

**Merit-based Incentive Payment System (MIPS):
Medicare Spending Per Beneficiary (MSPB)
Clinician Measure**

Measure Information Form
2022 Performance Period

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1.0 Introduction

This document details the methodology for the Medicare Spending Per Beneficiary (MSPB) Clinician measure and should be reviewed along with the Measure Codes List file, which contains the medical codes used in constructing the measure.

1.1 Measure Name

Medicare Spending Per Beneficiary (MSPB) Clinician

1.2 Measure Description

The MSPB Clinician measure assesses the cost to Medicare of services provided to a patient during an MSPB Clinician episode (hereafter referred to as the “episode”), which comprises the period immediately prior to, during, and following the patient’s hospital stay. An episode includes Medicare Part A and Part B claims with a start date between 3 days prior to a hospital admission (also known as the “index admission” for the episode) through 30 days after hospital discharge, excluding a defined list of services that are unlikely to be influenced by the clinician’s care decisions and are, thus, considered unrelated to the index admission. In all supplemental documentation, the term “cost” generally means the standardized¹ Medicare allowed amount.²

1.3 Measure Rationale

MSPB Clinician is an important means of measuring Medicare spending, as health expenditures continue to increase in the United States. Total health care spending is estimated to have increased by 4.6% in 2017, reaching \$3.5 trillion, and spending for Medicare, which is still predominantly paid on a fee-for-service (FFS) basis, grew by 3.6%, reaching \$672.1 billion.³ In 2016, Medicare FFS paid \$183 billion for approximately 10 million Medicare inpatient admissions and 200 million outpatient services, which reflects a 2.3% increase in hospital spending per FFS patient between 2015 and 2016 (MedPAC, 2018). Given that the inpatient hospital setting is such an important contributor to overall Medicare spending, gauging the efficacy of this spending requires measuring the cost performance of clinicians providing care at hospitals. The MSPB Clinician measure provides valuable context for such progress in efficiency by comparing the movement in costs associated with hospital admissions.

As background to this revised measure, a version of the MSPB Clinician measure has been part of the Merit-based Incentive Payment System (MIPS) Cost performance category since the 2017 MIPS performance period. Prior to this use in MIPS, the Centers for Medicare & Medicaid Services (CMS) used the MSPB measure in the Value Modifier (VM) Program and reported it in annual Quality and Resource Use Reports (QRURs) until the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) ended the VM Program. The MSPB Clinician measure

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 B Price (Payment) Standardization - Detailed Methods” documents posted on the [CMS Price \(Payment\) Standardization Overview webpage](https://www.resdac.org/articles/cms-price-payment-standardization-overview). (<https://www.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 patient deductible and coinsurance amounts.

³ “National Health Expenditure Projections, 2017-2026.” US Centers for Medicare & Medicaid Services, 2018

has undergone re-evaluation to address stakeholder feedback received from prior public comment periods and was finalized for 2020 MIPS performance period.

1.4 Patient Exclusion Criteria

Patients' episodes are excluded from the measure population if the patients meet any of the following conditions:

- They were not enrolled in both Medicare Parts A and B for the entirety of the lookback period plus episode window.
- They were enrolled in a private Medicare health plan (e.g., a Medicare Advantage or a Medicare private FFS plan) for any part of the lookback period plus episode window.
- They resided outside the United States or its territories during any month of the performance period.

1.5 Measure Numerator

The numerator for the MSPB Clinician measure is the sum of the ratio of payment-standardized observed to expected episode costs for all episodes attributed to the clinician group, as identified by a unique Medicare Taxpayer Identification Number (TIN), or to the clinician, as identified by a unique TIN and National Provider Identifier pair (TIN-NPI). The sum is then multiplied by the national average payment-standardized observed episode cost to generate a dollar figure.

1.6 Measure Denominator

The denominator for the MSPB Clinician measure is the total number of episodes attributed to a clinician or clinician group.

1.7 Data Sources

The MSPB Clinician measure uses the following data sources:

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

1.8 Care Settings

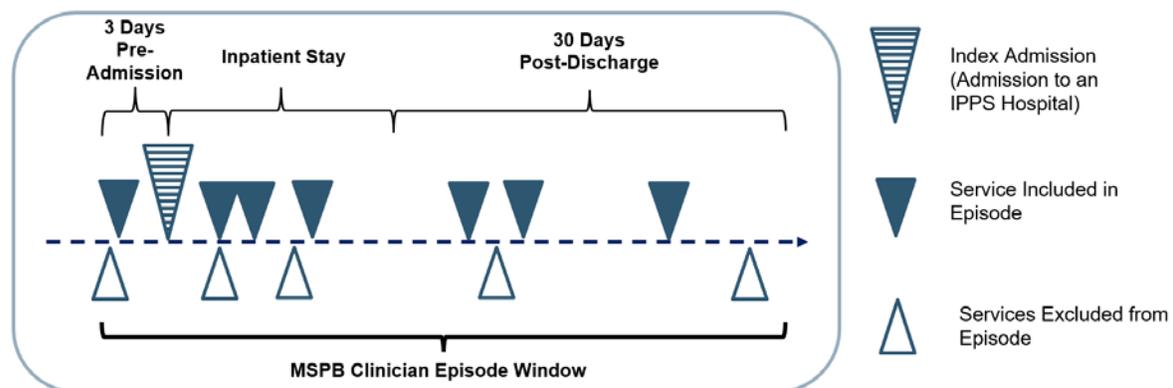
The MSPB Clinician cost measure can be triggered at acute care facility hospitals.

2.0 Methodology Steps

There are 2 overarching processes in calculating MSPB Clinician measure scores: episode construction (Steps 1-3) and measure calculation (Steps 4-6). This section provides a brief summary of these processes, and Appendix A describes them in detail.

1. **Define the population of index admissions:** Episodes are opened, or triggered, by admission to an inpatient hospital. The episode window starts 3 days prior to this index admission and ends 30 days after discharge. Medicare Parts A and B claims billed during the episode window are considered for inclusion, and are refined as described in Appendix A.
2. **Attribute the episode to a clinician group:** Episodes with medical Medicare Severity Diagnosis-Related Group (MS-DRGs) are attributed to any clinician group rendering at least 30% of evaluation and management (E&M) services on Medicare Part B Physician/Supplier claims during the inpatient stay (including admission and discharge days), and to any clinician who bills at least one E&M service that was used to determine the episode's attribution to the clinician group. Episodes with surgical MS-DRGs are attributed to the clinician and clinician group rendering any main procedure determined to be clinically relevant to the inpatient stay.
3. **Exclude unrelated services and calculate the episode observed cost:** Clinically unrelated services are removed from the episode. The costs of the remaining services occurring during the episode window are summed to obtain each episode's standardized observed cost.

Figure 1: MSPB Clinician Episode Framework



4. **Exclude episodes:** Exclusions remove a small, unique group of episodes 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 episode cost through risk adjustment:** Risk adjustment aims to isolate variation in clinician costs to only costs clinicians can reasonably influence (e.g., accounting for patient age, comorbidities, and other factors). A regression model is applied to the risk adjustment variables 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 observed cost (from Step 3) to risk-adjusted expected cost (from Step 5) is calculated and averaged across all of a clinician 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 page provides a quick, at-a-glance reference for the MSPB Clinician cost measure specifications. 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-Index Admission Period: 3 days

Post-Discharge Period: 30 days

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

The episode trigger is an admission to an inpatient hospital. The MSPB Clinician cost measure can be triggered at acute care facility hospitals.

Episode Attribution: How is the MSPB Clinician measure attributed at the TIN/TIN-NPI levels?

The performance period is a pre-defined and static calendar year performance period. Episodes ending during the performance period are included in the calculation of the MSPB Clinician measure. Episodes are attributed as follows:

- Episodes with Medical MS-DRGs
 - Attributed to any clinician group rendering at least 30% of E&M services on Medicare Part B Physician/Supplier claims during the inpatient stay, and to any clinician who bills at least one E&M service that was used to determine the episode's attribution to the clinician group.
- Episodes with Surgical MS-DRGs
 - Attributed to the clinician and clinician group rendering any main procedure determined to be clinically relevant to the index admission.

Service Assignment: Which services are excluded from the measure?

Service exclusions are a defined list of services that are unlikely to be influenced by the clinician's care decisions. The service exclusion rules are defined specific to the Major Diagnostic Category (MDC) of the index admission. Service exclusions examples include:

- No orthopedic procedures for episodes triggered by DRG under Disorders of Gastrointestinal System (MDC 06 and MDC 07)
- No valvular procedures for episodes triggered by DRG under Disorders of the Pulmonary System (MDC 04)
- No hospice costs

Risk Adjustors: How does the measure adjust for patient-level risk factors that can affect medical costs?

- The MS-DRG of the index hospitalization and indicators for any prior acute hospital admission.
- Comorbidities captured by 79 Hierarchical Condition Category (HCC) codes that map with over 9,500 ICD-10-CM codes
- Interaction variables accounting for a range of comorbidities
- Patient age category
- Patient disability status
- Patient end-stage renal disease (ESRD) status
- Recent use of institutional long-term care

Exclusions: Which populations are excluded from the measure?

- The patient has a primary payer other than Medicare for any time during the episode window or 90-day lookback period prior to the episode start 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 main clinician is attributed the episode.
- The patient's date of birth is missing.
- The patient's death date occurred before or during the episode.

- The index admission for the episode did not occur in either a subsection (d) hospital⁴ paid under the Inpatient Prospective Payment System (IPPS) or in an acute hospital in Maryland.
- The discharge of the inpatient stay occurred in the last 30 days of the performance period.
- The index admission for the episode was involved in an acute-to-acute hospital transfer.
- The inpatient claim of the inpatient stay indicated a \$0 actual payment or a \$0 standardized payment.

⁴ For more information on short-term stay acute hospitals as defined by subsection (d), please refer to Section A.4.

Appendix A. Detailed Measure Calculation Methodology

Construction of MSPB Clinician measure episodes is divided into 3 steps: (A.1) identifying index admissions, (A.2) attributing episodes to clinicians, and (A.3) calculating observed episode cost. Once measure episodes are constructed, measure calculation involves (A.4) creating comparable costs across episodes by excluding certain episodes, (A.5) estimating expected costs for the patient population based on patient comorbidities and other risk factors, and (A.6) calculating the average episode ratio and cost measure score. The following sections describe the 6 steps for calculating the MSPB Clinician measure scores in more detail.

A.1 Define and Trigger Episodes

Episodes are opened, or triggered, by admissions to inpatient hospitals. The episode window is defined as the 3 days prior to this index admission to 30 days after the hospital discharge. There is a 90-day lookback period before the episode start date. This period is used to check patient enrollment information for episode exclusions and patient pre-existing health characteristics used for risk adjustment.

A.2 Attribute Episodes to Clinicians

Attribution is the process of determining which clinician groups are responsible for an episode. There are different methods of attribution depending on whether the MS-DRG is medical or surgical, with some exceptions.

The MSPB Clinician measure utilizes 2 attribution methods for medical and surgical MS-DRG episodes. The measure attributes episodes with medical MS-DRGs to any clinician/clinician group that is responsible for managing the medical condition, and attributes episodes with surgical MS-DRGs to the clinician/clinician group performing the main procedure of an episode.

- For episodes in which the index admission has a medical MS-DRG, the episode is attributed first to the TIN that bills at least 30% of E&M codes found on Part B Physician/Supplier claims during the inpatient stay (including admission and discharge days). The episode is then attributed to the TIN-NPI who billed at least one E&M service that was used to determine the episode's attribution to the TIN.
- For episodes in which the index admission has a surgical MS-DRG, the episode is attributed to the TIN and TIN-NPI who billed any related surgical procedure on Part B Physician/Supplier claims during the inpatient stay. The full list of Current Procedural Terminology / Healthcare Common Procedure Coding System (CPT/HCPCS) codes determined as related to each surgical MS-DRG can be found in the Measure Codes List file.⁵

A.3 Exclude Clinically Unrelated Services to Calculate Episode Observed Cost

Medicare Part A and Part B services during the episode window are considered for inclusion toward the episode, with exceptions for services that are unlikely to be influenced by the clinician's care decisions. Clinically unrelated services are excluded based on service exclusion rules developed by the MSPB Service Refinement Expert Workgroup. The service exclusion rules are defined specific to the MDC of the index admission. The service exclusion codes and logic for services deemed clinically unrelated can be found in the

⁵ For diagrams illustrating examples of attribution for medical and surgical episodes, please refer to Appendix B.

“SE_[General/Post]_Service_Category” tabs of the Measure Codes List file. The sum of the cost of the services that are included towards the episode is referred to as the episode observed cost.

A.4 Exclude Episodes

Before measure calculation can occur, a series of episode exclusions are applied to remove certain episodes from measure score calculation. Episodes are excluded from the MSPB Clinician measure if they meet any of the following conditions:

- The patient is enrolled in a Medicare Advantage plan or Medicare is the secondary payer at any time during the episode window or 90-day lookback period.
- The patient was not continuously enrolled in both Medicare Parts A and B from 90 days before episode start date through 30 days after discharge.
- No main clinician is attributed the episode.
- The patient’s date of birth is missing.
- The patient’s death date occurred before or during the episode.
- The index admission for the episode did not occur in either a subsection (d) hospital paid under the Inpatient Prospective Payment System (IPPS)⁶ or in an acute hospital in Maryland.
- The discharge of the inpatient stay occurred in the last 30 days of the performance period.⁷
- The index admission for the episode is involved in an acute-to-acute hospital transfer (i.e., the inpatient stay ends in a hospital transfer or begins because of a hospital transfer).
- The inpatient claim of the inpatient stay indicated a \$0 actual payment or a \$0 standardized payment.

After applying the exclusions outlined above, all remaining episodes are included in the calculation of the MSPB Clinician measure score.

A.5 Calculate Expected Episode Costs Through Risk Adjustment

Risk adjustment is used to estimate episode expected costs in recognition of the different levels of care patients may require due to comorbidities, disability, age, and other risk factors. A separate risk adjustment model is estimated for episodes within each MDC, which is determined by the MS-DRG of the index admission. This model includes variables from the CMS Hierarchical Condition Category Version 22 (CMS-HCC V22) 2016 Risk Adjustment Model⁸ and other standard risk adjustors to capture patient characteristics.

Further detail about the MSPB Clinician risk adjustment model is provided below:

⁶ 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 Section 2779A1 of [Chapter 2 of the CMS State Operation Manual](https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/som107c02.pdf). (<https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/som107c02.pdf>)

⁷ The performance period is a pre-defined and static calendar year performance period. Episodes ending during the performance period are included in the calculation of the MSPB Clinician measure.

⁸ 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. There are over 9,500 ICD-10-CM codes that map to one or more of the 79 HCC codes included in the CMS-HCC V22 model.

- The model includes 12 age categorical variables, representing various age brackets.
- Severity of illness is measured using the MS-DRG of the index hospitalization, an indicator for any prior acute hospital admission, and 79 HCC indicators with information derived from the patient's claims.
- The model includes status indicator variables for whether the patient qualifies for Medicare through disability or age, ESRD, and whether the patient is receiving long-term care (designated as "long-term institutionalized", or LTI).
- In addition, the model accounts for interactions between particular variables. Interaction terms are included because the presence of certain patient characteristics can increase expected cost in a greater way than predicted by the indicators alone.
- Patient characteristics are identified using Medicare Parts A and B claims that end in the 90-day lookback period from the episode start date.

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

- **Define** HCC and patient characteristic-related risk adjustors using Medicare Parts A and B claims in the 90-day lookback period from the episode start date.
- **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 90-day lookback period.
 - Identify patients who reside in a long-term care institution as of the episode trigger day using LTC MDS assessment data.
- **Drop** risk adjustors that are defined for less than 15 episodes nationally for each MDC 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 with the next adjacent age range category.
- **Calculate** 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 expected episode cost. A separate OLS regression is run for each episode MDC group nationally.
- **Winsorize**⁹ the expected episode cost by assigning the value of expected episode cost at the 0.5th percentile of the distribution for episodes within the same MDC to all episodes with expected episode costs below the 0.5th percentile.
- **Renormalize**¹⁰ values by multiplying each episode's winsorized expected cost by the ratio of the MDC group's average observed cost and the MDC group's average winsorized expected cost.

⁹ 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.

¹⁰ 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.

- **Exclude**¹¹ episodes with outlier residuals to obtain finalized expected episode cost. This step is performed across all episodes regardless of the MDC group.
 - **Calculate** each episode's residual as the difference between the observed cost and the re-normalized, winsorized expected cost computed above.
 - **Exclude** episodes with residuals below the 1st percentile or above the 99th percentile of the residual distribution.
 - **Renormalize** all remaining episodes by multiplying their cost by the ratio of the average observed episode cost and the average winsorized expected cost when excluding outliers.

A.6 Calculate Measure Scores

The MSPB Clinician measure is calculated for each clinician (TIN-NPI) or clinician group practice (TIN) by (i) calculating the ratio of standardized observed episode costs to final expected episode costs and (ii) multiplying the average cost ratio across episodes for each TIN or TIN-NPI by the national average standardized episode cost. This method of cost ratio calculation allows for comparison of differences in observed and expected costs at the level of each individual episode before comparison at the clinician or clinician group level.

Step 1. Calculate risk-adjusted episode cost ratio

For each non-outlier episode, the episode's total standardized observed cost is divided by the episode's final expected cost.

Step 2. Calculate the MSPB Clinician measure for each TIN or TIN-NPI

After calculating each episode's risk-adjusted cost ratio, average the cost ratios across all episodes for each TIN or TIN-NPI. Multiplying this average cost ratio by the national average episode cost (all total standardized costs averaged over the universe of attributed, non-outlier episodes) gives the MSPB Clinician measure for each TIN or TIN-NPI. Multiplication of the ratio by national average cost per episode is done to convert the ratio into a figure that's more meaningful from a cost perspective by having the clinician's average cost measure score represented as a dollar amount rather than a ratio. Figure 2 below displays a formula representing how the measure score for any attributed clinician (or clinician group practice) "j" can be represented mathematically.

Figure 2. MSPB Clinician Measure Score Formula

$$\text{Measure Score}_j = \left(\frac{1}{n_j} \sum_{i \in \{I_j\}} \frac{Y_{ij}}{\bar{Y}_{ij}} \right) \left(\frac{1}{n} \sum_{i \in \{I\}} Y_i \right)$$

¹¹ 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 observed payment for episode i and attributed clinician (or clinician group practice) j
- Y_i is the standardized observed payment for episode i
- \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 episodes nationally
- $i \in \{I_j\}$ is all episodes i in the set of episodes attributed to clinician (or clinician group practice) j
- $i \in \{I\}$ is all episodes i in the set of episodes nationally

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.

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 B. Illustrations of Attribution for Medical and Surgical MS-DRG Episodes

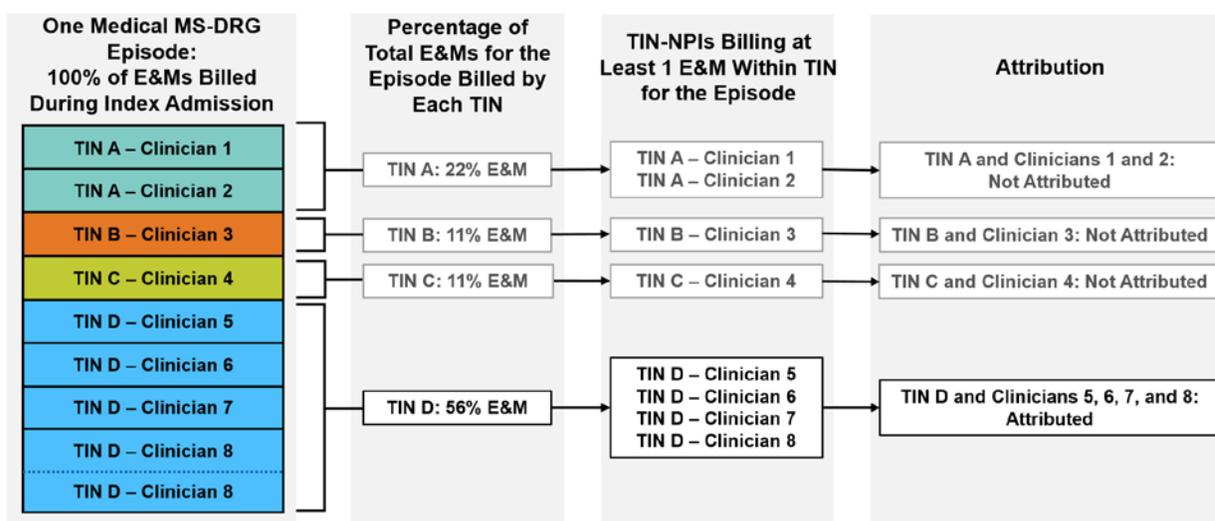
This appendix provides some further details and examples of attribution for episodes with medical and surgical MS-DRGs.

Medical MS-DRG Episode Attribution

An episode with a medical MS-DRG is attributed to a:

- TIN if that TIN billed at least 30% of the E&M claims billed during the inpatient stay.
- TIN-NPI if a clinician within an attributed TIN billed at least one E&M claim that was used to determine the episode’s attribution to the TIN.

Figure B - 1. Diagram of E&Ms Billed within a Medical MS-DRG Episode



In the example shown above, the stacked, colored boxes on the left represent 9 E&M claims billed by 8 different clinicians (Clinicians 1 through 8) across 4 TINs (TINs A through D) during the inpatient stay for one medical MS-DRG episode. Clinicians 1 through 7 billed one E&M claim, 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 inpatient stay billed by each of the 4 TINs. Moving right, the next set of boxes lists the clinicians within each of the 4 TINs who had billed at least one E&M during the inpatient stay. Finally, the last set of boxes shows a summary of how this affects attribution.

Only TIN D billed at least 30% of the E&M codes during the inpatient stay. This means:

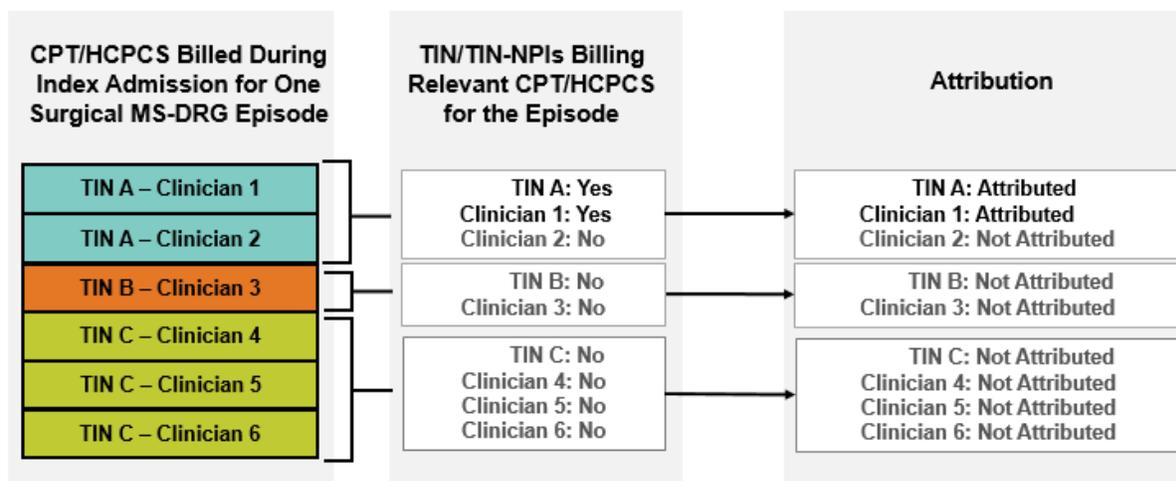
- At the TIN level, only TIN D is attributed this episode.
 - TINs A, B, and C didn’t meet the 30% threshold, so they aren’t attributed this episode.
- At the TIN-NPI level, each TIN-NPI (Clinicians 5, 6, 7, and 8) billing at least one E&M claim within TIN D is attributed this episode.
 - TINs A, B, and C didn’t meet the 30% threshold, so the TIN-NPIs billing within them aren’t attributed this episode.

Surgical MS-DRG Episode Attribution

An episode with a surgical MS-DRG is attributed to a:

- TIN if that TIN billed the relevant CPT/HCPCS code determined as related to the surgical MS-DRG.
- TIN-NPI if that clinician billed the relevant CPT/HCPCS code determined as related to the surgical MS-DRG.

Figure B - 2. Diagram of CPT/HCPCS Billed within a Surgical MS-DRG Episode



In the example shown above, the stacked, colored boxes on the left represent 6 CPT/HCPCS codes billed by 6 different clinicians (Clinicians 1 through 6) across 3 TINs (TINs A through C) during the inpatient stay for one surgical MS-DRG episode. The next set of boxes to the right of the colored boxes shows whether each TIN/TIN-NPI billed a relevant or a non-relevant CPT/HCPCS code to the episode's surgical MS-DRG. Finally, the last set of boxes shows a summary of how this affects attribution.

- Only TIN A billed the relevant CPT/HCPCS to the episode's surgical MS-DRG during the inpatient stay. This means that only TIN A is attributed this episode.
 - TINs B and C did not bill any relevant CPT/HCPCS, so they aren't attributed this episode.
- At the TIN-NPI level, only Clinician 1, who billed the relevant CPT/HCPCS code within TIN A, is attributed this episode.
 - Clinicians 2 through 6 did not bill any relevant CPT/HCPCS codes, so they aren't attributed this episode.