrated Delivery System, Other, Population : Community, County or City, Population : Regional and State

IF Endorsement Maintenance – Original Endorsement Date: Apr 02, 2012 **Most Recent Endorsement Date:** Apr 02, 2012

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results?

Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. ***Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.***

IM1. High Priority

IM1.1. Demonstrated High Priority Aspect of Healthcare

Affects large numbers

A leading cause of morbidity/mortality

High resource use

IM1.2. Provide epidemiologic or resource use data that demonstrates the measure addresses a high priority aspect of healthcare.

List citations in IM.1.3. Pneumonia is an inflammation of the lung most often caused by infection with bacteria, viruses, and other organisms, although there are also non-infectious causes. Approximately 50 percent of pneumonia cases are believed to be caused by viruses and tend to result in less severe illness than bacteria-caused pneumonia. Most pneumonia in the very young is caused by viral infection. Streptococcus pneumoniae or pneumococcal pneumonia is the most common cause of bacterial pneumonia acquired outside of hospitals. It is estimated that 175,000 cases of pneumococcal pneumonia occur each year, with a fatality rate of 5-7%, or even much higher among the elderly.⁵ Mycoplasmas are responsible for approximately 15-50 percent of all adult cases of pneumonia and an even higher rate in school-aged children.⁶ Pneumonia is often a complication of a pre-existing condition/infection and is triggered when a patient's defense system is weakened, most often by a simple viral respiratory tract infection or a case of influenza, especially in the elderly.

There are no generally effective treatments for most types of viral pneumonia, which usually heal on their own. Early treatment with antibiotics can cure bacterial pneumonia and speed recovery from mycoplasma pneumonia. However, the disease has become more resistant to these drugs, making treatment of pneumococcal infections more difficult.

Together, pneumonia and influenza represented a cost to the U.S. economy in 2005 of \$40.2 billion, \$6 billion due to indirect mortality I costs and \$34.2 billion in direct II costs.¹

Pneumonia and influenza together are ranked as the eighth leading cause of death in the United States.² Pneumonia consistently accounts for the overwhelming majority of deaths between the two. In 2006, 55,477 people died of pneumonia.³

There were an estimated 589,000 hospital discharges in males (40.2 per 10,000) and 643,000 discharges in females (42.4 per 10,000) attributable to pneumonia in 2006. The highest pneumonia discharge rate that year was seen in those 65 and over at 189.0 per 10,000.⁴

The pneumococcal polysaccharide vaccine (PPSV) is recommended for anyone over 65 years of age and all those over 2 years of age who have asthma, long-term health problems, lowered infection resistance (from disease, condition, or treatment), are a candidate for or recipient of a cochlear implant, or are a smoker.¹⁰

Overall in 2008, 67 percent of those 65 years of age or older received the pneumonia vaccine (median for the fifty states and DC).⁷ In 2008, only 53.6 percent of African Americans 65 years of age or older received the pneumonia vaccine, compared to 69.5 percent of whites in the same age group (median for the fifty states and DC).⁸ This is despite it being covered by Medicare and available to seniors.⁹

Analyses of Ingenix healthcare benchmark data for a large population of individuals can support an understanding of the importance of pneumonia and the measurement of resource use. Using a 12-month sample population of more than 7 million individuals (primarily non-elderly) from 9 health care organizations, patients with pneumonia were identified using diagnosis codes assigned to medical administrative claim records. The percentage of costs for these patients related to pneumonia and other conditions was also estimated using ETG grouped data for the identified pneumonia patients. Using this benchmark data, 0.4% of the total population was identified as having pneumonia. Total cost per member per month for these individuals was \$4,905. Approximately 14% of the total costs for the members identified with pneumonia were identified as being related to pneumonia (based on total

costs grouped to those condition episodes for those patients).

Analyses of the Ingenix healthcare benchmark data described above for episodes attributed to internal medicine physicians can further support an understanding of the relative financial importance of resource use measures for the condition. As shown below, across all physician episodes, the average total cost per episode is more than \$4,000. Hospital Services comprise the largest component of costs for these episodes.

Pneumonia

of Episodes 12,448

Cost per Episode:

Total Cost per Episode	\$4,054
Primary Care Core Cost per Episode	\$161
Specialty Care Cost per Episode	\$677
ER Cost per Episode	\$160
Radiology Cost per Episode	\$116
Pharmacy Cost per Episode	\$152
Laboratory Cost per Episode	\$44
Hospital Services Cost per Episode	\$2,745

Utilization per 1,000 Episodes:

Specialist Visits per 1000 Episodes	3,586
Radiology Encounters per 1000 Episodes	1,781
Laboratory Encounters per 1000 Episodes	356
ER Visits per 1000 Episodes	169
Admission Days per 1000 Episodes	1,357
Number of Admissions per 1000 Episodes	215
Number of Prescriptions per 1000 Episodes	1,942

IM1.3. Citations for data demonstrating high priority provided in IM.1.2

1 Centers for Disease Control. MMWR Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2007. Vol. 56: June 2007.

2 National Center for Health Statistics. National Vital Statistics Report. Deaths: Final Data for 2006. Vol. 57, 14 April 2009.

3 Ibid.

4 National Center for Health Statistics. National Hospital Discharge Survey, 1988 2006.

5 Immunization Action Committee. Ask the Experts. Pneumococcal polysaccharide vaccine (PPSV). July 2009. Available at http://www.immunize.org/askexperts/experts_ppv.asp. Accessed on August 19, 2009.

6 US National Library of Medicine and US National Institutes of Health. Medline Plus. Medical Encyclopedia: Mycoplasma pneumonia. July 2007. Available at <http://www.nlm.nih.gov/medlineplus/ency/article/000082.htm>. Accessed on August 12, 2009.

7 Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. Prevalence and Trends Data, 2008. Available at <http://apps.nccd.cdc.gov/brfss/display.asp?cat=IM&yr=2008&qkey=4408&state=UB>. Accessed on August 19, 2009.

8 Ibid

9 Centers for Disease Control and Prevention. Public health and aging: Influenza vaccination coverage among adults aged >50 years and pneumococcal vaccination coverage among adults aged >65 years – United States, 2003. Morbidity and Mortality Weekly Report. October 2003;52(41): 987-992.

10 Centers for Disease Control and Prevention. Vaccines and Preventable Diseases: Pneumococcal Disease in Short. January 2009. Available at <http://www.cdc.gov/vaccines/vpd-vac/pneumo/in-short-both.htm>. Accessed on August 12, 2009.

12 American Lung Association. pneumonia Fact Sheet: national estimates and general information on pneumonia in the United States, 2011 [Internet]. Available at <http://www.lungusa.org/lung-disease/influenza/in-depth-resources/pneumonia-fact-sheet.html>. Accessed on February 1, 2011.

IM2. Opportunity for Improvement

IM2.1. Briefly explain the rationale for this measure (e.g., the benefits or improvements in performance envisioned by use of this measure)

Benefits envisioned by this set of measures relates to identifying opportunities and measuring value. In particular, the measure and

its components can support:

--The understanding of opportunities to improve the efficiency of healthcare, in particular for patients with selected conditions. Reducing unwarranted variation will provide an opportunity to decrease resources expended without a significant impact on quality of care and outcomes. In some cases, outcomes may improve due to the decrease in the provision of unnecessary services and

--Measurement of the value delivered by individual providers, provider groups, and delivery systems – in particular the resources expended in care delivery. A number of current initiatives require a valid and robust approach to resource measurement, including medical homes, value-based payment and accountable care organizations (ACOs). The ETG episode methodology described in this submission provides a solid foundation to support such measurements. The resource cost and use measures included in this submission provide actionable insights into relative performance and opportunities for improvement.

IM2.2. Provide performance scores on the measure as specified (current and over time) **at the specified level of analysis.** (This is required for endorsement maintenance. Include mean, stddev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include).

This information also will be used to address the subcriterion on improvement (U.2.1.) under Usability and Use.

The variation in resource use across providers can be demonstrated using actual measures of physician performance for the condition episodes.

Data to explore this question were extracted from the Ingenix National health care services benchmark database. This database describes enrollment, medical and pharmacy services, and providers for a population of more than 25 million covered lives. The data used for this analysis was primarily for commercial non-elderly individuals and covered the years 2009 thru 2010. In particular, data for 9 health care organizations including 7 million members were selected. The information was processed to produce pneumonia episodes. Incomplete and low cost outlier episodes were excluded. High cost outlier episodes were truncated at the high outlier threshold level. Episodes were attributed to providers in relevant specialties (peer groups).

The observed and expected costs for pneumonia episodes were computed, with expected costs based on averages for a provider's peers, adjusted to reflect the providers mix of pneumonia episodes by severity level. In particular, the following steps were performed:

- Computed the observed experience for the provider being measured, across all episodes to be included in the comparison;
- Computed the experience for the provider's peers. Compute this experience at the level of the risk adjustment, in this case ETG base condition and severity level. For a peer benchmark, average cost per episode across all peers for the ETG base condition and episode level can be computed.;
- Compared the observed experience to the expected result. This expected result is based on the peers average level of performance, adjusted to reflect the provider's own case mix of episodes by condition and level of severity. The ratio of observed to expected results can be termed the relative cost ratio (O/E ratio) and is a risk adjusted measure. A ratio above 1.00 indicates greater resource use than peers, less than 1.00 lower resource use.

Variation in the O/E ratio across providers was assessed. In this way comparisons or relative resource use can be made, removing differences in the underlying mix of episodes included. Providers with greater than 20 pneumonia episodes were selected. For pneumonia 187 providers and 5,241 episodes were included covering the specialties of internal medicine, family practice and pediatrics. The providers in each specialty were compared with their peers only (same specialty and same enrolled population for the healthcare organization). However, OE results were aggregated across healthcare organizations and specialties to summarize variation.

The observed variation in cost of care performance can be summarized using the inter-quartile range for the O/E ratio (the difference between the 25th and 75th percentile physician OE ratios). The results showed variation in performance across these measure physicians. In particular, the inter-quartile range for the O/E ratio for the following key measures was approximately: (e.g., 0.60 can be interpreted as 40 percent below peers, 1.40 as 40 percent above peers)

- Total Cost per Episode – 0.48 to 1.32
- Specialty Care Cost per Episode – 0.25 to 1.21
- Pharmacy Prescriptions per Episode – 0.80 to 1.15

As shown, the variation observed across providers is significant.

IM2.3. If no or limited performance data on the measure as specified is reported in IM.2.2., then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.

Variations in per capita spending - Inpatient-based and specialist-oriented pattern of practice

Regional differences in Medicare spending are largely explained by the more inpatient-based and specialist-oriented pattern of practice observed in high-spending regions. Neither quality of care nor access to care appear to be better for Medicare enrollees in higher-spending regions.

Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The Implications of Regional Variations in Medicare Spending. Part 1: The Content, Quality, and Accessibility of Care. *Ann Intern Med*. 2003 138(4): 273-287.

The Dartmouth Atlas shows a more than two-fold variation in per capita Medicare spending in different regions of the country. Adjusting for price differences leads to only a modest decline in overall variations. It is utilization -- the amount of care delivered to patients -- that explains most of the regional variation in Medicare spending. Most spending variation was due to differences in use of the hospital as a site of care (versus, say, hospice, nursing home, or the doctor's office) and to discretionary specialist visits and tests.

Reflections on variations, The Dartmouth Atlas Of Health Care. Available at:

<http://www.dartmouthatlas.org/keyissues/issue.aspx?con=1338>. Accessed on February 12, 2011.

Variations in clinical decision making – ambulatory care-sensitive conditions

Clinicians have identified a group of diagnoses referred to as “ambulatory care-sensitive” conditions – such as poorly controlled pneumonia or worsening heart failure – which can be treated in either the inpatient or the outpatient setting, and for which hospitalization can often be prevented by better outpatient management. The variations among regions in admission rates of patients with these conditions can be ascribed to differences in clinical decision-making, rather than to differences in underlying illness rates. Hospitalization rates for these – and for most medical conditions – are also highly correlated with the local supply of hospital beds.

Hospital Discharges for Ambulatory Care-Sensitive Conditions Per 1,000 Medicare Enrollees, By Gender And Type Of Admission, The Dartmouth Atlas Of Health Care (2005) Available at: <http://www.dartmouthatlas.org/data/topic/topic.aspx?cat=20> Accessed on February 12, 2011.

Variations in the use of diagnostic tests and discretionary services

Variations in ECG ordering are not explained by patient characteristics. The tremendous nonclinical variations in ECG test ordering suggest a need for greater consensus about use of screening ECGs in primary care.

Randall SS, Bismruta M. Variation in routine electrocardiogram use in academic primary care practice. *Arch Intern Med*. 2001;161:2351-2355

Physicians in high-spending regions see patients back more frequently and are more likely to recommend screening tests of unproven benefit and discretionary interventions compared with physicians in low-spending regions; however, both appear equally likely to recommend guideline-supported interventions.

Physicians in higher-spending regions were much more likely than those in lower-spending regions to recommend discretionary services, such as referral to a subspecialist for typical gastroesophageal reflux or stable angina or, in another vignette, hospital admission for an 85-year-old patient with an exacerbation of end-stage congestive heart failure. And they were three times as likely to admit the latter patient directly to an intensive care unit and 30% less likely to discuss palliative care with the patient and family. Differences in the propensity to intervene in such gray areas of decision making were highly correlated with regional differences in per capita spending.

Sirovich B, Gallagher PM, Wennberg DE, Fisher ES. Discretionary decision making by primary care physicians and the cost of U.S. health care. *Health Aff (Millwood)*. 2008; 27:813-823

Widely varying levels of health care spending across the United States are strongly correlated with the tendency of local physicians to recommend discretionary interventions. Physicians in regions of differing spending appear to differ only in their discretionary decision making. For decisions that are informed by evidence or practice guidelines (such as screening mammography and standard exercise tolerance testing), physicians were equally likely to recommend interventions regardless of local spending levels

Sirovich B, Gallagher PM, Wennberg DE, Fisher ES. Discretionary Decision Making By Primary Care Physicians And The Cost Of U.S. Health Care. *Health Aff (Millwood)*. 2008; 27(3): 813–823.

Supply sensitive care

Supply-sensitive care accounts for more than half of all Medicare spending. In regions where there are more hospital beds per capita, patients will be more likely to be admitted to the hospital. In regions where there are more intensive care unit beds, more patients will be cared for in the ICU. More specialists will result in more visits to specialists. And the more CT scanners are available, the more CT scans patients will receive. The Dartmouth Atlas has consistently demonstrated these relationships.

Patients do not experience improved survival or better quality of life if they live in regions with more care. In fact, the care they receive appears to be worse. They report being less satisfied with their care than patients in regions that spend less, and having more trouble getting in to see their physicians.

Supply sensitive care, The Dartmouth Atlas Of Health Care (2005) Available at:

<http://www.dartmouthatlas.org/keyissues/issue.aspx?con=2937> Accessed on February 14, 2011.

Numerous studies have found that higher bed supply is associated with more hospital use for conditions where outpatient care is a viable alternative. This includes most medical causes of hospitalization. In 2006, bed supply remained an important determinant of medical discharges.

The implications of regional variations in Medicare spending. Part 1: the content, quality, and accessibility of care. *Annals of Internal Medicine*. Feb 18 2003;138(4):273-287.

Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 2: health outcomes and satisfaction with care. *Annals of Internal Medicine*. Feb 18 2003;138(4):288-298.

By far, the most significant factor associated with how much Medicare spends in any given region is the availability of medical resources. Studies from the Dartmouth Atlas Project have shown that the frequency with which physicians admit patients with chronic diseases to the hospital is highly correlated with the number of beds per capita in the region. The frequency of visits to medical specialists is correlated with the number of specialists available. And the frequency with which chronically ill patients undergo many diagnostic tests and procedures also varies. We call such procedures and tests, along with the rates of hospitalization and physician visits, "supply-sensitive" care, or care that varies with the local availability of such medical resources as physicians, hospital beds, intensive care unit (ICU) beds, and diagnostic imaging equipment. The volume of supply-sensitive care that is delivered to the chronically ill is a powerful force driving Medicare spending. The utilization of supply-sensitive services for treating the chronically ill varies dramatically across different regions of the country, and it is responsible for much of Medicare spending. Local capacity, or the local supply of medical resources per capita, varies widely, and this local capacity bears directly on how much care is used to treat the chronically ill.

Wennberg JE, Fisher ES, Goodman DC, Skinner JS. "Tracking the care of patients with severe chronic illness." *The Dartmouth Atlas of Health Care* 2008. Available at: http://www.dartmouthatlas.org/downloads/atlas/2008_Chronic_Care_Atlas.pdf Accessed on February 14, 2011.

IM2.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity, gender, age, insurance status, socioeconomic status, and/or disability. (This is required for endorsement maintenance. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.) **This information also will be used to address the subcriterion on improvement (U.2.1.) under Usability and Use.**

Health disparities are defined as differences in the occurrence, frequency, death and burden of diseases and other unfavorable health conditions that exist among specific population groups¹. Examining health care differences or gaps experienced by one population compared to another is an integral part of understanding and improving health care quality². The quality of healthcare delivered within the United States also differs from population to population due to differences in access to care, healthcare utilization and other factors².

Measures of healthcare utilization allow for a broader understanding of access to care². Barriers to care that are associated with differences in healthcare utilization may have a more significant impact on healthcare quality than other factors². Several studies on disparities have relied upon measures of healthcare utilization and the data demonstrates some of the most significant differences in care among diverse groups². Current efforts to improve healthcare delivery continue to rely upon measures of health care utilization to fully understand the complexities surrounding disparate health care outcomes. For example, greater utilization of services does not necessarily indicate better care. In fact, high use of some inpatient services may reflect compromised access to outpatient health services².

In 2006, the Nation's 14 million health service workers provided approximately 960 million office visits, 673 million hospital outpatient visits, treated 37 million hospitalized patients and 1.4 million nursing home residents². Approximately 70% of the non-institutionalized civilian population visited a provider's medical office or outpatient facility and about 60% received a prescription

medication². National health expenditures totaled over \$2 trillion dollars in fiscal year 2006 with 5% of the population accounting for 55% of total costs². Additionally, almost one-third of all healthcare expenditures are estimated to be the result of low-quality care, including overuse, misuse and waste². Utilization resource measures provide a mechanism to better understand healthcare delivery patterns in order to improve the health of all population groups.

The cost and use measures included in this submission will provide an approach to assessing disparities. For example, episode-based measures of cost and use can be employed to create severity-adjusted comparisons of the resources expended in treating cardiovascular conditions, including supporting a focus on the condition-related resources.

IM2.5. If no or limited data on disparities from the measure as specified is reported in IM.2.4., then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations.

1. Health Disparities in the United States: Facts and Figures, American Society of Clinical Oncology, 2009
2. National Healthcare Disparities Report, U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, 2008

IM3. Measure Intent

IM3.1. Describe intent of the measure and its components/ Rationale (including any citations) for analyzing variation in resource use in this way.

All of our submitted measures for pneumonia rely on a foundational “episodes of care” concept that uses the Ingenix Episode Treatment Groups (ETG) methodology. Episode-based resource use measurement provides a representation of a patient’s course of treatment for a specific condition. The attached ETG General Methods Construct Logic provides a high level explanation of our ETG concept and a summary of the ETG approach to creating episodes of care for pneumonia.

As noted in IM2.1, the intent of the measure and its components is to support:

-- The understanding of opportunities to improve the efficiency of healthcare, in particular for patients with selected conditions. Reducing unwarranted variation will provide an opportunity to decrease resources expended without a significant impact on quality of care and outcomes. In some cases, outcomes may improve due to the decrease in the provision of unnecessary services and

-- Measurement of the value delivered by individual providers, provider groups, and delivery systems – in particular the resources expended in care delivery. A number of current initiatives require a valid and robust approach to resource measurement, including medical homes, value-based payment and accountable care organizations (ACOs). The ETG episode methodology described in this submission provides a solid foundation to support such measurements. The resource cost and use measures included in this submission provide actionable insights into relative performance and opportunities for improvement.

Scientific Acceptability of Measure Properties

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. ***Measures must be judged to meet the sub criteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.***

Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the Quality Data Model (QDM).

De.5. Subject/Topic Area (check all the areas that apply):

Respiratory : Pneumonia

De.6. Non-Condition Specific (check all the areas that apply):

Care Coordination

Safety : Overuse

De.7. Care Setting (Select all the settings for which the measure is specified and tested):

Ambulatory Care : Clinic/Urgent Care

Ambulatory Care : Clinician Office

Emergency Department and Services

Home Care
Inpatient/Hospital
Outpatient Services
Post Acute/Long Term Care Facility : Rehabilitation
Post-Acute Care

S.1. Measure-specific Web Page (Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.)

S.2. Type of resource use measure (Select the most relevant)
Per episode

S.3. Level of Analysis (Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED):
Clinician : Group/Practice, Clinician : Individual, Facility, Health Plan, Integrated Delivery System, Other, Population : Community, County or City, Population : Regional and State

S.4. Target Population Category (Check all the populations for which the measure is specified and tested if any):
Elderly

S.5. Data Source (Check ONLY the sources for which the measure is SPECIFIED AND TESTED).
If other, please describe in S.5.1.
Claims
Other

S.5.1. Data Source or Collection Instrument (Identify the specific data source or data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.)
Both medical and pharmacy administrative service records (claims or encounters) are used to support the measures. Member enrollment span, pharmacy benefit status and age and gender are also required. Provider characteristics, including specialty and unique provider identifier also have importance to support episode grouping, attribution and definition of peers.

S.5.2. Data Source or Collection Instrument Reference (available at measure-specific Web page URL identified in S.1 OR in the file attached here) (Save file as: S_5_2_DataSourceReference)
S7.2_Data Source Reference-634413052967372187.xls

S.6. Data Dictionary or Code Table (Please provide a web page URL or attachment if exceeds 2 pages. NQF strongly prefers URLs. Attach documents only if they are not available on a web page.)

Data Dictionary:

URL:

Please supply the username and password:

Attachment: S5_Pneumonia_DataDictionary.xls

Code Table:

URL:

Please supply the username and password:

Attachment: S5_Pneumonia_DataDictionary-634413047004559687.xls

Construction Logic

S.7.1. Brief Description of Construction Logic

If applicable, summarize the general approach or methodology to the measure construction. This is most relevant to measures that

are part of or rely on the execution of a measure system or applies to multiple measures.

[Please refer to information provided in S2 and S8 for construction logic](#)

S.7.2. Construction Logic *(Detail logic steps used to cluster, group or assign claims beyond those associated with the measure's clinical logic.)*

[Please refer to information provided in S2 and S8 for construction logic](#)

S.7.2a. CONSTRUCTION LOGIC ATTACHMENT or URL: If needed, attach supplemental documentation (Save file as: S_7_2_Construction_Logic). All fields of the submission form that are supplemented within the attachment must include a summary of important information included in the attachment and its intended purpose, including any references to page numbers, tables, text, etc.

[URL:](#)

[Please supply the username and password:](#)

[Attachment: ETG Construction Logic Pneumonia-634413056088309687.doc](#)

S.7.3. Concurrency of clinical events, measure redundancy or overlap, disease interactions *(Detail the method used for identifying concurrent clinical events, how to manage them, and provide the rationale for this methodology.)*

ETG does provide methodology to deal with cases where a code will shift an episode from one ETG to another. For example, a concurrent renal transplant procedure will shift an episode of ETG Chronic renal failure to an episode of ETG Kidney transplant. For pneumonia there are 21 diagnosis codes which would cause an episode of pneumonia to shift to an episode of Viral pneumonia. An example of a diagnosis code that will cause pneumonia to shift to Viral pneumonia is 480.2 (pneumonia due to parainfluenza virus). Please refer to worksheet "IncidentalDxCodes" within attachment S5_Pneumonia_DataDictionary for a list of diagnosis codes that will result in an episode shift (see where column "diagnosisEligibilityType"=5). Within the same spreadsheet the columns "shiftedEtg" and "shiftedEtgDescription" describe the ETG the episode will shift to.

In the case where a diagnosis and procedure code on a claim are eligible for multiple episodes, a specific hierarchy of rules determines the most appropriate episode to group to, based on the rankings of the diagnosis and procedure code for the ETG of each episode. All of the eligibility and ranking information is contained in a set of tables within the ETG application.

[For more information about episode building construction/logic, please refer to the attachment for S.2 .](#)

S.7.4. Complementary services *(Detail how complementary services have been linked to the measure and provide rationale for this methodology.)*

ETG does not group based on complimentary services. All claims group to the appropriate episode on their own merits.) [For more information about episode building construction/logic, please refer to the attachment we provided in s.2 .](#)

S.7.5. Clinical hierarchies *(Detail the hierarchy of codes or condition groups used and provide rationale for this methodology.)*

As noted in S8.2 and S8.3, ETG uses different clinical relationships between diagnosis and procedure codes and conditions to support the creation of pneumonia episodes. Many of these relationships involve clinical hierarchies, including how specific and non-specific and signs and symptoms diagnosis codes are used. The relationship between primary and incidental diagnoses and the strength of association of incidental diagnoses to pneumonia and other episode concepts is a further example. A third example is the procedure hierarchies that apply across all concepts for pneumonia. Please see the discussion for sections S8.2 and S8.3 and the attachment for S2 for a summary of the role of rankings, strength of association and hierarchies are used in the ETG methodology for pneumonia. Further, as described below in the discussion of severity adjustment, ETG also uses hierarchies to identify the most important co-morbidities within a related set of co-morbidities for use in measuring severity.

S.7.6. Missing Data *(Detail steps associated with missing data and provide rationale for this methodology (e.g., any statistical techniques to impute missing data)*

:

[Missing provider specialty assignment will impact the ability to assign record type to a claim line. In addition invalid and incomplete](#)

diagnosis and procedure coding, will impact the results of the episode grouping and the measures for pneumonia. For example, inaccurate coding may result in a service record not grouping to a pneumonia episode – due to the miscoding of a pneumonia diagnosis or the procedure code assigned to the service. ETG will attempt to group these services. However, invalid data may prevent this grouping to happen in an appropriate way. In this way, ETG handles data quality issues through the rigor of the logic designed to create appropriate episodes.

In terms of working with missing information during the episode grouping process, ETG uses the following approaches:

-- Missing Diagnosis Codes: If all four diagnosis codes are missing from a non-pharmaceutical claim the ETG application will use the procedure code to group, except when the procedure code requires a valid diagnosis code to be present. This requirement is per the ETG eligibility table. In cases where all diagnosis codes are missing and the procedure requires a valid diagnosis code to also be present, the service record will not group to a pneumonia episode and will be assigned to an error ETG.

-- Missing Procedure Codes: If there is no procedure code on a service record then the record will group based on the diagnosis codes or NDC drug code. If there is no diagnosis, procedure or pharmacy code on the claim, then the claim will not group to a pneumonia episode and will have an error code assigned to it.

--Missing Provider Specialty: If the provider specialty is not available on a service record then the record will be assigned an error ETG code and will not group to a pneumonia episode.

The services not assigned to an episode and noted as “errors” based on missing data are marked with an error ETG number. Services with these ETG numbers would not be included in a pneumonia episode or be used in episode-based resource measurement for pneumonia.

-- Missing Pharmacy Data: For some members and populations, pharmacy data can be missing generally, due to the different factors, including not having a pharmacy benefit with the entity collecting the data used in measurement or pharmacy services being managed by a pharmacy benefits manager (PBM) for the measurement entity. Where pharmacy data are not generally available for a member, adjustments are required to ensure valid comparisons.

The ETG grouping methodology for pneumonia itself does not require pharmacy data. Pharmacy services are treated as ancillary records and can never start an episode for pneumonia. Pharmacy services will join pneumonia episodes. However, missing pharmacy records will impact the observed cost of an episode – which will be underestimated, on average, where pharmacy data are missing. It is recommended that pharmacy benefit/data status be used as a separate category in risk adjusting pharmacy and total costs per episode. For example, the expected or “peer” results for a physician should reflect their mix of members with and without pharmacy benefits/data.

S.7.7. Resource Use Service Categories (Units) (Select all categories that apply)

Inpatient services: Inpatient facility services

Inpatient services: Admissions/discharges

Ambulatory services: Outpatient facility services

Ambulatory services: Emergency Department

Ambulatory services: Pharmacy

Ambulatory services: Evaluation and management

Ambulatory services: Procedures and surgeries

Ambulatory services: Imaging and diagnostic

Ambulatory services: Lab services

S.7.8. Identification of Resource Use Service Categories (Units)

(For each of the resource use service categories selected above, provide the rationale for their selection and detail the method or algorithms to identify resource units, including codes, logic and definitions.)

The following resource-use categories are included as measures for this submission.

Cost of Care per Episode

1. Total
2. Primary Care Core Services, Total
3. Primary Care Core Services, Visits
4. Primary Care Core Services, Other (Non-Visits)
5. ER Services
6. Hospital Services, Total
7. Inpatient Acute
8. Inpatient Non-Acute
9. Other Outpatient
10. Laboratory Services
11. Radiology Services, Diagnostic, Total
12. Radiology, MRI, CT Scan Services
13. Radiology, Other Diagnostic Services
14. Specialty Care Services, Total
15. Specialty Care, Other Diagnostic Testing Services
16. Specialty Care, Evaluation & Management Services
17. Specialty Care, Medicine Services
18. Specialty Care, Surgery Services
19. Specialty Care, Other Services
20. Pharmacy Prescription Services

Utilization per 1,000 Episodes

1. PCP Visits
2. Specialist Visits
3. Specialist Referrals
4. Total Evaluation & Management Visits
5. ER Visits
6. Hospital Inpatient Admits, Acute
7. Hospital Inpatient Days, Acute
8. Laboratory Services
9. Radiology Services, Diagnostic, Total
10. Radiology Services, MRI/CT Scan Services
11. Radiology Services, Other Diagnostic Services
12. Pharmacy Prescriptions Services

Each resource use category measure is described below, including reference to the specific codes and logic used to identify the services involved.

I. General Methods

The following notes on General Methods apply to all resource measures described here and provide guidelines on service costs, the treatment of incomplete and outlier episodes, and the selection of time periods. The logic described for type of service plays a specific role in each measure. These general methods are employed across all submitted measures:

-- Service cost -- as a guideline, the service cost used in resource use measurement should reflect the actual payments or costs associated with the service or a standard-priced resource cost amount. As a further guideline, the financial amount used in resource measurement should reflect all payments for a service, including those made to the provider by payer, patient and other entities. The

allowed or equivalent payment is an example.

-- Complete episodes – Only complete episodes should be included in resource measurement. See the attachment for s.2 for a discussion of how ETG assigns completion status to an episode.

-- Outlier episodes – as a guideline, low outlier cost episodes should be excluded from resource use measurement. High outlier cost episodes should be included, but all costs truncated at the high outlier cost threshold used for the episode (a technique called “winsorization”). Where costs by type of service are used in measurement, individual service costs can be pro-rated to reflect the truncated total cost for a high cost outlier episode.

-- Episode Time periods – as a guideline, the episodes included in resource use measure should focus on a specific 12 month period, for example, all episodes ending in calendar year 2010.

-- Selecting Clinical Episodes – For pneumonia, select all remaining episodes with pneumonia Base ETG

-- Type of Service. The type of service logic for each measure is described in the sections below. Each type of service definition includes an overview of the key steps used in identifying the relevant services used in measuring cost and utilization. As an initial step, prescription pharmacy services and hospital inpatient confinements are identified (more detail below). For the remaining services:

- a. Providers are categorized into facility, anesthesiology specialties and other professional (not anesthesiology);
- b. The attached document S9.5_RU_Categories then describes two levels of specifications used in assigning services to a type of service category;
- c. The first table in the attachment IMAP_TOS_PROC includes one row per procedure code (CPT, HCPCS, Revenue). For each row, the table includes the procedure code, a short description and the columns PROFTOS, ANESTOS, OPTOS, and PCC_TYPE. PROFTOS, ANESTOS, OPTOS include standard TOS_I codes that are assigned to each procedure code based on whether the provider is a facility, anesthesiologist or other professional, using OPTOS, ANESTOS and PROFTOS, respectively;
- d. Some services are also assigned a value for PCC_TYPE (described below);
- e. The second table, IMAP_TOS, includes one row for each of the standard TOS codes included in PROFTOS, ANESTOS and PROFTOS and columns for the TOS_I codes, ENC_TOS, and ENC_TOP and a brief description of the TOS_I. ENC_TOS and ENC_TOP are used in defining encounters below.
- f. These two tables are used in creating the measures described below.

-- Encounters. An Encounter is contact between an individual and the health care system for a related set of services. It is based on the type of service and the type of provider for a member on a specific day. Providing the ability to view data by encounters helps convey the scope and influence of all services associated with patient-health care system meetings. The concept of an encounter is used for the utilization measures described below. The following steps are used to assign an encounter value to each service record:

- a. Hospital inpatient admissions. A hospital inpatient confinement is considered a single encounter (ENCOUNTER=1).
- b. Prescription pharmacy. A pharmacy service record (claim record) is considered a single encounter (ENCOUNTER=1).
- c. Ancillary Drug Administered Services. All Ancillary, Drugs Administered (TOS_I values 201 thru 211), are considered an encounter (ENCOUNTER=1).
- d. For all other services, the number of encounters is dependent on the Type of Service and the Type of Provider assigned to the claims. In particular, the values included in the table IMAP_TOS for Encounter Type of Service (ENC_TOS) and Encounter Type of Provider (ENC_TOP) are used. As shown in IMAP_TOS, both the Encounter TOS and Encounter TOP are based on Type of Service (TOS_I) and can be assigned using table IMAP_TOS, and joining on TOS_I from the service record.
- e. For these other services, medical service records are sorted by Member, Date of Service, ENC_TOS and ENC_TOP.
- f. The calculation of encounters for services other than emergency room, laboratory and radiology services is 1 divided by the total number of records in the combination of Member, Date of Service, Encounter TOS, and Encounter TOP.
- g. Additional logic. Emergency room, laboratory and radiology services need to have a different logic because these services often are billed using both a technical and professional component – where both a professional provider and facility provider are involved.
- h. Any service with the following Encounter TOS values will use the additional logic when calculating encounters.
 1. ER professional and facility services (ENC_TOS=24)
 2. Lab and pathology professional and facility services (ENC_TOS=29, 31)
 3. Diagnostic and therapeutic radiology professional and facility services (ENC_TOS=47, 49)
- i. For the services using the additional logic, for each Member, Date of Service, and ENC_TOS distinct combination, sum the number of records for each of the Encounter TOP values of 1 and 2.
 1. Two cases can exist for these services: there are both facility and professional records in the combination; or there are only facility records or only professional records.
 2. Where at least one facility record and one professional record, the encounter is divided up equally between the professional

and technical components. Therefore, the calculations for Encounters for these situations are: 0.5 divided by {number of records with Encounter TOP = 1 (Facility)} and 0.5 divided by {number of records with Encounter TOP = 2 (Professional)}.

3. Where all records have the same ENC_TOP value, the encounters calculation will be the generic calculation: 1 divided by {number of records in the combination of Member, Date of Service, Encounter TOS, Encounter TOP}.

-- Cost and Utilization Measures. The actual resource use for an episode is the sum of the costs or encounters for those services grouped to the episode. Measures of actual cost or use per episode across episodes, is the sum of cost or use divided by the total number of episodes included in the measurement.

II. Cost of Care per Episode

Total Service Costs. Total services costs include the total costs for all services included in the selected clinical episodes.

Primary Care Core Services Costs. Primary Care Core (PCC) services include a select group of services traditionally performed by an individual's primary care physician. The PCC concept is similar to the idea of the group of services typically included in a primary care capitation definition. In particular, these services include non-inpatient evaluation and management services and selected imaging, diagnostic and minor procedure services. PCC Services are identified as follows:

-- First select services rendered by a primary care provider. The identification of primary care providers can be made configurable.

At a minimum, these providers include the individual's assigned PCP. Further, to include covering providers, other primary care providers in the network are included, defined using either a list of provider ids or all physicians with a specialty of internal medicine, family practice, geriatric medicine, adolescent medicine and pediatrics, or both (e.g., using a list to include specific OB/GYN providers in addition to all providers with primary care specialties).

i. The CPT procedure code on the selected services is then used to identify:

1. PCC Services Total
2. PCC Services, Visits and
3. PCC Services Other.

ii. The CPT procedure codes assigned to these categories are included in the column PCC_TYPE in the attachment table

IMAP_TOS_PROC. Values of "Visit" and "Other" are used. Blank entries for a procedure code indicate that they are not included as a PCC service.

-- ER Service Costs. These services include professional and facility emergency room services.

- i. Professional ER Services are identified as having values of 1803 thru 1805 in IMAP_TOS
- ii. Facility ER Services are identified as having values of 801 and 802 in IMAP_TOS

-- Hospital Costs. Includes the facility cost of an inpatient stay and services provided by an outpatient facility other than those defined elsewhere (e.g., ER, Lab, Radiology, Other). These services include professional and facility emergency room services.

- i. Inpatient Acute Services are identified as having a value of 601 in IMAP_TOS
- ii. Non-Inpatient Acute Services are identified as having a value of 703 in IMAP_TOS
- iii. Other Outpatient Hospital Services are identified as having values of 901 thru 1399 in IMAP_TOS

-- Laboratory Services. These services include professional and facility laboratory services, other than those professional services assigned to Primary Care Core.

- i. Professional Lab Services are identified as having values of 2101-2118 (Professional, Lab) or 2501-2511 (Professional, Pathology) in IMAP_TOS
- ii. Facility LAB Services are identified as having values of 1001 thru 1005 in IMAP_TOS

-- Radiology Services, Diagnostic. These services include diagnostic professional and facility radiology services, other than those professional services assigned to Primary Care Core:

- i. Professional Radiology, MRI, CT Scan Services are identified as having values of 2901 thru 2903 in IMAP_TOS
- ii. Facility Radiology, MRI, CT Scan Services are identified as having values of 1201, 1203, 1204 in IMAP_TOS
- iii. Professional Radiology, Other Diagnostic Services are identified as having values of 2905, 2906, 2907, 2908 in IMAP_TOS
- iv. Facility Radiology, Other Diagnostic Services are identified as having values of 1202, 1206, 1207, 1208 in IMAP_TOS
- v. Note that Therapeutic Radiology is included in Specialty Care Services, Medicine

-- Specialty Care Services. These services include those services not identified above and are categorized as follows (including TOS_I values in IMAP_TOS):

- i. Specialty Care, Other Diagnostic Testing

- i. 1701-1733 (Professional, Diagnostic)
- ii. Specialty Care, Evaluation & Management
 1. 1601-1609 (Professional, Consult)
 2. 2001-2013 (Professional, Inpatient Visit)
 3. 2401-2411 (Professional, Office Visit)
 4. 2717-2719 (Professional, Home Visit)
 5. 2729-2731 (Professional, Domiciliary/Rest Home Visit)
 6. 2801-2807 (Professional, Preventive Medicine)
 7. Excludes any services assigned to Primary Care Core
- iii. Specialty Care, Medicine
 1. 1401-1405 (Professional, Allergy Tests)
 2. 1901-1901 (Professional, Immunizations / Injection)
 3. 2909-2915 (Professional, Therapeutic Radiology)
- iv. Specialty Care, Surgery
 1. 3001-3214 (Professional, Surgery)
- v. Specialty Care, Other
 1. 101-131 (Ancillary, DME)
 2. 201-211 (Ancillary, Drug Admin)
 3. 301-307 (Ancillary, Home Health)
 4. 401-403, 431 (Ancillary, Services and Supplies)
 5. 405-414 (Ancillary, Med and Surg Supplies)
 6. 416-424 (Ancillary, Orthotics)
 7. 425-429, 432 (Ancillary, Supplies)
 8. 433-436 (Ancillary, Oxygen/Resp)
 9. 437-446 (Ancillary, Prosthetics)
 10. 448-449 (Ancillary, Vision)
 11. 450-459 (Ancillary, Rpt/Trking)
 12. 501-503 (Ancillary, Transportation)
 13. 1501-1599 (Professional, Anesthesia)
 14. 2203-2212 (Professional, Mental Health)
 15. 2302-2317 (Professional, Obstetrics)
 16. 2601-2625 (Professional, Phys Medicine/Rehab)
 17. 2701-2715, 2721-2728 (Professional, Professional Other)

III. Utilization per 1,000 Episodes

Encounters are used for all utilization counts for the utilization measures described below.

Evaluation and Management Visits. E&M Visit services by all professional providers and include the following TOS_I values from IMAP_TOS:

- i. 1601-1609 (Professional, Consult)
- ii. 1803-1805 (Professional, ER)
- iii. 2001-2013 (Professional, Inpatient Visit)
- iv. 2401-2411 (Professional, Office Visit)
- v. 2717-2719 (Professional, Home Visit)
- vi. 2729-2731 (Professional, Domiciliary/Rest Home Visit)
- vii. 2801-2807 (Professional, Preventive Medicine)

PCP Visits. PCP Visits include E&M visits rendered by a PCP or a PCP covering provider (see discussion above for PCC services).

Specialist Visits. Specialist Visits include E&M visits rendered by a provider other than a PCP or a PCP covering provider (see discussion above for PCC services).

Specialist Referrals. A Specialist Referral is indicated using E&M visits and indicates the first instance of the Provider for an E&M service for that member. A specialist is a provider other than a PCP or a PCP covering provider (see discussion above for PCC services).

ER Visits. Indicates an ER service encounter. ER services are defined by a TOS_I value of Facility Outpatient, ER (801, 802) or

Professional, ER (1803, 1805).

Radiology Services, Diagnostic. Radiology utilization is defined as an encounter for the following Types of Service:

-MRI/Cat Scans – Facility Outpatient (1201, 1203, 1204), Professional (2901, 2902, 2903)

-Other Diagnostic Radiology – Facility Outpatient, Diag. Radiology (1202, 1206, 1207, 1208), Professional, Diagnostic Radiology, Nuclear Medicine (2905 thru 2908)

Laboratory Services. Laboratory utilization is defined as an encounter for the following Types of Service:

i. Facility Outpatient, Lab (1001, 1003, 1005)

ii. Professional, Lab, (2101 thru 2118)

iii. Professional, Pathology (2501 thru 2511)

Pharmacy Services. A pharmacy service prescription record.

Inpatient Admits and Days. Number of unique inpatient stays. An inpatient stay describes the entire stay by a patient in a facility at the same level of care. Transfers to a different level of care at the same facility results in a new admission. Acute inpatient stays describe inpatient confinements in an acute care facility. Non-acute inpatient stays describe inpatient confinements in a skilled nursing facility, transitional care unit/rehab, or other longer term/sub-acute facility. Inpatient days describe the difference between inpatient admission and discharge dates. Inpatient stays where the admission and discharge dates are equal are assigned one inpatient day.

S.7.8a. If needed, provide supplemental resource use service category specifications in either URL (preferred) or as an attachment (Save file as S.7.8a_RU_Service_Categories):

URL:

Please supply the username and password:

Attachment: S9.7_RU_Categories-634413225228606337.xls

Clinical Logic

S.8.1. Brief Description of Clinical Logic (Briefly describe your clinical logic approach including clinical topic area, whether or not your account for comorbid and interactions, clinical hierarchies, clinical severity levels and concurrency of clinical events.)

This measure identifies patients with pneumonia and creates pneumonia episodes of care using the ETG methodology described in the ETG Construction Logic attached in our response to S.2. Each episode of pneumonia is characterized by an ETG Base class ID that specifies the type of condition; the ETG Base class ID representing pneumonia is 437400.

An episode of pneumonia will contain all clinically relevant information related to the condition. In addition to this information, certain diagnoses are considered co-morbidities or condition status factors for pneumonia. For example, for pneumonia, Streptococcal pneumonia is a condition status factor and Septicemia is a comorbidity.

Each episode is assigned a severity level based on age, gender and the observed comorbidity and condition status factors. The severity level is an indicator of the relative resources expected to be required for the given episode of pneumonia.

The pneumonia episode clinical framework is defined by the services, or claim lines, that can begin an episode, the primary and incidental diagnosis relationships involved, how records group to an episode, including relative strength of relationship, and the severity logic employed.

S.8.2. Clinical Logic (Detail any clustering and the assignment of codes, including the grouping methodology, the assignment algorithm, and relevant codes for these methodologies.)

The pneumonia measure's episodes are defined using the Episode Treatment Group (ETG) methodology. Please note that this specification will reference different attachments included with the submission for these measures, including:

- S2_ETG_Construction_Logic_Pneumonia. This attachment provides an overview of ETGs and a summary of the methodology used for pneumonia episodes.

- S5_Peumonia_DataDictionary (Excel workbook attachment). This attachment describes the clinical relationships between

diagnosis and procedure codes and the episode condition.

- S8_Pneumonia_ClinicalLogic (Excel workbook attachment). This attachment includes Worksheets that describe the details around the components of pneumonia methodologies that relate to co-morbidities, condition status factors, and severity adjustment.

The individual Worksheets in these attachments that relate to the specific components of the methodology are referenced in the following specification.

The pneumonia ETG episode building process that supports pneumonia resource use measures has four important steps:

Step 1: Identify Records; Assign Record Type and Anchor Records, Classify Diagnoses and Procedures

Step 2: Build Episodes from Anchor Records

Step 3: Group Non-Anchor Records to Episodes

Step 4: Finalize the Episodes (identify co-morbidities and complicating factors, and assign episode severity)

This section (S8.2 Clinical Framework) describes the first three steps in the episode building process. Sections S8.3 and S8.5 describe episode co-morbidities and condition status factors and episode severity.

Step 1- Identify Records; Assign Record Type and Anchor Records, Classify Diagnoses and Procedures

Assign services to record types, identify anchor records and classify diagnoses and procedures on service records to support the creation of pneumonia and other episodes.

Step 1A: Assign Record Type to each Service:

Assign each service to one of the following 5 record types:

- Facility: A claim record submitted by a treatment facility for room & board charges (F)
- Surgery: A claim record submitted by a provider for surgical or related procedure (S)
- Management: A claim record submitted by a provider related to the evaluation of a patient's condition (M)
- Ancillary: A claim record submitted by any provider for laboratory, radiological or similar services (A)
- Pharmaceutical: A claim record for a prescription drug claim (P)

Assign record type based upon servicing provider type and the nature of the service procedure.

- Assign provider type based on the specialty of the service provider. The "ExTypeOfProvider" worksheet of the attachment S5_Pneumonia_DataDictionary includes an example mapping of specialty to provider type. Based upon the specialty of the service provider on the claim record the provider type recognized by ETG is assigned. For example, using the "ExTypeOfProvider" worksheet a provider specialty code of 100 on the claim would be assigned the ETG provider type of Facility.

- Type of service is based on the service procedure code (CPT, HCPCS, Revenue, NDC). The worksheet "ProcToRecordType" in the attachment S5_Pneumonia_DataDictionary includes the information required to assign record type based upon the procedure code on the claim record.

- Use the combination of type of provider and type of service to determine record type. The worksheet "ProcToRecordType" in the attachment S5_Pneumonia_DataDictionary provides a mapping of provider type and type of service to record type. For example, procedure code 99025 (Initial surgical evaluation) is assigned a record type of Management (M) when the provider type is either clinician (see column "Clinician Record Type" where procedureCode=99025) or a facility (see column "Facility Record Type" where procedureCode=99025). This same procedure code would be assigned a record type of Ancillary (A) when the provider type is non-clinician (see column "Non-Clinician Record Type" where procedureCode=99025).

Examples of record type assignment include:

- An office visit record provided by an internist will be assigned a "Clinician" provider type and a record type of "Management (M)"
- A cholecystectomy provided by a general surgeon will be assigned a "Clinician" provider type and a record type of "Surgery (S)"
- A pharmacy prescription will be assigned a record type of "Pharmaceutical (P)"
- An injection for chemotherapy (e.g., HCHPS J-code) will also be assigned a record type of "Pharmaceutical (P)"
- An imaging service provided by a radiologist, orthopedic surgeon, facility or any provider will be assigned a record type of "Ancillary (A)".

The worksheet "ExRecordType" in the attachment S5_Pneumonia_DataDictionary includes further examples.

The assigned record type provides information to the pneumonia episode-building methodology about the nature of the service and whether the diagnostic and other information on the service provides confirmatory information for a clinician service (versus potentially rule-out information from imaging, lab or other diagnostic services). Record type plays an important role in how services can trigger episodes of care and join and/or modify existing episodes.

Step 1B: Identify Anchor Records. The record type assigned in Step 1A is used to identify anchor records. An anchor record indicates that a clinician has evaluated the patient, assigned a diagnosis and has initiated the treatment and care of the patient for the condition. If the record type assigned to the service is M, S, or F (Management, Surgery or Facility), the service is an anchor record. All other services are considered non-anchor records.

Steps 1C through 1F: Before episodes can be built from anchor records and non-anchor services can be assigned to episodes, the relationship of diagnoses and procedures to each condition, including pneumonia, need to be assigned. Steps 1C through 1F describe how these relationships are defined. These initial steps categorize diagnoses and procedures relative to each condition, saving this information for use in the subsequent steps described in Step 2 and Step 3.

Note that in some instances a service may have a potential clinical relationship to more than one condition. This concept has importance to episode building, in general, and for episodes of pneumonia. While each service can inform grouping decisions across multiple episodes, the ETG methodology assigns each service uniquely to a single episode. Such an approach ensures that double-counting does not occur when considering service cost and utilization in the creation of resource use measures. As a result, accurate decisions on assigning a service to an episode of pneumonia or to another condition require the assessment of both the relationship of a service to pneumonia and to all other conditions for a patient. The methodology described in this section classifies diagnoses and procedures based on their relationship to pneumonia and also the strength of that relationship relative to other conditions. Using ETG, accurate episode grouping for pneumonia and other conditions must occur in the context of all of a patient's conditions.

Step 1C: Assign Diagnoses to Diagnosis Class

Assign each ICD-9 diagnosis code to a "diagnosis class". There are three diagnosis classes applied across all diagnosis codes, including diagnosis codes eligible for pneumonia:

- **Specific:** These diagnosis codes indicate a specific disease as opposed to a sign or symptom. These codes are specific enough to be linked to a single ETG. ICD-9 Diagnosis code 481 (pneumococcal pneumonia) is an example of a specific diagnosis code. It is primary to an episode of pneumonia. Specific diagnosis codes are usually primary to and eligible for a single ETG.
 - **Non-Specific:** Like specific diagnoses, these diagnosis codes represent a disease or condition, but are not specific enough to support linkage to a single condition. ICD-9 Diagnosis code 079.89 (Other specified viral infection, in conditions classified elsewhere and of unspecified site) is an example of a non-specific ICD-9 code. Although it represents disease as opposed to a sign or symptoms, it is not specific as to representing a single disease. Services with this diagnosis will be assigned to an episode based on both information related to a pneumonia episode as well as information related to other potential conditions.
 - **Signs and Symptom:** These diagnosis codes represent signs and symptoms of disease as opposed to a disease or condition. For example, ICD-9 Diagnosis code 780.61 (fever presenting with conditions classified elsewhere) represents a sign and symptom rather than a disease. This code could be related to multiple diseases. ETG assigns sign and symptoms diagnoses to the lowest specificity. Services with signs and symptoms diagnosis codes may be eligible for many ETGs due to their generic nature. These services will be gathered to episodes as a later step in the grouping process, after other, more specific, information has been considered.
- Diagnosis class assignments determine how a service is grouped to an episode and the order in which it is considered. The ETG methodology considers one person at a time and an individual's medical and pharmacy service records are grouped in several distinct passes. The methodology first processes the specific and non-specific diagnosis codes on anchor records so that concrete conditions/diseases are created. It then processes services with sign and symptom diagnosis codes in reverse chronological order (based on dates of service) to determine the best episode these services can group to.

Step 1D: Identify the Clinical Relationship Between Diagnosis Codes and Conditions, Including Pneumonia

Match each diagnosis code with one or more conditions (ETGs) through a diagnosis eligibility table. In addition to mapping diagnosis codes to conditions, each diagnosis code is further ranked, based on its strength of association with a condition. A rank of "primary" or "incidental" is assigned to each diagnosis and condition combination, with a further ranking assigned to incidental relationships:

- **Primary:** A "primary" diagnosis/condition relationship is assigned where the diagnosis defines that condition. The diagnosis codes that are classified as primary to pneumonia are listed on the "PrimaryDxCodes" worksheet within the attachment "S5_Pneumonia_DataDictionary" (Note: the word "primary" here is used to describe the relationship between a diagnosis and an episode, it is not used to indicate the position of the diagnosis code on the claim line. The diagnosis in any position on the claim line can have a primary relationship with pneumonia). This map is used to identify primary diagnoses for pneumonia. Examples of

diagnoses ranked as primary for pneumonia are 481 (pneumococcal pneumonia), 482 (Other bacterial pneumonia) and 483 (pneumonia due to other specified organism). Primary diagnosis codes can only be ranked as primary for a single ETG condition.

- Incidental: These diagnosis codes are eligible for a condition but are not classified as primary. These diagnosis codes can be incidental to other conditions. To support the linkage of these diagnosis codes to a final episode, a further ranking is assigned for each condition based on the relative strength of association between the diagnosis and condition. Values of low, medium, or high are assigned for each diagnosis/condition. The Diagnosis codes that are incidental to pneumonia are listed on the “IncidentalDxCodes” worksheet within the attachment “S5_Pneumonia_DataDictionary”. The column “diagnosisEligibilityType” in the worksheet describes the relative strength ranking where 3 represents a high association, 2 represents a medium association and 1 represents a low association. A value of 5 means that the diagnosis code can shift the pneumonia ETG to a different ETG.

Step 1E: Identify Relationships between Procedure Codes and Conditions, Including Pneumonia

Match each procedure code with one or more conditions, including pneumonia, through a procedure eligibility table. All procedure codes that are eligible for pneumonia are listed on the “ProcedureCodes” worksheet within attachment “S5_Pneumonia_DataDictionary”. In the same way diagnoses can relate multiple conditions, a procedure can relate to more than one episode. The ProcedureCodes worksheet also includes a ranking of the strength of the clinical relationship of each CPT and HCPCS code with pneumonia, ranked from 1 to 4 based on the relative strength of the clinical relationship between the procedure and pneumonia. This relationship is included in the “ProcedureRank” column in the worksheet. A rank of 4 represents the strongest association and a rank of 1 the lowest. In this way, ETG considers not only the diagnostic information on a service when making grouping decisions around pneumonia, but also the service procedure and the strength of the relationship between the procedure and pneumonia relative to other potential conditions.

Step 1F: Identify Relationships Between Pharmacy Services and Conditions, Including Pneumonia

The relationship between pharmacy services and pneumonia and other conditions is based on the pharmacy code assigned to the service. To support this assessment, the ETG methodology assigns each pharmacy service to a Drug Category Code (DCC). The DCC describes the drug’s active ingredients and route of administration. DCCs are then mapped to ETGs and define the relationships between a drug and a condition. Most pharmacy services are defined using NDC procedure codes, however selected pharmacy services with a CPT or HCPCS code are also mapped to a DCC by ETG (e.g., J-codes describing injections).

The “Pharmacy” worksheet in the attachment “S5_Pneumonia_DataDictionary” describes the DCCs assigned to pneumonia. Similar to diagnoses and procedures, there are some instances a DCC code may be eligible for more than one ETG. In these cases, the ETG methodology uses strength of the clinical relationship between the DCC code and the episode condition. The “Rank” in the worksheet describes this strength of association for each DCC and pneumonia. The lower the value is for Rank, the stronger the association between the DCC and the episode. If multiple episodes are competing for a pharmacy service, this rank is used to support decisions on assignment.

Given the clinical relationships described in Steps 1A through 1F, the following steps are used to build episodes from anchor records.

Step 2- Build Episodes from Anchor Records.

Building pneumonia episodes from anchor records is a multi-step process that utilizes diagnostic and procedural information and the clinical relationships defined in Step 1. Anchor records are grouped in two passes through the patient’s data. The first pass groups the anchor records with specific and non-specific diagnoses. The second pass groups anchor records with sign and symptoms diagnoses. All anchor records are grouped before all non-anchor records.

Step 2A: Use Anchor Records to Start an Episode of pneumonia Using Specific and Non-Specific Diagnoses

A service must be an anchor record to start an episode of pneumonia. The service must also have a procedure code that is eligible for pneumonia and an ICD-9 diagnosis code that is primary for pneumonia. See worksheets “PrimaryDxCodes” and “ProcedureCodes” within attachment S5_Pneumonia_DataDictionary for a complete list of diagnosis codes and procedure codes that are primary for pneumonia. All codes within the “PrimaryDxCodes” worksheet are considered primary to pneumonia. If an anchor record meeting these requirements is observed, start an episode for pneumonia.

As an example of an anchor record that starts an episode of pneumonia, a pulmonologist sees a patient and submits a claim record using the CPT procedure code 99212 (Office visit, established patient) with and ICD-9 diagnosis code 481 (pneumococcal pneumonia).

Note that a single anchor record can start more than one episode. For example, an anchor record with a diagnosis and procedure code combination that is eligible for pneumonia will start a pneumonia episode. If that record also has a diagnosis and procedure code combination that is eligible for Hypertension, it will also start a Hypertension episode. (See Section I of the Attachment for S2 above for a discussion of the concept of “phantom episode clusters”.)

Step 2B: Group Anchor Records to an Episode of pneumonia Using Specific and Non-Specific Diagnoses

Once an episode of pneumonia is started, group further anchor records to that episode. Consider specific and non-specific diagnoses on anchor records first.

First identify whether the anchor record is eligible for pneumonia. Eligible anchor records for pneumonia have a procedure code eligible for pneumonia and a diagnosis code that has either a primary or incidental relationship to pneumonia. See the "ProcedureCodes" worksheet within S5_Pneumonia_DataDictionary for the procedure codes eligible for pneumonia. See the "PrimaryDxCodes" and "IncidentalDxCodes" worksheets within S5_Pneumonia_DataDictionary for a list of the diagnosis codes primary and incidental to pneumonia.

For anchor records with eligibility to a pneumonia episode, apply the following steps to assign the anchor record to an episode.

Step 2B1 - If the anchor record is only eligible for the open pneumonia episode, group the anchor record to the pneumonia episode. In some cases, an anchor record can be eligible to join more than one episode. This is true because a service may have more than one diagnosis code. Further, diagnosis codes that are incidental for pneumonia may also be eligible for another ETG condition.

Step 2B2 - If the anchor record is eligible for the pneumonia episode and another episode for the patient, apply the following tie-breaking steps to determine the episode an anchor record groups to:

- Assess the specificity of the diagnoses on the anchor record. Diagnosis class describes this specificity and was assigned to each diagnosis code in Step 1C (specific or non-specific).

- Assign the anchor record to an episode based on the diagnosis class. Episodes related to specific diagnoses take precedence over episodes related to non-specific diagnoses.

Specific diagnoses:

- If a diagnosis on the anchor record is specific and has a relationship with a single episode, assign the anchor record to that episode.

- If the anchor record has more than one specific diagnosis and those diagnoses have clinical relationships with more than one episode, then use the strength of association of the procedure code for the anchor record to determine the episode that the anchor groups to.

- If the strength of relationship between the procedure code and the different episode conditions is the same for the specific diagnoses, then the strength of the association of the diagnosis codes themselves are used to determine the grouping of the anchor record. As discussed in Step 1D, strength of association between diagnosis codes and conditions are described as primary or incidental. Primary relationships between diagnosis codes and episode conditions have precedence over incidental relationships.

- If the strength of the relationship between the specific diagnosis codes and the episode conditions is the same, the time between the anchor record and the closest anchor for the open episode is used.

Non-specific diagnoses:

- If no specific diagnoses are observed on the anchor record, consider non-specific diagnoses in assigning the anchor record to an episode. Apply the same order of logic described directly above for specific diagnoses to the assignment of anchor records based on non-specific diagnoses.

At the completion of Step 2B, each anchor record with a specific or non-specific diagnosis has been assigned to an episode, including episodes of pneumonia.

Note that in the same way a single anchor record can start more than one episode (Step 2A), a single anchor record can also extend more than one episode, however the anchor record itself can only be assigned to one episode, as described above. For example, an anchor record with a diagnosis and procedure code combination that is eligible for pneumonia can extend a pneumonia episode. If that record also has a diagnosis and procedure code combination that is eligible for Hypertension, it can also extend a Hypertension episode. (See Section I of the Attachment for S2 above for a discussion of the concept of "phantom episode clusters" and the concept of extending episodes.)

Step 2C: Group Anchor Records to an Episode of pneumonia Using Sign and Symptom Diagnoses

The last step in grouping Anchor records to pneumonia and other episodes involves processing anchor records with only sign and symptom diagnosis codes. All sign and symptom diagnosis codes for pneumonia are listed within the S5_Pneumonia_DataDictionary on worksheet "IncidentalDxCodes" where column "specificity"="Sign and Symptom". An example is Chest Pain (ICD-9 786.5).

For these anchor records with eligibility to a pneumonia episode, apply the following steps to assign the anchor record to an episode.

Step 2C1 - If the anchor record is only eligible for the open pneumonia episode, group the anchor record to the pneumonia episode.

Step 2C2 - If the anchor record is eligible for the pneumonia episode and another episode for the patient, apply the following tie-breaking steps to determine the episode an anchor record groups to:

- If the anchor record has more than one sign and symptom diagnosis and those diagnoses have clinical relationships with more than one episode, then use the strength of association of the procedure code for the anchor record to determine the episode that the anchor groups to.

- If the strength of relationship between the procedure code and the different episode conditions is the same for the sign and

symptom diagnoses, then the strength of the association of the diagnosis codes themselves are used to determine the grouping of the anchor record. As discussed in Step 1D, strength of association between diagnosis codes and conditions are described as primary or incidental. For sign and symptom diagnoses, incidental relationships between diagnosis codes and episode conditions have precedence over primary relationships.

-If the strength of the relationship between the sign and symptom diagnosis codes and the episode conditions is the same, the time between the anchor record and the closest anchor for the open episode is used.

At the completion of Step 2C, each anchor record with a sign and symptom diagnosis has been assigned to an episode, including episodes of pneumonia.

After completing these steps, anchor records have been used to open episodes of pneumonia, as well as episodes for other conditions. Anchor records have been assigned uniquely to individual episodes based on the clinical logic described above and in the attachment "S5_Pneumonia_DataDictionary".

Step 3. Group Non-Anchor Records to Episodes.

Non-anchor records (record type "Ancillary" and "Pharmacy") can not open episodes on their own, but can join episodes. For example, a service for 89399 (Pathology lab procedure) and an ICD-9 code of 481 (pneumococcal pneumonia) can group to an open episode of pneumonia but can not open the episode itself.

Step 3A: Group Non-Anchor Records other than Pharmacy to an Episode of pneumonia Using Specific and Non-Specific Diagnoses

Once an episode of pneumonia is started and anchor records have been grouped, non-anchor records can group to that episode.

Consider specific and non-specific diagnoses on non-anchor records first.

First identify whether the non-anchor record is eligible for pneumonia. Eligible non-anchor records for pneumonia have a procedure code eligible for pneumonia and a diagnosis code that has either a primary or incidental relationship to pneumonia. See the "ProcedureCodes" worksheet within S5_Pneumonia_DataDictionary for the procedure codes eligible for pneumonia. See the "Pharmacy" worksheet within S5_Pneumonia_DataDictionary for the pharmacy codes eligible for pneumonia. See the "PrimaryDxCodes" and "IncidentalDxCodes" worksheets within S5_Pneumonia_DataDictionary for a list of the diagnosis codes primary and incidental to pneumonia.

For non-anchor records with eligibility to a pneumonia episode, apply the following steps to assign the record to an episode.

Step 3A1 - If the non-anchor record is only eligible for the open pneumonia episode, group the record to the pneumonia episode.

In some cases, a non-anchor record can be eligible to join more than one episode. This is true because a service may have more than one diagnosis code. Further, diagnosis codes that are incidental for pneumonia may also be eligible for another ETG condition.

Step 3A2 - If the non-anchor record is eligible for the pneumonia episode and another episode for the patient, apply the following tie-breaking steps to determine the episode the record groups to:

-Assess the specificity of the diagnoses on the non-anchor record. Diagnosis class describes this specificity and was assigned to each diagnosis code in Step 1C (specific or non-specific).

-Assign the non-anchor record to an episode based on the diagnosis class. Episodes related to specific diagnoses take precedence over episodes related to non-specific diagnoses.

Specific diagnoses:

-If a diagnosis on the non-anchor record is specific and has a relationship with a single episode, assign the record to that episode.

-If the non-anchor record has more than one specific diagnosis and those diagnoses have clinical relationships with more than one episode, then use the strength of association of the procedure code for the record to determine the episode that the anchor groups to.

-If the strength of relationship between the procedure code and the different episode conditions is the same for the specific diagnoses, then the strength of the association of the diagnosis codes themselves are used to determine the grouping of the non-anchor record. As discussed in Step 1D, strength of association between diagnosis codes and conditions are described as primary or incidental. Primary relationships between diagnosis codes and episode conditions have precedence over incidental relationships.

-If the strength of the relationship between the specific diagnosis codes and the episode conditions is the same, the time between the non-anchor record and the closest anchor for the open episode is used.

Non-specific diagnoses:

-If no specific diagnoses are observed on the non-anchor record, consider non-specific diagnoses in assigning the record to an episode. Apply the same order of logic described directly above for specific diagnoses to the assignment of non-anchor records based on non-specific diagnoses.

At the completion of Step 3A, each non-anchor record with a specific or non-specific diagnosis has been assigned to an episode, including episodes of pneumonia.

Step 3B: Group Non-Anchor Records other than Pharmacy to an Episode of pneumonia Using Sign and Symptom Diagnoses

The last step in grouping non-anchor records to pneumonia and other episodes involves processing non-anchor records with only

sign and symptom diagnosis codes. All sign and symptom diagnosis codes for pneumonia are listed within the S5_Pneumonia_DataDictionary on worksheet "IncidentalDxCodes" where column "specificity"="Sign and Symptom". An example is Chest Pain (ICD-9 786.5).

For these non-anchor records with eligibility to a pneumonia episode, apply the following steps to assign the record to an episode. Step 3B1 -If the non-anchor record is only eligible for the open pneumonia episode, group the record to the pneumonia episode.

Step 3B2 - If the anchor record is eligible for the pneumonia episode and another episode for the patient, apply the following tie-breaking steps to determine the episode the record groups to:

- If the non-anchor record has more than one sign and symptom diagnosis and those diagnoses have clinical relationships with more than one episode, then use the strength of association of the procedure code for the record to determine the episode that the record groups to.

- If the strength of relationship between the procedure code and the different episode conditions is the same for the sign and symptom diagnoses, then the strength of the association of the diagnosis codes themselves are used to determine the grouping of the non-anchor record. As discussed in Step 1D, strength of association between diagnosis codes and conditions are described as primary or incidental. For sign and symptom diagnoses, incidental relationships between diagnosis codes and episode conditions have precedence over primary relationships.

- If the strength of the relationship between the sign and symptom diagnosis codes and the episode conditions is the same, the time between the non-anchor record and the closest anchor for the open episode is used.

Step 3C: Group Pharmacy Records to an Episode of Pneumonia

Pharmacy services group differently than other non-anchor records because they usually do not have ICD-9 diagnosis codes associated with them to use in grouping. Instead, pharmacy records are assigned to pneumonia and other episodes using a table that maps NDC to a DCC code (Drug Category Code) based on the drug's active ingredients and route of administration. A DCC to ETG map is then used to inform the grouping for the service. The relationship between DCC codes and pneumonia are described in the "Pharmacy" worksheet in the attachment "S5_Pneumonia_DataDictionary".

In some instances a DCC code may be eligible for pneumonia and another open episode for a patient. In these cases, where multiple episodes are observed for a patient where the DCC code has eligibility, use the strength of the clinical relationship between the DCC code and the episode to determine final assignment. The column "Rank" in the "Pharmacy" worksheet within attachment "S5_Pneumonia_DataDictionary" describes that strength of association. The lower the value is for Rank, the stronger the association between the DCC and the episode.

Due to the size of the attachment the full list of NDC to DCC mappings has not been provided within this submission. This file is available upon request. The DCC mappings included in the S5 attachment provide a summary of the key clinical relationships between drugs and the conditions described by the relevant ETGs. The NDC to DCC map would include the individual NDCs within a DCC that map to those relationships.

At the completion of Step 3C, all relevant records for pneumonia episodes have been assigned.

Step 4: Finalize the Episodes

Finalizing an episode of pneumonia involves determining whether or not the episode is complete, assigning co-morbidities and condition status factors and calculating a severity score and associated severity level. Co-morbidities and condition status factors will be discussed in section 8.3 and severity score calculation and level assignment is addressed in section 8.5.

In terms of episode completeness, pneumonia is an acute condition. Therefore the general clean period logic described in the attachment for question S2 above is applicable. All clinically consistent treatments for the care of a pneumonia patient will group to the episode of pneumonia for as long as data are available.

S.8.3. Evidence to Support Clinical Logic Described in S.8.2 *Describe the rationale, citing evidence to support the grouping of clinical conditions in the measurement population(s) and the intent of the measure (as described in IM3)*

S.8.3a. CLINICAL LOGIC ATTACHMENT or URL: If needed, attach supplemental documentation (Save file as: S_8_3a_Clinical_Logic). All fields of the submission form that are supplemented within the attachment must include a summary of important information included in the attachment and its intended purpose, including any references to page numbers, tables, text, etc.

URL:

Please supply the username and password:

Attachment: S8_Pneumonia_ClinicalLogic.xls

S.8.4. Measure Trigger and End mechanisms *(Detail the measure's trigger and end mechanisms and provide rationale for this methodology)*

As described in detail in S8, an episode is triggered by an anchor record. This is a claim record with a procedure indicating a face to face physician encounter, a surgical procedure by a physician or a facility charge indicating a confinement. The rationale for this is that the diagnosis and procedure codes on these record types are most likely to specify a valid clinical condition related to the individual. The length of the episode will depend on the subsequent records that occur within the ETGs clean period. When there is an interval longer than the clean period of the episode without any records eligible to group to the episode, it is considered complete.

Pneumonia is an acute condition. Therefore the clean periods described in Section I as part of the general ETG methodology are applicable. All clinically consistent treatments for the care of a Pneumonia patient will group to the episode of Pneumonia based upon the clean period.

For more information about episode building construction/logic, please refer to S8 and the attachment we provided in s.2 .

S.8.5. Clinical severity levels *(Detail the method used for assigning severity level and provide rationale for this methodology)*

Please note that this specification will reference different attachments included with the submission for these measures, including:

- S2_ETG_Construction_Logic_Pneumonia. This attachment provides an overview of ETGs and a summary of the methodology used for pneumonia episodes.

- S8_Pneumonia_ClinicalLogic (Excel workbook attachment). This attachment includes Worksheets that describe the details around the components of pneumonia methodologies that relate to co-morbidities, condition status factors, and severity adjustment.

More specifically, apply the following steps:

Step 1 – Identify Condition Status Factors and Comorbidities in an Episode

Assignment of severity occurs after the identification of condition status factors and comorbidities as detailed in specification S8.3. Interactions between various co-morbidities also play a role in severity assignment as well as demographic factors. The combination of all of these factors are used to describe a “severity” score and level for an episode, where a higher level of severity indicates an expectation of a higher level of resources required to diagnose, manage and treat an episode of pneumonia.

The steps required to identify condition status and comorbidity factors for pneumonia are described in S8.3.

Step 2 – Map Episode Comorbidities to the Final Comorbidities used to Calculate Episode Severity

The individual comorbidities identified in S8.3 are further grouped to the final comorbidity factors used in calculating episode severity. This step is performed to combine the effects of related comorbidities on severity. Further, in some cases, hierarchies are used to limit final factors to those comorbidities within a related group that have the greatest impact on episode severity. For example, for pneumonia, Other inflammatory lung diseases, Occupational & environmental pulmonary diseases, Chronic bronchitis, and Asthma are all qualified as comorbidities and are all conditions categorized as Bronchial Inflammation. Given the related nature of these comorbidities, only one factor is used as the final comorbidity factor for computing severity. Steps 2.1 through 2.4 describe how this final comorbidity is selected.

Worksheet “Comorbidities” – includes the ComorbidityCodes and Comorbidity Groups used to determine severity for pneumonia.

Co-MorbidityGroup2 is the final comorbidity factor used to compute episode severity. To determine this factor:

Step 2.1 – Assign ComorbidityGroup1 and ComorbidityGroup2 to each ComorbidityCode. Using Bronchial Inflammation as an example, Other inflammatory lung diseases, Occupational & environmental pulmonary diseases, Chronic bronchitis, and Asthma would all be assigned to Bronchial Inflammation for ComorbidityGroup1. Other inflammatory lung diseases, Occupational & environmental pulmonary diseases, and Chronic bronchitis would be assigned to "Bronchial Inflammation 2" for ComorbidityGroup2 and Asthma would be assigned to "Bronchial Inflammation 1" for ComorbidityGroup2.

Step 2.2 – Assign Priority to each ComorbidityCode. Other inflammatory lung diseases, Occupational & environmental pulmonary diseases, Chronic bronchitis, and Asthma would be assigned a Priority value of 1, 2, 3, and 4, respectively.

Step 2.3 – Across all of the values for ComorbidityCode within each ComorbidityGroup1, select the ComorbidityCode with the lowest value for Priority. As an example, if Chronic bronchitis and Asthma were both observed, Chronic Bronchitis would be selected due to its lower value for Priority (a Priority value of 3 take precedence over a Priority value of 4)

The remaining values for ComorbidityCode and ComorbidityGroup2 define the final comorbidity factors used in determining pneumonia severity. In the above example (where Chronic bronchitis and Asthma were both observed), Bronchial Inflammation 2 (Chronic Bronchitis) would be selected as the final comorbidity within Bronchial Inflammation.

Step 2.4 – Assign a risk weight to each remaining factor. Each risk weight reflects the incremental contribution of having a specific comorbidity factor on pneumonia severity. If the patient's age is less than 65, assign a risk weight using the column "Weight". If the patient's age is 65 or higher, use the risk weight using the value in the column ElderlyWeight. Use patient age as of the ending date for the measurement period to determine the appropriate weight. For Bronchial Inflammation 2, a risk weight of 0.78 would be assigned for a non-elderly patient. A risk weight of 0.78 would also be assigned for an elderly patient.

Step 3 – Identify Comorbidity Interactions

The interaction between two observed comorbidities can contribute to episode severity. Worksheet "ComorbidityInteractions" includes the interactions between Comorbidity Groups used to determine severity for pneumonia. The table describes pairings of the final comorbidity factors produced by Step 2 (identified by the values for ComorbidityGroup2).

Step 3.1 – Identify pairings of ComorbidityGroup2 for the episode that are also observed in the Worksheet "ComorbidityInteractions"

Step 3.1 – Assign a risk weight to each qualified interaction. Each risk weight reflects the incremental contribution of having a specific comorbidity interaction on pneumonia severity. If the patient's age is less than 65, assign a risk weight using the column "Weight". If the patient's age is 65 or higher, use the risk weight using the value in the column ElderlyWeight. Use patient age as of the ending date for the measurement period to determine the appropriate weight.

Step 4 – Identify Comorbidity Counts

For some ETG conditions the number of final comorbidity factors will impact episode severity – for example, where 3 or more comorbidity factors are observed. For these episodes, a separate Worksheet "ComorbidityCounts" includes these additional severity factors and their assigned risk weights added for those episodes. pneumonia does not include any Comorbidity Count factors; this step does not apply to pneumonia.

Step 5 – Condition Status Factors

The Worksheet "ConditionStatuses" – includes the Condition Status factors used to determine severity for pneumonia. The rightmost columns include risk weights for the non-elderly and elderly models. Each risk weight reflects the incremental contribution of having

a specific Condition Status factor on pneumonia severity.

For each condition status factor observed, assign a risk weight. If the patient's age is less than 65, assign a risk weight using the column "Weight". If the patient's age is 65 or higher, use the risk weight using the value in the column ElderlyWeight. Use patient age as of the ending date for the measurement period to determine the appropriate weight.

Step 6 – Identify Condition Status Interactions

For some ETG conditions, the interaction between two observed condition status factors can contribute to episode severity. A separate tab, Worksheet "ConditionStatusInteractions" would be used to identify qualified pairings and their weight in calculating severity. Pneumonia episodes do not use condition status interactions in calculating severity. Step 6 does not apply to pneumonia.

Step 7 – Identify Condition Status Counts

For some ETG conditions the number of final condition status factors will impact episode severity – for example, where 3 or more condition status factors are observed. For these episodes, a separate Worksheet "ConditionStatusCounts" includes these additional severity factors and their assigned risk weights added for those episodes. Pneumonia does not include any condition status count factors; this step does not apply to pneumonia.

Step 8 – Assign Demographic Factors

The Worksheet "Demographics" includes the additional severity factors added based on age and gender. Each risk weight reflects the incremental contribution of having a specific Demographic factor on pneumonia severity. Based on patient age, assign the patient to an age range group. Using gender and age group, assign a demographic factor weight. Use patient age as of the ending date for the measurement period to determine the appropriate age range group.

Step 9 – Compute Severity Score

Sum the risk weights assigned for each of the relevant factors identified above. The sum of these weights is the overall severity score for the episode. As noted above, the higher the severity score for an episode, the more resources are expected relative to other pneumonia episodes.

As a note, the estimation of the risk weights used in computing severity for pneumonia episodes is based on empirical analyses of healthcare data for a benchmark population of over 25 million individuals. In particular, multivariate regression analyses were used where cost per episode for individual pneumonia episodes was the dependent variable and the defined array of co-morbidity and condition status factors and patient age and gender were the independent variables. The model was run separately for individuals 65 and over and those under 65 years of age. The resulting estimated parameters were used to assign weights to each factor described in the above tables. These weights and the presence of a particular set of factors for an episode are used to determine a pneumonia severity score for the episode.

Step 10 – Compute Severity Level

Based on the severity score, the severity "level" indicates a categorical ranking of where the specific episode is relative to the population of all pneumonia episodes. There are four potential severity levels for pneumonia, where the value 1 indicates a less severe episode and the value 4 indicates the most severe episode. The "Thresholds" Worksheet in attachment

“S8_Pneumonia_ClinicalLogic” describe the three cut-off points that define the four levels of severity for pneumonia episodes.

Assign severity level to the episode depending on the episode severity score calculated in Steps 1-9 and where that score falls within the ranges defined in the “Threshold” Worksheet.

Example: Assigning Severity Score and Level to Pneumonia Episodes

The example included within the S8_Pneumonia_ClinicalLogic attachment (see worksheet “ExSevScore&Level”) shows the calculation of severity score and level for a pneumonia episode.

The example describes a Female patient, age 32, observed to have a number of anchor records with a diagnosis that maps to the pneumonia ETG. The patient is also observed to have one condition status factor and one comorbidity that are also eligible for pneumonia. The condition status factor (70142: Mycoplasma pneumonia) was identified through one or more anchor records observed within the episode where the diagnosis on the records mapped to that condition status factor. The comorbidity (80071: Other drug dependence) was identified on one or more anchor records observed outside of the pneumonia episode.

Assign severity markers and weights: The patient receives a severity marker for each of the condition status and comorbidity factors and a risk weight is assigned to each. The patient also receives severity weight related to her age and gender which fall into the “Female 19-34” range.

Calculate severity score: A severity score of 0.4807 is calculated based upon the sum of:

-The Demographic weight of 0.2498 (see worksheet “Demographics” within S8_Pneumonia_ClinicalLogic where column “gender”=F and column “ageRange”=19-34);

-The condition status weight for Mycoplasma pneumonia of 0 (see worksheet

“ConditionStatuses” within S8_Pneumonia_ClinicalLogic where column “conditionStatusCode”=70142),

-The comorbidity weight for Other drug dependence of 0.2309 (see worksheet “Comorbidities” within S8_Pneumonia_ClinicalLogic where column “comorbiditycode”=80071. The Other drug dependence comorbidity belongs to the Comorbiditygroup2 of Drug Dependence.);

-The final severity score is calculated as $0.2498 + 0 + 0.2309 = 0.4807$

Calculate severity level: The severity score of 0.4807 falls with the range of <0.7 and the episode is assigned to Severity Level 1.

S.8.6. Comorbid and interactions *(Detail the treatment of co-morbidities and disease interactions and provide rationale for this methodology.)*

Please note that this specification will reference different attachments included with the submission for these measures, including:

- S2_ETG_Construction_Logic_Pneumonia. This attachment provides an overview of ETGs and a summary of the methodology used for pneumonia episodes.

- S8_Pneumonia_ClinicalLogic (Excel workbook attachment). This attachment includes Worksheets that describe the details around the components of pneumonia methodologies that relate to co-morbidities, condition status factors, and severity adjustment.

Co-morbidities and condition status factors are identified for each pneumonia episode. These factors provide specificity of the episode’s clinical condition and also play a key role in assigning a severity score and level to the episode.

Steps to Assign Co-morbidities and Condition Status Factors to Pneumonia Episodes:

Step 1 – Condition Status Factors for Pneumonia Episodes.

Each pneumonia episode is evaluated to determine whether any Condition Status Factors for pneumonia are observed. To do this, the anchor records for the episode are evaluated using a comparison of their ICD-9 diagnoses with the diagnoses for the conditions status factors for pneumonia. The condition status factors used for pneumonia and the matching diagnoses for each are included in the “ConditionStatusToDxCodeMap” Worksheet in the attachment “S8_Pneumonia_ClinicalLogic”.

The following condition status factors are defined for pneumonia:

- H. influenzae pneumonia
- K. pneumoniae pneumonia
- Pseudomonal pneumonia
- Staphylococcal pneumonia
- Pneumonia, with abscess
- Chlamydia pneumonia
- Legionnaires pneumonia
- Other gram negative pneumonia
- Anaerobic pneumonia
- Streptococcal pneumonia
- Pneumococcal pneumonia

If these Condition Status Factor diagnosis codes are present on the anchor records for a pneumonia episode, that condition status factor is recorded for the episode.

Each condition status factor belongs to a condition status group. If several condition status factors eligible for a given ETG occur in different condition status groups then all are assigned to the ETG. If there are 2 or more distinct condition status factors in a single condition status group then each condition status factor within the group has a ranking and only a single condition status factor is assigned to the ETG based on its ranking within the condition status group. If two or more condition status factors have the same ranking within a given condition status group, then they may or may not compete to be assigned to the ETG. If the compete flag is 1 or "on" then only one of the condition status factors is assigned to the ETG depending on which condition status factors occurs with the largest number of anchor claims. If the compete flag is 0 or "off" then all of the conditionStatuses with the same ranking are assigned to the ETG.

For the case of pneumonia, all condition status factors are in the same condition status group, all have the same priority and the compete flag is 0 (off). All condition status factors that occur for a given episode or pneumonia are assigned to the episode.

Step 2 –Comorbidity Factors for Pneumonia Episodes.

Each pneumonia episode is evaluated to determine whether any Comorbidity Factors for pneumonia are observed. To do this, the anchor records outside the pneumonia episode are evaluated using a comparison of their ICD-9 diagnoses with the diagnoses for the comorbidity factors for pneumonia. The comorbidity used for pneumonia and the matching diagnoses for each are included in the “ComorbtoDxCodeMap” Worksheet in the attachment “S8_Pneumonia_ClinicalLogic”.

Examples of the comorbidity groups for pneumonia include AIDS, Septicemia and Other Infectious Diseases. In the example included in the S8_Pneumonia_ClinicalLogic attachment (see worksheet “ExSevScore&Level”), the comorbidities 80071 (Other Drug

Dependence) are assigned to the pneumonia episode based upon the diagnosis information on anchor records that occur outside of the pneumonia episode.

As is the case for condition status factors, each comorbidity belongs to a comorbidity group and when several comorbidities are identified for an episode, the rankings of the comorbidities within the specific comorbidity groups and the status of the compete flag will determine whether or not the comorbidity is assigned to the given episode.

In addition to co-morbidities and condition status factors, interactions between two co-morbidities or two condition status factors are also assessed. These interactions are used in assigning severity to a pneumonia episode, as described in section 8.5.

Adjustments for Comparability

S.9.1. Inclusion and Exclusion Criteria *Detail initial inclusion/exclusion criteria and data preparation steps (related to clinical exclusions, claim-line or other data quality, data validation, e.g. truncation or removal of low or high dollar claim, exclusion of ESRD patients)*

:

In creating pneumonia episodes of care, ETG includes all claims for initial processing provided the input format is correct and required fields are provided (refer to section S6.1 for data preparation details and considerations). The ETG methodology does not truncate or eliminate service records based on any cost or other criteria. The identification of financial cost outliers, non-standard diagnosis or procedural coding and other invalid information at the service level is performed by the organization preparing the input data. As noted in S6.1, financial amounts on individual service records should be validated prior to their use in measurement.

In terms of resource use measure construction following ETG grouping, no additional data inclusion criteria are applied. Only pneumonia episodes are included in the measurement of pneumonia episode-based resource use, including the individual services that ETG groups to those episodes. As noted below in section 6.3, it is recommended that incomplete episodes be excluded from resource measurement and outlier episodes be treated appropriately.

As described in the submission for S6.2, for the application of ETG episode logic for pneumonia, ETG accepts all claims for initial processing provided the input format is correct and required fields are provided (refer to section S6.1 for data preparation details and considerations). The ETG methodology does not truncate or eliminate service records based on any cost or other criteria. The identification of financial cost outliers, non-standard diagnosis or procedural coding and other invalid information at the service level is performed by the organization preparing the input data. As noted in S6.1, financial amounts on individual service records should be validated prior to their use in measurement.

ETG does include logic to identify high or low cost outliers at the episode level. Although this is not the same as detailed service level data exclusions, inappropriately high individual claims or mispriced claims, in general, will impact the outlier treatment of the pneumonia episodes the claim is grouped to.

In terms of resource use measure construction following ETG grouping, no additional data exclusion criteria are applied. Only pneumonia episodes are included in the measurement of pneumonia episode-based resource use, including the individual services that ETG groups to those episodes. It is recommended that incomplete episodes be excluded from resource measurement and outlier episodes be treated appropriately.

S.9.2. Risk Adjustment Type (Select type)

If other:

S.9.3. Statistical risk model method and variables *(Name the statistical method - e.g., logistic regression and list all the risk factor variables.)*

The attachment for S2 and responses to S8 above provided a description of the approach used by ETG to assign a severity score and level to each pneumonia episode. To do this, ETG first assesses the observed co-morbidities and condition status factors for an episode and the patient's age and gender. ETG then assigns a weight to each factor found to influence the relative risk of an episode of pneumonia. These weights and factors are condition-specific and were estimated using pneumonia episode results for a large

population. The overall severity score for an episode is the sum of these weights for all factors observed. Using the severity score, a severity level is created, with each pneumonia episode assigned to one of four severity levels.

The approach used by ETG to assign episode severity has several advantages. First, the approach uses broad clinical profile of an episode, describing its clinical status and that of the patient. Second, the weightings assigned describe the incremental contribution of each factor to overall episode severity. Further, the approach used for severity is condition-specific – a separate model and weightings are constructed for each condition, including pneumonia. These severity results provide the key information required to support risk adjusted comparisons using pneumonia episodes.

Risk adjustment is an important step in resource use measurement. Measures of the cost of care for an organization or provider can be impacted by the underlying risk and severity of the patients they enroll or manage. Case-mix or risk adjustment addresses these differences and supports more consistent and equitable comparisons. These approaches allow a focus on differences in resource use deriving from differences in the practice of medicine rather than differences in the mix of episodes or patients.

The level of severity assigned by ETG to an episode is used to support risk adjustment. The risk adjustment approach includes three important steps:

-- Compute the observed experience for the provider being measured, across all episodes to be included in the comparison;

-- Compute the experience for peers or a best practice benchmark. Compute this experience at the level of the risk adjustment, in this case ETG base condition and severity level. For a peers benchmark, average cost per episode across all peers for the ETG base condition and episode level can be computed;

--Compare the observed experience with the risk adjusted peers or benchmark experience – often called the “expected” result. This expected result is adjusted to reflect both the peers/benchmark levels of performance and also the provider’s own case mix of episodes by condition and level of severity. The ratio of observed to expected results can be termed the relative cost ratio and is a risk adjusted measure.

The table in S10.1 provides an example comparing the cost of care performance of two cardiologists using episodes of care and the condition of CHF. The analysis used only complete, non-outlier CHF episodes. The upper section of the table summarizes results at the condition and severity level. A higher severity level for a condition indicates the presence of one or more condition status factors and/or co-morbidities that impact the resources required for treatment. The table also summarizes results for CHF, across all severity levels.

The table shows the number of episodes attributed to the cardiologist, the observed cost per episode, peers cost per episode (the “expected” amount), and the ratio of the cost per episode of the cardiologist to his peers. By condition and severity level, the peers cost per episode is the average experience of all cardiologists included in the measurement for those episodes. The peer’s experience is risk adjusted and assumes the same mix of episodes (by condition and severity) as the physician being measured. Notice that for the overall CHF summary, the peers cost per episode for Dr. Jones is \$2,081, while that amount for Dr. Smith is \$1,841. The higher amount for Dr. Jones indicates a higher case-mix and greater expected costs relative to Dr. Smith. These peer amounts, adjusted for the specific mix of episodes observed for the physician being measured, capture the risk adjustment appropriate for the analysis.

In the last column, a relative cost ratio less than 1.00 indicates that the observed cost per episode for a provider is less than his peers. As shown, Dr. Jones cost is lower than peers and Dr. Smith is higher cost than peers. An additional report using the same measure information could summarize results by type of service, or specific utilization such as the use of a specific diagnostic test or treatment, providing greater insights into the factors behind differences in resource use. The risk adjustment for these measures would use the same approach as described here for total cost per episode.

S.9.4. Detailed Risk Model Specifications *available at measure-specific Web page URL identified in S.1 OR in attached data dictionary/code list Excel or csv file.*

Attachment

S10_Risk Adjustment Method Example-634413225817356337.xls

S.9.5. Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, definitions, specific data collection items/responses, code/value sets)*

ETG stratifies episodes by the intensity of service, or total cost. For a given episode, a severity score is assigned based on demographic factors (gender and age) and the presence of comorbidities and complications. The determination of this severity score is described in sections 8.3, 8.4 and 8.5. Once a severity score is determined, a severity level, a number between 1 and 4 is assigned based on a table that relates severity levels to severity scores for each ETG. The method for determining the severity levels is described in section 8.5. The severity level can then be used to stratify episodes by severity, measured as resource consumption.)

S.9.6. Costing method

Detail the costing method including the source of cost information, steps to capture, apply or estimate cost information, and provide rationale for this methodology.

Other

The financial amounts used should be complete and valid, reflecting the total payments related to the service. The financial amount used in resource measurement should reflect all payments for a service, including those made to the provider by payer, patient and other entities. The allowed or equivalent payment is an example. The use of allowed payments provides the best estimate of the actual costs involved in delivering the medical and pharmacy services included in the measure. Allowed payments will reflect both the quantity of different services provided as well as the actual unit price of those same services. Allowed amounts are used extensively in the industry as a measure of cost of care, including comparison of physicians and delivery systems.

S.10. Type of score*(Select the most relevant):*

Continuous variable

Count

Rate/Proportion

Ratio

Attachment

If other:

Attachment:

S.11. Interpretation of Score *(Classifies interpretation of a ratio score(s) according to whether higher or lower resource use amounts is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score, etc.)*

The measures described in this submission include continuous cost measures, counts of utilization, rates and proportions (per episode), and the ratio of observed to expected results, based on risk adjusted comparisons.

For the continuous cost per episode measures (also a rate), an increase in costs can be interpreted as an increase in the resources used to diagnose, manage and treat the episodes in question. This score provides a representation of the weighted utilization expended, where the weights are based on the cost assigned to each individual service.

For the counts of utilization measures per 1,000 episodes (also a rate), an increase in utilization can be interpreted as an increase in the resources used to diagnose, manage and treat the episodes in question. This score provides a representation of un-weighted utilization. Counts of utilization measures are most useful when the services being aggregated are similar (e.g., inpatient admits, E&M visits, MRI services).

The risk adjusted observed to expected cost or utilization ratio (O/E ratio) includes three important steps:

-- Compute the observed experience for the provider being measured, across all episodes to be included in the comparison;

-- Compute the experience for peers or a best practice benchmark. Compute this experience at the level of the risk adjustment, in this case ETG base condition and severity level. For a peers benchmark, average cost per episode across all peers for the ETG base condition and episode level can be computed;

-- Compare the observed experience with the risk adjusted peers or benchmark experience – often called the “expected” result.

This expected result is adjusted to reflect both the peers/benchmark levels of performance and also the provider’s own case mix of episodes by condition and level of severity. The ratio of observed to expected results can be termed the relative cost ratio and is a risk adjusted measure.

The O/E ratio (relative resource use ratio) can be interpreted based on its magnitude and relationship to a peer average or other guidelines. A relative cost ratio less than 1.00 indicates that the observed resource use per episode for a provider is less than his peers. A relative cost ratio greater than 1.00 indicates that the observed resource use per episode for a provider is greater than his risk adjusted peers.

S.12. Detail Score Estimation (*Detail steps to estimate measure score.*)

The measures described in this submission include continuous cost measures, counts of utilization, rates and proportions (per episode), and the ratio of observed to expected results, based on risk adjusted comparisons. The continuous cost measures, counts of utilization, and rates per episode are described in detail in S9.5. The details involved in computing the O/E ratio measure is provided in S10.1.

Reporting Guidelines

This section is optional and will be available for users of the measure as guidance for implementation and reporting.

S.13.1. Describe discriminating results approach

Detail methods for discriminating differences (reporting with descriptive statistics--e.g., distribution, confidence intervals).

In all of these measures we end up with an O/E ratio for a provider. In order to determine the statistical accuracy of this measure we start by measuring the variance of this metric:

$Var(O/E)$

The Variance of this metric has been estimated by the following expression in a number of journal articles :

$Var(O/E) = (Sum(Var(O_i)) / [Sum(E_i)]^2$

Where $Var(O_i)$ is the variance for each of the physician's episodes across all episodes in it's statistical unit for the peer group.

Then the standard error (SE) for this measurement is $Sqrt(Var(O/E))$.

Finally, a 95% confidence interval could be calculated by:

$(O/E - 1.96 * SE, O/E + 1.96 * SE)$

Alternatively, a 90% confidence interval could be calculated by: $(O/E - 1.64 * SE, O/E + 1.64 * SE)$

Adams et al. BMC Health Services Research 2010, 10:57 <http://www.biomedcentral.com/1472-6963/10/57>

S.13.2. Detail attribution approach

Detail the attribution rules used for attributing resources/costs to providers (e.g., a proportion of total measure cost or frequency of visits during the measure's measurement period) and provide rationale for this methodology.

Attributing patients and episodes to appropriate physicians and groups is a challenging step in cost measurement. Over some period of time a patient can have multiple conditions and, in many cases, multiple providers caring for the same condition. For example, for an episode of hypertension, a patient can be managed by their primary care physician, an internist, and also receive services from a cardiologist. For a patient with coronary artery disease, an internist, a cardiologist, and a surgeon can all play a key role in providing the patient's care. A methodology is required to identify these episodes for a patient and the providers responsible for the services performed within those episodes.

As a guideline, some principles are involved in determining a valid approach to be used in assigning episodes:

-- The approach must be valid conceptually. It must be defensible, understandable and accepted by providers, health plans, and other users of the measurement results;

-- The approach must be supported by readily available information, including the outputs from an episode grouping;

-- The approach should be robust across applications -- working well for different sources of health plan data, patient populations and over time;

-- The approach should be flexible and consider the characteristics of the specialists being compared and the nature and severity of their patients and episodes;

-- Both activity-based and population-based approaches should be supported. An activity-based approach, describes attribution where an episode is assigned to the providers responsible for the greatest amount of activity during the course of the episode. Activity can be measured using different concepts including service costs, episode clusters, or patient visits.

A population, or panel-based approach is sometimes used when measuring performance for primary care physicians (PCPs), in particular where providers are performing a gatekeeper function for a population of members. In this case, responsibility for a member's qualified episodes of care may be attributed to the member's PCP -- whether or not the PCP provided any of the services for that member during those episodes.

- “Sufficient” evidence of the provider’s responsibility for the episode should exist. Thresholds should be considered that prevent providers from “winning” episodes where they have a small amount of involvement – relative to their physician peers or relative to all physicians involved in the episode.
- Attributing the same episode to multiple providers in different specialties should be considered, when appropriate.

Care during an episode can include two types of services: services where important clinical decisions are made regarding the course of care and services that are a response to those decisions. Office visits, consultations and other evaluation and management services are examples of the first type of services. As part of these services, decisions to perform tests, prescribe drugs or order other ancillary services are made. The second type of service includes diagnostic lab, imaging, other tests, DME, drug therapies and treatments. These services are typically responses to decisions made regarding the course of care. Some services, such as surgery, may describe a closely linked bundle of care and relate to both categories – where the surgeon has some role in the decision to perform the procedure and also performs the surgery itself.

The dichotomy above suggests two important concepts for assessing approaches to attribution. First, the measure of “activity” to be used in identifying a responsible provider should focus on those types of service where decisions regarding the course of care and management of the episode take place. Second, the decision on the approach to be used for attribution may differ by specialty. In the case of a group of providers such as surgeons, where the majority of their services may be of the second type – after the decision to undergo surgery has been made – using cost as the activity measure for attribution may make sense. However in the case of PCPs or medical specialists, non-acute E&M visits or the number of episode clusters (qualified services), may be a superior service activity measure for determining episode responsibility.

As a guideline, four different general options for physician episode attribution can be considered to attribute episodes to individual providers – three activity-based and one population-based approach. Each of these options can be supported using standard outputs from ETG and the measures described in this submission. For each option, the description below assumes the following steps have been performed prior to attribution:

- ETG episode grouping – producing the detail and summary output files to be used in attribution and measurement;
- Identification of the comparison peer group and the individual physicians to be included;
- The selection of qualified episodes for the peer group. Qualified episodes include those episodes with an ETG that matches the pre-defined list to be used for that peer group. Qualified episodes are further limited to complete, non-outlier episodes that fall within the time period defined for measurement.

For this discussion, it is assumed that the objective is to assign a single winner, if possible, for each peer group in which the episode is relevant, but allow providers in different peer groups to be assigned the same episode. To support this, the following logic would be applied separately, peer group by peer group. The activity-based options are described first. Although these approaches are described for attribution at the individual physician level, they could also be applied using physician groups as the unit for attribution.

Approach 1 - Physician Episode Attribution using Professional Service Costs. This attribution approach identifies the responsible physician for an episode as that provider rendering the greatest amount of professional service costs during the episode. Professional services are those performed by a clinician in managing and treating the patient during an episode of care, including visits and consultations, surgery and therapies. Professional services exclude inpatient and outpatient services billed by a facility and also typically exclude ancillary services, such as laboratory, imaging, DME, injectibles, medical and surgical supplies, transportation, pharmaceuticals, etc. One modification of the “professional services” to be used in this attribution approach that has been proposed by some is the use of information on the “ordering” provider, for a pharmacy prescription or diagnostic test. If available, this information could be used to extend the concept of services “rendered” by a professional provider. Some ETG users have assigned total costs for a cluster to the cluster provider as a way to extend this type of concept for attribution – the argument being that cluster ownership may suggest that the physician played an important role in the decisions to perform the ancillary services grouped to the cluster.

Using professional service costs for attribution involves the following steps:

- For each qualified episode, sum the costs of all professional services grouped to that episode, by physician.
- Identify those physicians with episode costs (if any) that are also included in the peer group being measured. Disregard any episodes without one or more physicians for that peer group;

- Identify the peer group physician with the greatest amount of total costs. If two or more peers are found to have the most costs, apply an appropriate "tie-breaker" to determine the winning physician (discussed below).
- For each physician, compute their professional costs, as a percentage of costs for all clinicians for the episode and also as a percentage of all costs for all physicians in the peer group. These amounts can be used to compare against percentage thresholds to determine the degree to which a provider is "dominant" within an episode (discussed below).

After application of appropriate tie-breaker and threshold comparisons, the peer group physician with greatest amount of professional costs, is the responsible provider for that episode for that peer group.

Approach 2 - Physician Episode Attribution using Episode Clusters. This attribution approach identifies the responsible physician for an episode as that provider in the peer group owning the greatest number of "clusters" within the episode.

As described in the attachment for S.2, other than the individual service, the cluster is the basic unit of an ETG episode. Episode clusters are created using anchor records. Anchor records represent services provided by a clinician engaging in the direct evaluation, management or treatment of a patient. Office visits, therapies, and surgical procedures are examples. An anchor record indicates that a clinician has evaluated a patient's illness and has decided on the types of services required to further identify and treat the patient's condition. ETG links an anchor record with related services to form a cluster. Clinically homogeneous clusters are then combined to create episodes of care.

The clinical nature of an episode cluster makes it a natural candidate as an activity measure for episode attribution. In particular, the anchor records that define a cluster represent those types of service where decisions regarding the course of care and management of an episode take place. An additional benefit of episode clusters is that an anchor record service for a cluster can reside in another episode of care, but the cluster and cluster provider can still be identified for the episode of interest.

Using episode clusters for attribution involves the following steps:

- For each qualified episode, sum the number of clusters "owned" by each clinician. The detail output file from ETG can be used for this purpose. For each service that can be assigned to an episode, the detail file identifies a unique cluster number and a cluster provider ID (same as the servicing provider ID for the cluster anchor record). Using this file, the unique cluster providers for an episode and the number of clusters each provider owns can be identified.

- Identify those physicians with episode clusters (if any) that are also included in the peer group being measured. Disregard any episodes without one or more cluster providers from that peer group;

- Identify the peer group physician with the greatest number of episode clusters. If two or more providers are found to have the most clusters, apply an appropriate "tie-breaker" to determine the winning provider (discussed below).

- For each peer group physician, compute their number of clusters, as a percentage of clusters for all clinicians for the episode and also as a percentage of all clusters for all physicians in that peer group. These amounts can be used to compare against percentage thresholds to determine the degree to which a provider is "dominant" within an episode (discussed below).

After application of appropriate tie-breaker and threshold comparisons, the peer group physician with greatest number of clusters is the responsible provider for that peer group.

Approach 3 - Physician Episode Attribution using Non-Acute Evaluation and Management (E/M) Visits. This attribution approach identifies the responsible physician for an episode as that physician providing the greatest number of non-acute E/M visits within the episode.

Non-Acute E/M services include office visits and consultations and other E/M services that occur outside of an acute setting where a provider is managing patients and their care. For example, these services exclude initial and subsequent inpatient visits, inpatient consultations, ER visits and critical care visits. It includes office visits and consults, home visits, SNF visits, psychiatric evaluations and therapy and preventive services.

The clinical nature of these services makes them a logical candidate as an activity measure for episode attribution. In particular, these services represent encounters where decisions regarding the course of care and management of an episode take place. This subset of services will be narrower than that described by episode clusters.

Using non-acute E/M visits for attribution involves the following steps:

- For each qualified episode, sum the number of non-acute E/M visits (visits) rendered by each clinician during the episode.

- Identify those physicians with these visits (if any) that are also included in the peer group being measured. Disregard any episodes without one or more visit providers from that peer group;

- Identify the peer group physician with the greatest number of visits. If two or more providers are found to have the most visits, apply an appropriate “tie-breaker” to determine the winning provider (discussed below).
- For each peer group physician, compute their number of visits, as a percentage of visits for all clinicians for the episode and also as a percentage of all visits for peer group physicians. These amounts can then be used to compare against percentage thresholds to determine the degree to which a provider is “dominant” within an episode (discussed below).

After application of appropriate tie-breaker and threshold comparisons, the peer group physician with greatest number of visits is the responsible provider for that episode for that peer group.

Approach 4 - Physician Episode Attribution using a Primary Care, Population-based Approach. As noted above, a “population” or “panel” based approach is sometimes used when measuring performance for peer groups comprised of primary care physicians. In particular, this approach is often considered where the PCPs are performing a gatekeeper function for a population of members. In this case, responsibility for a member’s qualified episodes of care may be attributed to the member’s PCP — whether or not the PCP provided any of the services for that member during those episodes.

This approach requires two important steps:

- Identification of a PCP for each member. This identification can often be obtained from the member’s eligibility record which can include a notation of their assigned PCP for a period of time. Alternatively, a PCP can be “imputed” for a member based on that primary care specialist providing the greatest number of services or service costs for selected primary care. When imputing, the list of eligible providers is typically limited to those physicians involved in primary care. Using either approach, a member is linked to a PCP for a defined period of time.
- For each qualified episode, identify the patient’s assigned PCP during the episode period. Most users of this approach will select the member’s assigned PCP at the beginning or ending date of the episode (episode begin and end date is available as part of the standard ETG output).

Using this approach, the peer group physician would be assigned all qualified episodes where they were determined to be the patient’s PCP during the defined time period.

Physician Episode Attribution – Other Issues. Some general issues around episode attribution remain. The first involves tie-breakers. When using activity-based attribution for some episodes, two or more providers may have the same amount of costs, clusters or visits. In this case, a tie-breaker is often applied to determine the responsible physician for the episode. Useful candidates for this purpose are the alternative activity measures described here. For example, if two physicians own the same number of clusters within an episode, the physician with the greatest amount of professional services costs could be selected. If a tie still remains, the physician with the greatest number of visits could be chosen, and so on.

A second issue involves setting appropriate thresholds to determine sufficient activity. As noted above, most activity-based attribution approaches involve some screening of the winning provider to ensure that they owned sufficient activity relative to their peers and to other providers during the course of the episode. This is typically done using two threshold comparisons – a provider’s percentage of the total activity of peers and a provider’s percentage of the total activity described by all clinicians for the episode. This percentage is then compared to a predefined threshold(s). For the physician with the greatest activity, if their percentages exceed both of these thresholds, they are determined to be responsible for the episode.

As an example, for an episode with 10 clusters, Dr. Jones is responsible for 2 of the 10 clusters and 8 other physicians are responsible for 1 cluster each. Even though Dr. Jones has the most clusters, he still may not be assigned the episode because his involvement was very small.

Most users set these thresholds at 25 or 30 percent. For example, the winning provider must own 25% or more of all of the episode clusters owned by peers and 25% or more of all episode clusters owned by all clinicians.

As a final point, it is useful to summarize the issues around allowing an episode to be attributed to multiple providers. As noted above, many ETG users who employ episode results to support physician measurement perform attribution separately for each specialty peer group of interest, including primary care. In doing this, they select a single winner, if possible, for each peer group in which the episode is relevant, but allow providers in different peer groups to be assigned the same episode, if attribution requirements are met.

In this way, it is theoretically possible to assign more than one physician to an episode if each peer group is considered separately. Users typically do not assign two physicians from the same peer group to the same episode.

To support multiple attribution across peer groups, users would repeat the attribution step selected from above separately for each peer group. Those physicians both meeting the dominant provider status for their peer group and also exceeding the threshold requirements could be responsible for the episode.

S.13.3. Identify and define peer group

Identify the peer group and detail how peer group is identified and provide rationale for this methodology.

Peer groups define the group of physicians being compared. For example, a common practice in physician episode measurement is to assess the actual costs for those episodes attributed to an individual physician or practice and compare actual costs to peer results, risk adjusted to support more valid comparisons. The peer values use in these comparisons will be influenced by the selection of providers included in the peer group.

In defining a peer group for cost of care measurement, most organizations will include physicians from the same specialty or area of expertise. For organizations with a network covering broad geographic area, some distinction by provider geography can also be used. Internal medicine, cardiology, or general surgery within a certain geographic area are examples of a peer group. Although not directly related to defining a group of providers as peers, many organizations provide separate measurements by line of business, separating results and peer comparisons by commercial, Medicare and Medicaid products.

S.13.4. Sample size

Detail the sample size requirements for reporting measure results.

The choice of sample size is less important using techniques that include statistical methods that find only statistically significant difference. If your choice of sample size is low, you will not find many cases that are statistically significantly different. A sample size of 30 is chosen because this is when the normal distribution is a good approximation of the student's t distribution. However, the choice of sample size is less critical when using tests of statistical significance.

S.13.5. Define benchmarking and comparative estimates

Detail steps to produce benchmarking and comparative estimates and provide rationale for this methodology.

The response to section S10.1 includes examples on how to compare the results for a physician with that of their peers or with external best practice benchmarks. As a guideline, in making comparative estimates, the following considerations should be made:

-- As described in S10.1, comparative results should be risk adjusted to support more valid comparisons;

-- Differences in fee schedules and contracts – for some comparisons using cost of care, differences between actual practice and the benchmark can be influenced by different unit pricing assumptions. In these cases standard pricing or general adjustments to cost levels can be made; and

-- Practice styles and service utilization can differ between geographic areas and also between physicians in different specialties. Although comparisons across areas and specialties can provide insights, proper care should be taken in interpreting and communicating results.

Validity – See attached Measure Testing Submission Form

SA.1. Attach measure testing form

[SA_Reliability_VValidity Testing_Pneumonia-635193841576031191.xls](#)

Feasibility

F.1. Byproduct of Care Processes

For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).

F.1.1. Data Elements Generated as Byproduct of Care Processes.

Generated by and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition
Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims)

If other:

F.2. Electronic Sources

The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

F.2.1. To what extent are the specified data elements available electronically in defined fields (i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields)

ALL data elements are in defined fields in electronic claims

F.2.1a. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources.

F.2.2. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL.

Attachment:

F.3. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

F.3.1. Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.

The measure is in use beyond internal QI. Please see the section on Usability.

F.3.2. Describe any fees, licensing, or other requirements to use any aspect of the measure as specified (e.g., value/code set, risk model, programming code, and algorithm)?

F.3.3. If there are any fees associated with the use of this measure as specified, attach the fee schedule here. (Save file as: F3_3_FeeSchedule)

Usability and Use

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making.

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

U.1.1. Current and Planned Use

Specific Plan for Use	Current Use (for current use provide URL)
Public Reporting	
Payment Program	
Quality Improvement (Internal to the specific organization)	

U.1.2. For each CURRENT use, checked above, provide:

- Name of program and sponsor
- Purpose

- Geographic area and number and percentage of accountable entities and patients included

U.1.3. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)

U.1.4. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)

U.2.1. Progress on Improvement. (Not required for initial endorsement unless available.) Performance results on this measure (current and over time) should be provided in IM.2.2 and IM.2.4.

Discuss:

- Purpose Progress (trends in performance results)
- Geographic area and number and percentage of accountable entities and patients included

U.2.2. If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

U.3.1. Were any unintended negative consequences to individuals or populations identified during testing; OR has evidence of unintended negative consequences to individuals or populations been reported since implementation? If so, identify the negative unintended consequences and describe how benefits outweigh them or actions taken to mitigate them.

The main source of inaccuracies relate to small sample size. There are lower limits on the number of episodes for a given provider or specialty that are allowed for inclusion in the analysis. Sample sizes that are determined to be too small are eliminated from the analysis.

These situations will occur infrequently, as the sample sizes that are customarily dealt with are very large. A methodology for applying statistical techniques to determine confidence intervals of the results has been created and can be applied to gauge the accuracy of the analysis. In addition, sample size is less of an issue when multiple episode types are combined for a single metric.

In some cases, there are physicians that are "ultra" specialized that may not have a reasonably sized peer group for comparison. Sub-specialties like hepatology, or muscular dystrophy specialists may fall into this category.) A second source of potential inaccuracies relate to the validity and completeness of the administrative data available to support the measurement. As described in S6.1, a careful evaluation of the data to be used to support the measurement is required and actions taken to address identified issues.

Related or Competing Measures

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure.

H.1. Relation to Other NQF-endorsed Measures

If there are related measures (conceptually, either same measure focus or target population) or competing measures (conceptually both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.

H.1.1. List of related or competing measures (selected from NQF-endorsed measures)

H.1.2. If related or competing measures are not NQF endorsed please indicate measure title and steward.
H.2. Harmonization H.2.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s): Are the measure specifications completely harmonized? H.2.2. If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.
H.3. Competing Measure(s) H.3.1. If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s): Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)

Contact Information
Co.1 Measure Steward (Intellectual Property Owner): Optum Co.2 Point of Contact: Steven, Pranke , steve.prnake@optum.com , 801-982-3415- Co.3 Measure Developer if different from Measure Steward: Ingenix Co.4 Point of Contact: Dan, Dunn , daniel.dunn@ingenixconsulting.com , 781-419-8425-
Additional Information
Ad.1 Workgroup/Expert Panel involved in measure development List the workgroup/panel members' names and organizations. Describe the members' role in measure development.
Measure Developer/Steward Updates and Ongoing Maintenance Ad.2 Year the measure was first released: Ad.3 Month and Year of most recent revision: Ad.4 What is your frequency for review/update of this measure? Ad.5 When is the next scheduled review/update for this measure?
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