Quality Payment
PROGRAM

Respiratory Infection Hospitalization Measure

Merit-based Incentive Payment System (MIPS): Measure Information Form (MIF)

2025 Performance Period

Table of Contents

1.0 Introduction

This document details the methodology for the Respiratory Infection Hospitalization measure and should be reviewed along with the Respiratory Infection Hospitalization Measure Codes List file, which contains the medical codes used in constructing the measure.

1.1 Measure Name

Respiratory Infection Hospitalization episode-based cost measure

1.2 Measure Description

Episode-based cost measures represent the cost to Medicare for the items and services provided to a patient during an episode of care ("episode"). In all supplemental documentation, "cost" generally means the standardized[1] Medicare allowed amount,[2] and claims data from Medicare Parts A and B are used to construct the episode-based cost measures.

The Respiratory Infection Hospitalization episode-based cost measure evaluates a clinician's risk-adjusted cost to Medicare for patients who receive inpatient treatment for a respiratory infection during the performance period. The measure score is the clinician's risk-adjusted cost for the episode group averaged across all episodes attributed to the clinician. This acute inpatient medical condition measure includes costs of services that are clinically related to the attributed clinician's role in managing care during each episode from the clinical event that opens, or "triggers," the episode through 30 days after the trigger.

1.3 Measure Rationale

Pneumonia is a leading infectious cause of hospitalization and death among adults in the United States.[3] Respiratory infections are also a significant cause of morbidity and mortality in the older adult populations, who may be more susceptible to respiratory conditions due to factors such as greater comorbidities, potential for compromised immune systems, or higher likelihood of malnutrition that are often associated with age.[4,5] For individuals over 65 years old, mortality rates increases by approximately 6-7% with the presence of respiratory infections.[6] As such, respiratory conditions represent a significant share of US health care spending, totaling $170.8

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[1] Claim payments are standardized to account for differences in Medicare payments for the same service(s) across Medicare providers. Payment standardized costs remove the effect of differences in Medicare payment among health care providers that are the result of differences in regional health care provider expenses measured by hospital wage indexes and geographic price cost indexes (GPCIs) or other payment adjustments such as those for teaching hospitals. For more information, please refer to the "CMS Part A and Part B Price (Payment) Standardization - Basics" and "CMS Part A and Part B Price (Payment) Standardization - Detailed Methods" documents posted on the CMS Price (Payment) Standardization Overview page. (https://resdac.org/articles/cms-price-payment-standardization-overview).

[2] Cost is defined by allowed amounts on Medicare claims data, which include both Medicare trust fund payments and any applicable beneficiary deductible and coinsurance amounts.

[3] Regunath, Hariharan, and Yuji Oba. "Community-Acquired Pneumonia." National Library of Information, August 8, 2022. https://www.ncbi.nlm.nih.gov/books/NBK430749

[4] Rojas, Mauricio, Ana L Mora, Maria Kapetanaki, Nathaniel Weathington, Mark Gladwin, and Oliver Eickelberg. "Aging and Lung Disease. Clinical Impact and Cellular and Molecular Pathways." Annals of the American Thoracic Society. U.S. National Library of Medicine, December 2015. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6137674

[5] Akhtar, Ali, Mohamed Azmi Ahmad Hassali, Hadzliana Zainal, Irfhan Ali, Muhammad Shahid Iqbal, and Amer Hayat Khan. "Respiratory-Tract Infections among Geriatrics: Prevalence and Factors Associated with the Treatment Outcomes." Therapeutic advances in respiratory disease. U.S. National Library of Medicine, 2021. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8108383

[6] Ibid.

billion in 2016.[7] Given the prevalence of respiratory infections in the Medicare population and increase in associated health care expenditures, the Respiratory Infection Hospitalization measure represents an opportunity for improvement on overall cost performance.

The Simple Pneumonia with Hospitalization episode-based cost measure, which preceded the Respiratory Infection Hospitalization measure, was originally selected for development based on input from an expert clinician committee—the Pulmonary Disease Management Clinical Subcommittee—because of its impact in terms of patient population and clinician coverage, and the opportunity for incentivizing cost-effective, high-quality clinical care in this clinical area. This Clinical Subcommittee, which was originally convened during Wave 1 of episode-based cost measure development and met several times throughout 2017 to provide input on the full measure specifications, was reconvened as a workgroup in October 2022 to discuss updates to the measure as a part of the comprehensive measure reevaluation process, resulting in the Respiratory Infection Hospitalization measure.

1.4 Measure Numerator

The cost measure numerator is the sum of the ratio of observed to expected[8] payment-standardized cost to Medicare for all Respiratory Infection Hospitalization episodes attributed to a clinician. This sum is then multiplied by the national average observed episode cost to generate a dollar figure.

1.5 Measure Denominator

The cost measure denominator is the total number of episodes from the Respiratory Infection Hospitalization episode group attributed to a clinician.

1.6 Data Sources

The Respiratory Infection Hospitalization cost measure uses the following data sources:

- Medicare Part A and B claims data from the Common Working File (CWF)
- Enrollment Data Base (EDB)
- Long Term Care Minimum Data Set (LTC MDS)[9]

1.7 Care Settings

Methodologically, the Respiratory Infection Hospitalization cost measure can be triggered based on claims data from: acute inpatient (IP) hospitals.

1.8 Cohort

The cohort for this cost measure consists of patients who are Medicare beneficiaries enrolled in Medicare fee-for-service and who receive inpatient treatment for a respiratory infection that triggers a Respiratory Infection Hospitalization episode.

The cohort for this cost measure is also further refined by the definition of the episode group and measure-specific exclusions (refer to Section 4).

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[7] Duan, Kevin I, Maxwell Birger, David H Au, Laura J Spece, Laura C Feemster, and Joseph L Dieleman. "U.S. Health Care Spending on Respiratory Diseases, 1996-2016." ATS Journals. American Journal of respiratory and Critical Care Medicine, August 23, 2022. https://www.atsjournals.org/doi/abs/10.1164/rccm.202202-0294OC?journalCode=ajrccm

[8] Expected costs refer to costs predicted by the risk adjustment model. For more information on expected costs and risk adjustment, please refer to Section 4.5.

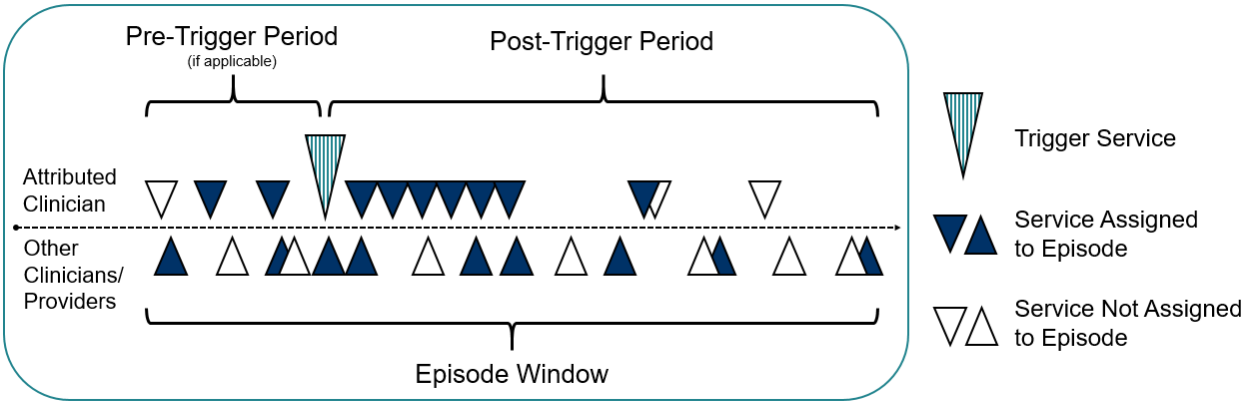
[9] For information on how LTC MDS data are used in risk adjustment, please refer to Section 4.5.

2.0 Methodology Steps

There are 2 overarching processes in calculating episode-based cost measure scores: episode construction (Steps 1-3) and measure calculation (Steps 4-6). This section provides a brief one-page summary of these processes for the Respiratory Infection Hospitalization cost measure. Section 4 describes the processes in detail.

1. **Trigger and define an episode**: Episodes are defined by billing codes that open, or "trigger," an episode. The episode window starts on the day of the trigger and ends 30 days after the trigger. To enable meaningful clinical comparisons, episodes are placed into more granular, mutually exclusive and exhaustive sub-groups based on clinical criteria. Some episodes may also be excluded based on other information available at the time of the trigger.
2. **Attribute the episode to a clinician**: For this acute inpatient medical condition episode group, an attributed clinician is a clinician who bills Part B Physician/Supplier (Carrier) claims for IP evaluation and management (E/M) service(s) provided during the trigger IP stay.
3. **Assign costs to the episode and calculate the episode observed cost**: Clinically related services occurring during the episode window are assigned to the episode. The cost of the assigned services is summed to determine each episode's standardized observed cost.

Figure 1. Diagram Showing an Example of a Constructed Episode for a Cost Measure



4. **Exclude episodes**: Exclusions remove unique groups of patients from cost measure calculation in cases where it may be impractical and unfair to compare the costs of caring for these patients to the costs of caring for the cohort at large.
5. **Calculate expected costs for risk adjustment**: Risk adjustment aims to isolate variation in clinician costs to only the costs that clinicians can reasonably influence (e.g., accounting for patient age, comorbidities and other factors). A regression analysis is run using the risk adjustment variables as covariates to estimate the expected cost of each episode. Then, statistical techniques are applied to reduce the effect of extreme outliers on measure scores.
6. **Calculate the measure score:** For each episode, the ratio of standardized total observed cost (from Step 3) to risk-adjusted expected cost (from Step 5) is calculated and averaged across all of a clinician's or clinician group's attributed episodes to obtain the average episode cost ratio. The average episode cost ratio is multiplied by the national average observed episode cost to generate a dollar figure for the cost measure score.

3.0 Measure Specifications Quick Reference

This section provides a quick, at-a-glance reference for the Respiratory Infection Hospitalization episode-based cost measure specifications. More details on each component can be found in Section 4, and the full list of codes and logic used to define each component can be found within the Measure Codes List file.

Episode Window: During what time period are costs measured?

Pre-Trigger Window: 0 days Post-Trigger Window: 30 days

Triggers: Patients receiving what medical care are included in the measure?

- Medicare Severity Diagnosis-Related Group (MS-DRG) code for respiratory infections (177, 178, 179) or simple pneumonia (193, 194, 195)

Sub-Groups: What are the mutually exclusive types of episodes?

1. Respiratory Infections and Inflammations
2. Simple Pneumonia and Pleurisy

Service Assignment: Which clinically related costs are included in the measure?

Assigned services generally fall within the following clinical themes:

- Respiratory Infection-Specific Complications
- Antibiotic-Related Complications
- Comorbidity Complications
- Non-Pulmonary Complications
- Post-Acute Care

Risk Adjustors: Which risk factors are accounted for in the risk adjustment model?

- Standard risk adjustors, including comorbidities captured by 86 Hierarchical Condition Category (HCC) codes that map with thousands of ICD-10-CM diagnosis codes, interaction variables accounting for a range of comorbidities, patient age category, patient disability status, patient end-stage renal disease (ESRD) status, and recent use of institutional long-term care.
- Measure-specific risk adjustors including asthma, acid-base disorders, COVID-19, pleural effusion/thoracentesis, dementia, limited mobility, recent use of long-term assisted care within 30 days, recent all-cause admission in prior 120 days, and prior oxygen use/respiratory failure.
- For the full list of standard and measure-specific risk adjustment variables, please reference the “RA” and “RA_Details” tabs of the Measure Codes List file.

Exclusions: Which populations are excluded from measure calculation?

- Standard exclusions to ensure data completeness:
  - The patient has a primary payer other than Medicare for any time overlapping the episode window or 120-day lookback period prior to the trigger day.
  - The patient was not enrolled in Medicare Parts A and B for the entirety of the lookback period plus episode window, or was enrolled in Part C for any part of the lookback plus episode window.
  - No clinician group (identified by Taxpayer Identification Number, or TIN) is attributed the episode.
  - The patient’s date of birth is missing.
  - The patient’s death date occurred before the episode ended.
  - The trigger IP stay has the same admission date as another IP stay.
  - The IP facility is not a short-term stay acute hospital as defined by subsection (d).[10]
- Measure-specific exclusions including pleurisy diagnosis, pleural conditions, pleural plaque, chest trauma, chest wall myopathy, epidemic myalgia, fibrothorax, influenza due to avian flu, adverse effects of glucocorticoids, hospitalizations for certain non-pneumonia infection/reaction diagnoses, and patients discharged against medical advice. For the full list of measure-specific exclusions, please reference the "Exclusions" and "Exclusions_Details" tabs of the Measure Codes List file.

[10] For more information on short-term stay acute hospitals as defined by subsection (d), please refer to Section 4.4.

4.0 Detailed Measure Methodology

This section contains the technical details for the 2 overarching processes in calculating episode-based cost measure scores in more detail: Sections 4.1 through 4.3 describe episode construction and Sections 4.4 through 4.6 describe measure calculation.

4.1 Trigger and Define an Episode

Respiratory Infection Hospitalization episodes are defined by Medicare Severity Diagnosis-Related Group (MS-DRG) codes that open, or trigger, an episode. Specifically, episodes are triggered by the occurrence of IP E/M codes on Part B Physician/Supplier claims during an IP facility stay with a specified MS-DRG. For the codes and logic relevant to this section please refer to the "Triggers" tab(s) in the Respiratory Infection Hospitalization Measure Codes List.

The steps for defining an episode for the Respiratory Infection Hospitalization episode group are as follows:

- **Identify** IP stays with positive standardized payment that have a trigger code specified in the “Triggers” and “Triggers_Details” tabs of the Respiratory Infection Hospitalization Measure Codes List file.
- **Identify** Part B Physician/Supplier claim lines with positive standardized payment that meet the following conditions:
    - They have a relevant inpatient Current Procedural Terminology / Healthcare Common Procedure Coding System (CPT/HCPCS) E/M code as listed in the “Attribution” tab of the Respiratory Infection Hospitalization Measure Codes List file.
    - They were billed by a clinician of a specialty that is eligible for MIPS.
- **Trigger** an episode for an identified IP stay if at least one identified Part B Physician/Supplier claim line has an expense date that occurs during the IP stay.
- **Establish** the episode window as follows:
    - Establish the episode trigger date as the IP stay admission date.
    - Establish the episode start date as the episode trigger date.
    - Establish the episode end date as 30 days after the episode trigger date.

Once a Respiratory Infection Hospitalization episode is triggered, the episode is placed into one of the episode sub-groups to enable meaningful clinical comparisons. Sub-groups represent more granular, mutually exclusive and exhaustive patient populations defined by clinical criteria (e.g., information available on the patient’s claims at the time of the trigger). Sub-groups are useful in ensuring clinical comparability so that the corresponding cost measure fairly compares clinicians with a similar patient case-mix.

Codes used to define the sub-groups can be found in the “Sub_Groups_Details” tab of the Respiratory Infection Hospitalization Measure Codes List file. This cost measure has 2 sub-groups:

- Respiratory Infections and Inflammations
- Simple Pneumonia and Pleurisy

4.2 Attribute Episodes to a Clinician

Once an episode has been triggered and defined, it is attributed to one or more clinicians of a specialty that is eligible for MIPS. Clinicians are identified by Taxpayer Identification Number (TIN) and National Provider Identifier (NPI) pairs (TIN-NPI), and clinician groups are identified by TIN. Only clinicians of a specialty that is eligible for MIPS or clinician groups where the triggering clinician is of a specialty that is eligible for MIPS are attributed episodes. For codes

relevant to this section, please refer to the "Attribution" tab of the Respiratory Infection Hospitalization Measure Codes List. For an example of how attribution works for acute inpatient medical condition episodes, please refer to Appendix A.

The steps for attributing a Respiratory Infection Hospitalization episode are as follows:

- **Identify** Part B Physician/Supplier claim lines for which all of the following conditions are true:
  - They have an expense date concurrent to the trigger IP stay.
  - They have a CPT/HCPCS code included in the list of IP E/M codes for TIN-NPI attribution.
- **Attribute** an episode to a TIN if that TIN billed at least 30% of the IP E/M codes on identified Part B Physician/Supplier claim lines during the trigger IP stay.
- **Attribute** the episode to a TIN-NPI if a clinician within an attributed TIN billed any IP E/M codes on identified Part B Physician/Supplier claim lines during the IP stay.

Future attribution rules may benefit from the implementation of patient relationship categories[11] and codes.[12] As required by Section 101(f) of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), CMS will consider how to incorporate the patient relationship categories into episode-based cost measurement methodology as clinicians and billing experts gain experience with them.[13]

4.3 Assign Costs to an Episode and Calculate Total Observed Episode Cost

Services, and their Medicare costs, are assigned to an episode only when clinically related to the attributed clinician's role in managing patient care during the episode. Assigned services may include treatment and diagnostic services, ancillary items, services directly related to treatment, and those furnished as a consequence of care (e.g., complications, readmissions, unplanned care, and emergency department visits). Unrelated services are not assigned to the episode. For example, the cost of care for a chronic condition that occurs during the episode but is not related to the clinical management of the patient relative to the inpatient treatment for respiratory infection would not be assigned.

To ensure that only clinically related services are included, services during the episode window are assigned to the episode based on a series of service assignment rules, which are listed in the "Service_Assignment" tab of the Respiratory Infection Hospitalization Measure Codes List file.

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[11] The MACRA Patient Relationship Categories aim to distinguish the relationship and responsibility of a clinician with a patient at the time of furnishing an item or service, thereby facilitating the attribution of patients and episodes to one or more clinicians for purposes of measure score calculations. For more information on Patient Relationship Categories, please refer to the Patient Relationship Categories and codes operational list. (https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/CMS-Patient-Relationship-Categories-and-Codes.pdf)

[12] The MACRA Patient Relationship Codes are Healthcare Common Procedure Coding System (HCPCS) Level II modifier codes that clinicians report on claims to identify their patient relationship category. For the Patient Relationship Codes, please refer to Table 27 of the CY 2018 Physician Fee Schedule final rule. (https://www.federalregister.gov/d/2017-23953/p-2203)

[13] For more information on the Patient Relationship Categories and Codes, please download the Patient Relationship Categories and Codes FAQ. (https://qpp-cm-prod-content.s3.amazonaws.com/uploads/236/Patient-Relationship-Categories-and-Codes-webinar-FAQ.pdf)

For the Respiratory Infection Hospitalization episode group, only services performed in the following service categories are considered for assignment to the episode costs:

- Emergency Department (ED)
- Outpatient (OP) Facility and Clinician Services
- IP - Medical
- IP - Surgical
- Inpatient Rehabilitation Facility (IRF) - Medical
- Durable Medical Equipment, Prosthetics, Orthotics, and Supplies (DME)
- Home Health (HH)

In addition to service category, service assignment rules may be modified based on the service category in which the service is performed, as listed above. Service assignment rules may also be defined based on specific (i) service information alone or service information combined with diagnosis information, (ii) prior incidence of service, and/or (iii) the timing of the service, as detailed below.

- Services may be assigned to the episode based on the following service information combinations:
    - High level service code alone
    - High level service code combined with first 3 digits of the International Classification of Diseases – 10th Revision diagnosis code (3-digit ICD-10 diagnosis code)
    - High level service code combined with full ICD-10 diagnosis code
    - High level service code combined with more specific service code
    - High level service code combined with more specific service code and with 3-digit ICD-10 diagnosis code
    - High level service code combined with more specific service code and with full ICD-10 diagnosis code
- Assigned services may be further refined by prior incidence of service or diagnosis:
    - Services may be assigned unconditionally (regardless of prior incidence of the service in patient's recent claims history).
    - Services may be assigned if newly occurring.
    - Services may be assigned in combination with a diagnosis if the service is newly occurring.
    - Services may be assigned in combination with a diagnosis if the diagnosis is newly occurring.
    - Services may be assigned in combination with a diagnosis if either the service OR the diagnosis are newly occurring.
    - Services may be assigned in combination with a diagnosis if both the service AND the diagnosis are newly occurring.
- Services as defined by the applicable combinations and incidence options above may be assigned with only specific timing:
    - Services may be assigned based on whether or not the service occurs before the trigger (in the pre-trigger window) and/or after the trigger (in the post-trigger window).
    - Services may be assigned only if they occur within a particular number of days from the trigger within the episode window, and services may be assigned for a period shorter than the full duration of the episode window.

The steps for assigning costs are as follows:

- **Identify** all services on claims with positive standardized payment that occur within the episode window.
- **Assign** identified services to the episode based on the types of service assignment rules described above.
- **Assign** skilled nursing facility (SNF) claims based on the following criteria:
    - Identify SNF claims for which both (i) the SNF claim's qualifying IP stay is the IP stay during which the trigger occurs and (ii) the SNF claim occurs during the episode window.
    - For those identified SNF claims, assign the percentage of the claim amount proportional to the portion of the SNF claim that overlaps with the episode window.
- **Assign** all claims with trigger codes occurring during the trigger day/stay.
- **Assign** all physician claims and DME claims occurring during the concurrent IP stay as applicable.
- **Assign** all IP evaluation and management (E/M) claims during IP stays in the post-trigger window assigned to episode as applicable.
- **Sum** standardized Medicare allowed amounts for all claims assigned to each episode to obtain the standardized total observed episode cost.

Service Assignment Example

- Clinician A provides inpatient treatment for a respiratory infection for Patient K. This service triggers a Respiratory Infection Hospitalization episode, which is attributed to Clinician A.
- Clinician B provides an outpatient post-discharge follow-up visit shortly after discharge, which is considered a clinically related service, during the episode window.
- Because post-discharge outpatient follow-up visit during the episode window is considered to be clinically related to the initial inpatient treatment for the respiratory infection, the cost of the post-discharge outpatient follow-up visit will be assigned to Clinician A's Respiratory Infection Hospitalization episode.

4.4 Exclude Episodes

Before measure calculation, episode exclusions are applied to remove certain episodes from measure score calculation. Certain exclusions are applied across all acute inpatient medical condition episode groups, and other exclusions are specific to this measure, based on consideration of the clinical characteristics of a homogenous patient cohort. The measure-specific exclusions are listed in the "Exclusions" and "Exclusions_Details" tabs in the Respiratory Infection Hospitalization Measure Codes List file.

The steps for episode exclusion are as follows:

- **Exclude** episodes from measure calculation if:
    - The patient has a primary payer other than Medicare for any time overlapping the episode window or 120-day lookback period prior to the trigger day.
    - The patient was not enrolled in Medicare Parts A and B for the entirety of the lookback period plus episode window, or was enrolled in Part C for any part of the lookback plus episode window.
    - No TIN is attributed the episode.
    - The patient's date of birth is missing.
    - The patient's death date occurred before the episode ended.
    - The trigger IP stay has the same admission date as another IP stay.

    - The IP facility is not a short-term stay acute hospital as defined by subsection (d).[14]
- **Apply** measure-specific exclusions, which check the patient's Medicare claims history for certain billing codes (as specified in the Measure Codes List file) that indicate the presence of a particular procedure, condition, or characteristic.

4.5 Estimate Expected Costs through Risk Adjustment

Risk adjustment is used to estimate expected episode costs in recognition of the different levels of care patients may require due to comorbidities, disability, age, and other risk factors. The risk adjustment model includes variables from the CMS Hierarchical Condition Category Version 24 (CMS-HCC V24) 2021 Risk Adjustment Model,[15] as well as other standard risk adjustors (e.g., patient age) and variables for clinical factors that may be outside the attributed clinician's reasonable influence. A full list of risk adjustment variables can be found in the "RA" and "RA_Details" tabs of the Respiratory Infection Hospitalization Measure Codes List file.

Steps for defining risk adjustment variables and estimating the risk adjustment model are as follows:

- **Define** HCC and episode group-specific risk adjustors using service and diagnosis information found on the patient's Medicare claims history in the 120-day period prior to the episode trigger day (or the timing specified in the "RA_Details" tab of the Measure Codes List file) for certain billing codes that indicate the presence of a procedure, condition, or characteristic.
- **Define** other risk adjustors that rely upon Medicare beneficiary enrollment and assessment data as follows:
    - Identify patients who are originally "Disabled without ESRD" or "Disabled with ESRD" using the original reason for joining Medicare field in the Medicare beneficiary EDB.
    - Identify patients with ESRD if their enrollment indicates ESRD coverage, ESRD dialysis, or kidney transplant in the Medicare beneficiary EDB in the lookback period.
    - Identify patients who have spent at least 90 days in a long-term care institution without having been discharged to the community for 14 days, based on LTC MDS assessment data, during the lookback period.
- **Drop** risk adjustors that are defined for less than 15 episodes nationally for each sub-group to avoid using very small samples.
- **Categorize** patients into age ranges using their date of birth information in the Medicare beneficiary EDB. If an age range has a cell count less than 15, collapse this in the next adjacent age range category towards the reference category (65-69).
- **Include** the MS-DRG of the episode's trigger IP stay as a categorical risk adjustor.

[14] Only stays at IP facilities that are paid under a short-term stay acute hospital as defined by subsection (d) will be included. Subsection (d) hospitals are hospitals in the 50 states and D.C. other than: psychiatric hospitals, rehabilitation hospitals, hospitals whose inpatients are predominantly under 18 years old, hospitals whose average inpatient length of stay exceeds 25 days, and hospitals involved extensively in treatment for or research on cancer. For details on the identification of these hospitals, please refer to the CMS Certification Number (CCN) definitions for Short-term (General and Specialty) Hospitals facility types in Chapter 2, Section 2779A1 of the CMS State Operation Manual. (https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/som107c02.pdf)

[15] CMS uses an HCC risk adjustment model to calculate risk scores. The HCC model ranks diagnoses into categories that represent conditions with similar cost patterns. Higher categories represent higher predicted healthcare costs, resulting in higher risk scores. The 86 HCC codes included in the CMS-HCC V24 model are mapped to thousands of ICD-10-CM diagnosis codes.

- **Run** an ordinary least squares (OLS) regression model to estimate the relationship between all the risk adjustment variables and the dependent variable, the standardized observed episode cost, to obtain the risk-adjusted expected episode cost. A separate OLS regression is run for each episode sub-group nationally.
- **Winsorize**[16] expected costs as follows.
    - Assign the value of the 0.5th percentile to all expected episode costs below the 0.5th percentile.
    - Renormalize[17] values by multiplying each episode's winsorized expected cost by the sub-group's average expected cost, and dividing the resultant value by the sub-group's average winsorized expected cost.
- **Exclude**[18] episodes with outliers as follows. This step is performed separately for each sub-group.
    - Calculate each episode's residual as the difference between the re-normalized, winsorized expected cost computed above and the observed cost.
    - Exclude episodes with residuals below the 1st percentile or above the 99th percentile of the residual distribution.
    - Renormalize the resultant expected cost values by multiplying each episode's winsorized expected costs after excluding outliers by the sub-group's average standardized observed cost after excluding outliers, and dividing by the sub-group's average winsorized expected cost after excluding outliers.

4.6 Calculate Measure Scores

Measure scores are calculated for a TIN or TIN-NPI as follows:

- Calculate the ratio of observed to expected episode cost for each episode attributed to the clinician/clinician group.
- Calculate the average ratio of observed to expected episode cost across the total number of episodes attributed to the clinician/clinician group.
- Multiply the average ratio of observed to expected episode cost by the national average observed episode cost to generate a dollar figure representing risk-adjusted average episode cost.

The clinician-level or clinician group practice-level risk-adjusted cost for any attributed clinician (or clinician group practice) "j" can be represented mathematically as:

$$Measure\ Score_j = \left(\frac{1}{n_j}\sum_{i \in I_j}\frac{Y_{ij}}{\widehat{Y_{ij}}}\right)\left(\frac{1}{n}\sum_{j}\sum_{i \in \{I_j\}} Y_{ij}\right)$$

[16] Winsorization aims to limit the effects of extreme values on expected costs. Winsorization is a statistical transformation that limits extreme values in data to reduce the effect of possible outliers. Winsorization of the lower end of the distribution (i.e., bottom coding) involves setting extremely low predicted values below a predetermined limit to be equal to that predetermined limit.

[17] Renormalization is performed after adjustments are made to the episode's expected cost, such as bottom-coding or residual outlier exclusion. This process multiplies the adjusted values by a scalar ratio to ensure that the resulting average is equal to the average of the original value.

[18] This step excludes episodes based on outlier residual values from the calculation and renormalizes the resultant values to maintain a consistent average episode cost level.

where:

Y_{ij}	is the standardized payment for episode *i* and attributed clinician (or clinician group practice) *j*
$\hat{Y}_{ij}$	is the expected standardized payment for episode *i* and clinician (or clinician group practice) *j*, as predicted from risk adjustment
n_j	is the number of episodes for clinician (or clinician group practice) *j*
n	is the total number of TIN/TIN-NPI attributed episodes nationally
$i \epsilon \{I_j\}$	is all episodes *i* in the set of episodes attributed to clinician (or clinician group practice) *j*

A diagram demonstrating a visual depiction of an example measure calculation can be found in Appendix B.

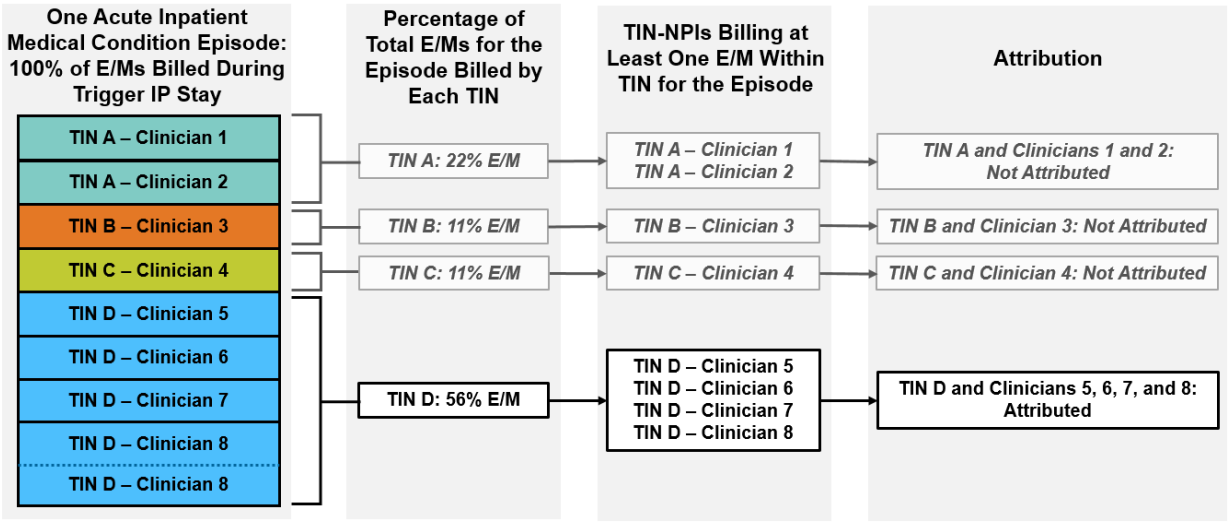
A lower measure score indicates that the observed episode costs are lower than or similar to expected costs for the care provided for the particular patients and episodes included in the calculation, whereas a higher measure score indicates that the observed episode costs are higher than expected for the care provided for the particular patients and episodes included in the calculation.

Appendix A. Attribution Example for Acute Inpatient Medical Condition Episodes

This appendix provides some further details and an example of attribution for acute inpatient medical condition episodes. An episode is attributed to a:

- **TIN** if that TIN billed at least 30% of the IP E/M codes on identified Part B Physician/Supplier claim lines during the trigger IP stay.
- **TIN-NPI** if a clinician within an attributed TIN billed any IP E/M codes on identified Part B Physician/Supplier claim lines during the trigger IP stay.

Figure A-1. Diagram of E/Ms Billed Within One Acute Inpatient Medical Condition Episode



In the example shown above, the stacked, colored boxes on the left represent E/Ms billed by 8 different TIN-NPIs (Clinicians 1 through 8) across 4 TINs (TINs A through D) in the trigger IP stay for one acute inpatient medical condition episode. Clinicians 1 through 7 each billed one E/M claim each under their respective TINs, and Clinician 8 billed 2 E/M claims under TIN D. The next set of boxes to the right of the colored boxes shows the percentage of total E/Ms for that trigger IP stay billed that were by each of the 4 TINs. Moving right, the next set of boxes list the clinicians within each of the 4 TINs who had billed at least one E/M during the trigger IP stay. Finally, the diagram shows a summary of how this affects attribution.

In this example, only TIN D billed at least 30% of the IP E/M codes during the trigger IP stay. This means:

- At the TIN-level, only TIN D is attributed this episode.
    - TINs A, B, and C did not meet the 30% threshold, so they are not attributed this episode.
- At the TIN-NPI level, each TIN-NPI (Clinicians 5, 6, 7, and 8) billing at least one E/M within TIN D is attributed this episode.

TINs A, B, and C did not meet the 30% threshold, so the TIN-NPIs billing within them are not attributed this episode.

Appendix B. Measure Calculation Example

The diagram below provides an illustrated example of measure calculation, using an example measure where the clinician has only 4 attributed episodes for demonstration purposes. For more details on measure calculation, please refer to Section 4.6.

Figure B-1. Episode-Based Cost Measure Calculation Example