Quality Payment
PROGRAM

Breast Cancer Screening Measure

Draft Cost Measure Methodology

Winter 2026 Field Testing

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1.0 Introduction

This document details the methodology for the Breast Cancer Screening measure. It is part of a set of documents that together contain the measure specifications:

- Draft Cost Measure Methodology document (this document)
- Draft Measure Codes List file, which contains the medical codes used in the measure

These documents have been shared as part of field testing, where clinicians (individual practitioners or clinician groups) who are attributed a minimum number of episodes received Field Test Reports containing measure performance information.

Field testing allows the Centers for Medicare & Medicaid Services (CMS) and the measure development contractor, Acumen LLC, to gather feedback on new episode-based cost measures.[1] All interested parties have the opportunity to provide feedback on the draft measure specifications and a Mock Field Test Report by reviewing this document and other publicly posted supplemental documentation. For more information about the development process for this measure, please see the Episode-Based Cost Measures Development Process document.[2]

We are collecting feedback from **January 29 to February 27, 2026.**
To provide feedback on the draft measure specifications, please navigate to the 2026 Cost Measures Field Testing Feedback Survey.

1.1 Measure Name

Breast Cancer Screening 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[3] Medicare allowed amount,[4] and claims data from Medicare Parts A and B are used to construct the episode-based cost measures.

The Breast Cancer Screening episode-based cost measure evaluates a clinician's risk-adjusted cost to Medicare for women 40 years of age or older who received a screening mammogram 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 procedural measure includes costs of services that are clinically related to the attributed clinician's role in managing

[1] CMS worked with Acumen to develop cost measures for potential use in the Merit-based Incentive Payment System (MIPS).
[2] "Wave 6 and Wave 7 Measure Development Process," Quality Payment Program: Current Cost Measure Activities, (https://www.cms.gov/medicare/quality/value-based-programs/cost-measures/current)
[3] 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 Payment Standardization - Basics" and "CMS Part A and B Payment Standardization - Detailed Methods" documents posted on the CMS Price (Payment) Standardization Overview page. (https://resdac.org/articles/cms-price-payment-standardization-overview).
[4] 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.

care during each episode from the screening mammogram that opens, or "triggers," the episode through 12 months (360 days) after the trigger.

1.3 Measure Rationale

Breast cancer is the second leading cause of cancer death in women in the United States, with women having a one in eight chance of developing breast cancer during their lives.[5] According to the American Cancer Society, breast cancers found during screening, but before symptoms appear, are more likely to be smaller and less likely to have spread beyond the breast (metastasis). Early detection makes it easier to treat breast cancer successfully and can result in a better prognosis for the patient. Screening mammography reduces breast cancer mortality by an estimated 20%-35% in women aged 50-69 years.[6] As such, early detection is one of the most important strategies for preventing deaths from breast cancer.[7]

Two challenges with screening mammography are false negatives and false positives. Screening mammograms miss an estimated one in eight breast cancers; research indicates that 1.3%-45% of missed cancers were visible on mammograms.[8,9] False positives are also common. Around half of all women getting annual mammograms over a 10-year period will have a false positive finding, which can result in unnecessary testing and patient anxiety.[10] To balance the risks of false negatives and false positives, organizations have defined key metrics and developed acceptable ranges for breast cancer screening and diagnosis. Use of these metrics have been associated with improvements in breast imaging programs.[11]

The Breast Cancer Screening episode-based cost measure was selected for development because of its impact in terms of patient population, clinician coverage, and Medicare spending, as well as addressing a gap in clinician coverage of cost measures for specialists such as diagnostic radiologists.[12] Based on prior public comments and feedback, initial empirical analyses, and CMS priority areas, the subsequent measure-specific clinician expert workgroup provided extensive, detailed input on this measure.

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[5] American Cancer Society. Key Statistics for Breast Cancer. American Cancer Society. January 12, 2024. https://www.cancer.org/cancer/types/breast-cancer/about/how-common-is-breast-cancer.html.

[6] Elmore JG, Armstrong K, Lehman CD, Fletcher SW. Screening for breast cancer. *Journal of the American Medical Association.* 2005;293(10):1245-1256. https://doi.org/10.1001/jama.293.10.1245.

[7] American Cancer Society. American Cancer Society Recommendations for the Early Detection of Breast Cancer. 2023. https://www.cancer.org/cancer/types/breast-cancer/screening-tests-and-early-detection/american-cancer-society-recommendations-for-the-early-detection-of-breast-cancer.html.

[8] Ekpo EU, Alakhras M, Brennan P. Errors in Mammography Cannot be Solved Through Technology Alone. *Asian Pacific Journal of Cancer Prevention,* 2018;19(2):291-301. https://doi.org/10.22034/APJCP.2018.19.2.291.

[9] Warren Burhenne LJ, Wood SA, D'Orsi CJ, et al. Potential contribution of computer-aided detection to the sensitivity of screening mammography. *Radiology*. 2000;215(2):554-562. https://doi.org/10.1148/radiology.215.2.r00ma15554.

[10] American Cancer Society. Limitations of Mammograms. January 14, 2022. https://www.cancer.org/cancer/types/breast-cancer/screening-tests-and-early-detection/mammograms/limitations-of-mammograms.html.

[11] Hussain S, Omar A, Shah BA. The Breast Imaging Medical Audit: What the Radiologist Needs to Know. *Contemporary Diagnostic Radiology.* 2021;44(8):1-5. https://doi.org/10.1097/01.cdr.0000741868.68828.ef.

[12] CMS. 2023 Call for Cost Measures. https://mmshub.cms.gov/sites/default/files/2022-Call-for-Cost-Measures-Fact-Sheet.pdf.

1.4 Measure Numerator

The cost measure numerator is the sum of the ratio of observed to expected[13] payment-standardized cost to Medicare for all Breast Cancer Screening 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 Breast Cancer Screening episode group attributed to a clinician.

1.6 Data Sources

The Breast Cancer Screening cost measure uses the following data sources in addition to public use files:

- Medicare Part A and B claims data from the Common Working File (CWF)
- Common Medicare Environment (CME)
- Standardized Medicare Parts A and B payment data from the Integrated Data Repository (IDR)
- Long Term Care Minimum Data Set (LTC MDS)[14]

1.7 Care Settings

Methodologically, the Breast Cancer Screening cost measure can be triggered based on claims data from: ambulatory/office-based care centers, outpatient (OP) hospitals, and ambulatory surgical centers (ASC).

1.8 Cohort

The cohort for this cost measure consists of women 40 years of age or older who are Medicare beneficiaries enrolled in Medicare fee-for-service and who undergo a breast cancer screening mammogram that triggers a Breast Cancer Screening 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).

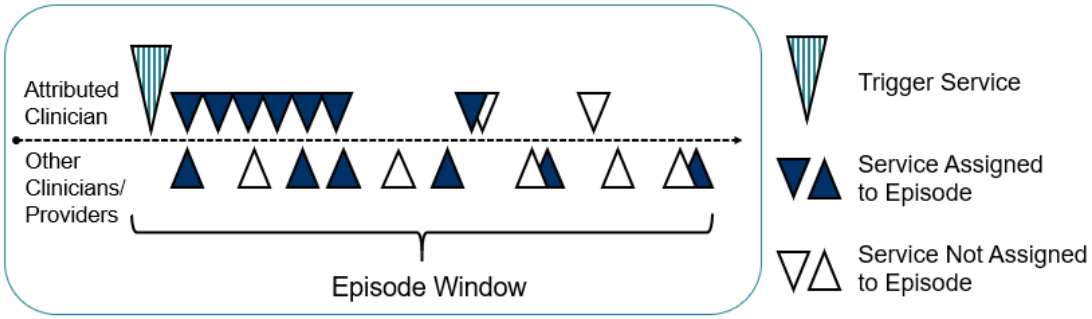
[13] Expected costs refer to costs predicted by the risk adjustment model. For more information on expected costs and risk adjustment, please refer to Section 4.5.
[14] For information on how LTC MDS data are used in risk adjustment, please refer to Section 4.5.

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 Breast Cancer Screening cost measure. Section 4 describes the processes in detail, and Appendix A contains a visual flowchart depicting these steps.

1. **Trigger and define an episode**: Episodes are defined by billing codes that open, or "trigger," an episode. The episode window starts the day of the trigger event (screening mammogram) and ends 12 months (360 days) after the trigger (Figure 1). To enable meaningful clinical comparisons, episodes are placed into more granular, mutually exclusive and exhaustive sub-groups based on clinical criteria. Some episodes may be excluded based on other information available at the time of the trigger.
2. **Attribute the episode to a clinician**: For this procedural episode group, an attributed clinician is any clinician who bills a trigger code for the episode group on the day of the procedure.
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 costs of basic diagnostic services and emergency department (ED) services are assigned to all episodes, whereas advanced diagnostic services and treatment services are assigned to only late cancer detection episodes. The national median fixed oncology cost is used to assign treatment services. The cost of assigned services is summed to determine each episode's standardized observed cost.

Figure 1. Diagram Showing an Example of a Constructed Episode



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 Breast Cancer Screening 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 Draft Measure Codes List file.

Episode Window: During what time period are costs measured?

Episode Start Date: day of trigger event (screening mammogram)

Episode End Date: 12 months (360 days) after trigger

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

- Current Procedural Terminology / Healthcare Common Procedure Coding System (CPT/HCPCS) code indicating a screening mammogram

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

1. Breast cancer detection
2. No breast cancer detection

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

Assigned services generally fall within the following clinical themes:

- Basic diagnostic services (including, but not limited to): mammography, diagnostic ultrasound
- Emergency department (ED) services: ED visits, critical care services
- Advanced diagnostic services (including, but not limited to): laboratory, pathology
- Treatment services (including, but not limited to): mastectomy, lumpectomy, cancer chemotherapy

Service assignment rules assign the costs of basic diagnostic services and ED services to all episodes. The costs of advanced diagnostic services and treatment services are assigned only to late cancer detection episodes, defined as episodes with breast cancer detection more than eight months after the initial screening mammogram. Treatment services are assigned as a fixed oncology cost, calculated as the national median episode-level treatment costs across all late cancer detection episodes within the performance period.

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, and recent use of institutional long-term care.
- Measure-specific risk adjustors including patients with a history of genetic risk of breast cancer (BRCA [breast cancer gene] carrier status), prior presence of dense breast tissue, history of abnormal mammogram, and family history of breast cancer.
- For the full list of standard and measure-specific risk adjustment variables, please reference the “RA” and “RA_Details” tabs of the Draft 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 365-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 main clinician is attributed the episode.
  - The patient’s date of birth is missing.
  - The patient’s death date occurred before the episode ended.
- Measure-specific exclusions including male patients, patients under 40 years of age, and patients with a history of breast cancer. For the full list of measure-specific exclusions, please reference the “Exclusions” and “Exclusions_Details” tabs of the Draft Measure Codes List file.

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

Breast Cancer Screening episodes are defined by a Current Procedural Terminology/Healthcare Common Procedure Coding System (CPT/HCPCS) code for a screening mammogram on Part B Physician/Supplier (Carrier) claims that open, or trigger, an episode. For the codes and logic relevant to this section please refer to the "Triggers" tab(s) in the Breast Cancer Screening Draft Measure Codes List.

The steps for defining an episode for the Breast Cancer Screening episode group are as follows:

- **Identify** Part B Physician/Supplier claim lines with positive standardized payment that have a trigger code.
- **Trigger** an episode if all the following conditions are met for an identified Part B Physician/Supplier claim line:
    - It was billed by a clinician of a specialty that is eligible for MIPS.
    - It does not have a post-operative modifier code.[15]
    - It is the highest cost claim line across all claim lines identified in the above bullets and that have a Breast Cancer Screening trigger code billed for the patient on that day.
- **Establish** the episode window as follows:
    - Establish the episode trigger date as the expense date of the trigger claim line identified in the "Trigger an episode" bullet above.
    - Establish the episode start date as the day of the episode trigger date.
    - Establish the episode end date as 12 months (360 days) after the episode trigger date.

Once a Breast Cancer Screening 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 Breast Cancer Screening Draft Measure Codes List file. This cost measure has 2 sub-groups:

- Breast Cancer Detection
    - The Breast Cancer Detection sub-group is designated by breast cancer treatment or two evaluation and management (E/M) services with a breast cancer diagnosis on two separate days.

[15] Post-operative modifier codes indicate that a clinician billing the service was not involved in the main procedure but was involved in the post-operative care for that procedure, and as such the post-operative clinician would not be responsible for the trigger.

- No Breast Cancer Detection
    - Episodes that do not meet the criteria for the Breast Cancer Detection sub-group, defined as having no breast cancer treatment and fewer than two E/M services with a breast cancer diagnosis on distinct days.

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 the "Attribution" tab of the Breast Cancer Screening Draft Measure Codes List.

The steps for attributing a Breast Cancer Screening episode are as follows:

- **Identify** claim lines with positive standardized payment for a trigger code that occurs on the episode trigger day.
- **Designate** a TIN-NPI as a main clinician if the following conditions are met:
    - No assistant modifier code is found on one or more claim lines billed by the clinician.
    - No exclusion modifier code is found on the same claim line.
- **Designate** a TIN-NPI as an assistant clinician if the following conditions are met:
    - The TIN-NPI was not designated as a main clinician.
    - An assistant modifier code is found.
    - No exclusion modifier code is found.
- **Attribute** an episode to any TIN-NPI designated as a main or assistant clinician.
- **Attribute** episodes to the TIN by aggregating all episodes attributed to NPIs that bill to that TIN. If the same episode is attributed to more than one NPI within a TIN, the episode is attributed only once to that TIN.

Future attribution rules may benefit from the implementation of patient relationship categories[16] and codes.[17] 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.[18]

[16] 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)

[17] 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)

[18] 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)

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 [ED] 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 breast cancer screening 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 Breast Cancer Screening Draft Measure Codes List file.

For the Breast Cancer Screening episode group, only services performed in the following service categories are considered for assignment to the episode costs:

- Basic diagnostic services:
    - Mammography; diagnostic ultrasound; breast biopsy; magnetic resonance imaging (MRI); E/M services (encounter for screening mammogram)
- ED services:
    - ED visits, critical care services
- Advanced diagnostic services:
    - Laboratory (chemistry and hematology), pathology, computed tomography (CT) scan, radioisotope scan and function studies
- Treatment services:
    - E/M services (with breast cancer diagnosis); breast biopsy, local excision, and other breast procedures; mastectomy; lumpectomy, quadrantectomy of breast; cancer chemotherapy; anesthesia; non-hospital based care; CT scan for radiation therapy, therapeutic radiology; therapeutic procedures (skin and breast, female organs); ancillary services; medications (injections, infusions, etc.); durable medical equipment and supplies; hospitalizations (malignant breast disorders; septicemia or severe sepsis; complications of treatment)

The costs of basic diagnostic services and ED services related to screening mammography are included in all Breast Cancer Screening episodes. Advanced diagnostic services and breast cancer treatment services are assigned to only late cancer detection episodes, which are episodes when cancer is detected between 8-12 months from the initial screening mammogram (i.e., more than 240 days after the initial screening mammogram and within the 360-day episode window). The measure assigns the cost of treatment services using a fixed cost representative of oncology care. The fixed oncology cost is defined as the national median episode-level treatment costs across all late cancer detection episodes during a given performance period.

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 as defined aggregated code categories (Clinical Classifications Software Services and Procedures and Diagnosis-Related Groups)
    - 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 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** all claims with trigger codes occurring during the trigger day/stay.
- **Sum** standardized Medicare allowed amount for services by cost categories using the assignment rules elaborated above to episodes based on cancer detection status. Specifically, costs for basic diagnostic services and ED services are assigned to all episodes, whereas costs for advanced diagnostic services and a fixed treatment cost are assigned only to late cancer detection episodes.

Service Assignment Example A: Breast Cancer Screening with No Cancer Detection

- Clinician A performs a screening mammogram for Patient J. This service triggers a Breast Cancer Screening episode, which is attributed to Clinician A.
- Based on the results of the mammogram, additional imaging is requested by Clinician A. Clinician B then performs a breast MRI during the episode window.
- The breast MRI does not indicate cancer and Patient J is not diagnosed with breast cancer during the episode window.
- The breast MRI during the episode window is considered to be clinically relevant and is categorized as a basic diagnostic service; therefore, its cost will be assigned to Clinician A's Breast Cancer Screening episode.

Service Assignment Example B: Breast Cancer Screening with Early Cancer Detection

- Clinician C performs a screening mammogram for Patient K. This service triggers a Breast Cancer Screening episode, which is attributed to Clinician C.
- Based on the results of the mammogram, additional imaging is requested by Clinician C. Clinician D performs a breast MRI in month 2. Later, Clinician E performs a breast biopsy in month 5.
- Patient K is diagnosed with breast cancer in month 6, and undergoes a mastectomy by Clinician F in month 12.
- The breast MRI, breast biopsy, and mastectomy occur during the episode window and are considered clinically relevant. However, because the cancer is detected no later than eight months following the initial screening mammogram, only the costs of basic diagnostic services (i.e., the breast MRI and breast biopsy) are assigned to Clinician C's Breast Cancer Screening episode. The cost of the mastectomy is not assigned.

Service Assignment Example C: Breast Cancer Screening with Late Cancer Detection

- Clinician G performs a screening mammogram for Patient L. This service triggers a Breast Cancer Screening Mammogram episode, which is attributed to Clinician G. No immediate follow-up is requested by Clinician G.
- Patient L subsequently experiences symptoms and receives a breast biopsy from Clinician H and genetic testing from Clinician I, and is diagnosed with breast cancer 9 months after the screening mammogram. Patient K begins chemotherapy by month 12.
- The breast biopsy, genetic testing, and chemotherapy occur during the episode window and are considered to be clinically relevant. Because the cancer is detected more than eight months after the initial screening mammogram, both basic diagnostic (breast biopsy) and advanced diagnostic (genetic testing) costs are assigned to Clinician G's episode. Observed chemotherapy costs are not assigned. Instead, a fixed oncology cost, defined as the national median episode-level cancer treatment cost across all episodes in the measure during the performance year, is assigned.

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 procedural 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 Breast Cancer Screening Draft 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 365-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 main clinician is attributed the episode.
  - The patient's date of birth is missing.
  - The patient's death date occurred before the episode ended.
- **Apply** measure-specific exclusions, which check the patient's Medicare claims history for certain billing codes (as specified in the Draft 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,[19] 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 Breast Cancer Screening Draft 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 365-day period prior to the episode trigger day (or the timing specified in the "RA_Details" tab of the Draft 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 CME data.
  - 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 CME data. 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).
- **Run** an ordinary least squares (OLS) regression model to estimate the relationship between all the risk adjustment variables and the dependent variable, the standardized

[19] 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.

observed episode cost, to obtain the risk-adjusted expected episode cost. A separate OLS regression is run for each episode sub-group nationally.

- **Winsorize**[20] expected costs as follows.
  - Assign the value of the 0.5th percentile to all expected episode costs below the 0.5th percentile.
  - Renormalize[21] 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**[22] 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:

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

[20] 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.

[21] 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.

[22] 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.

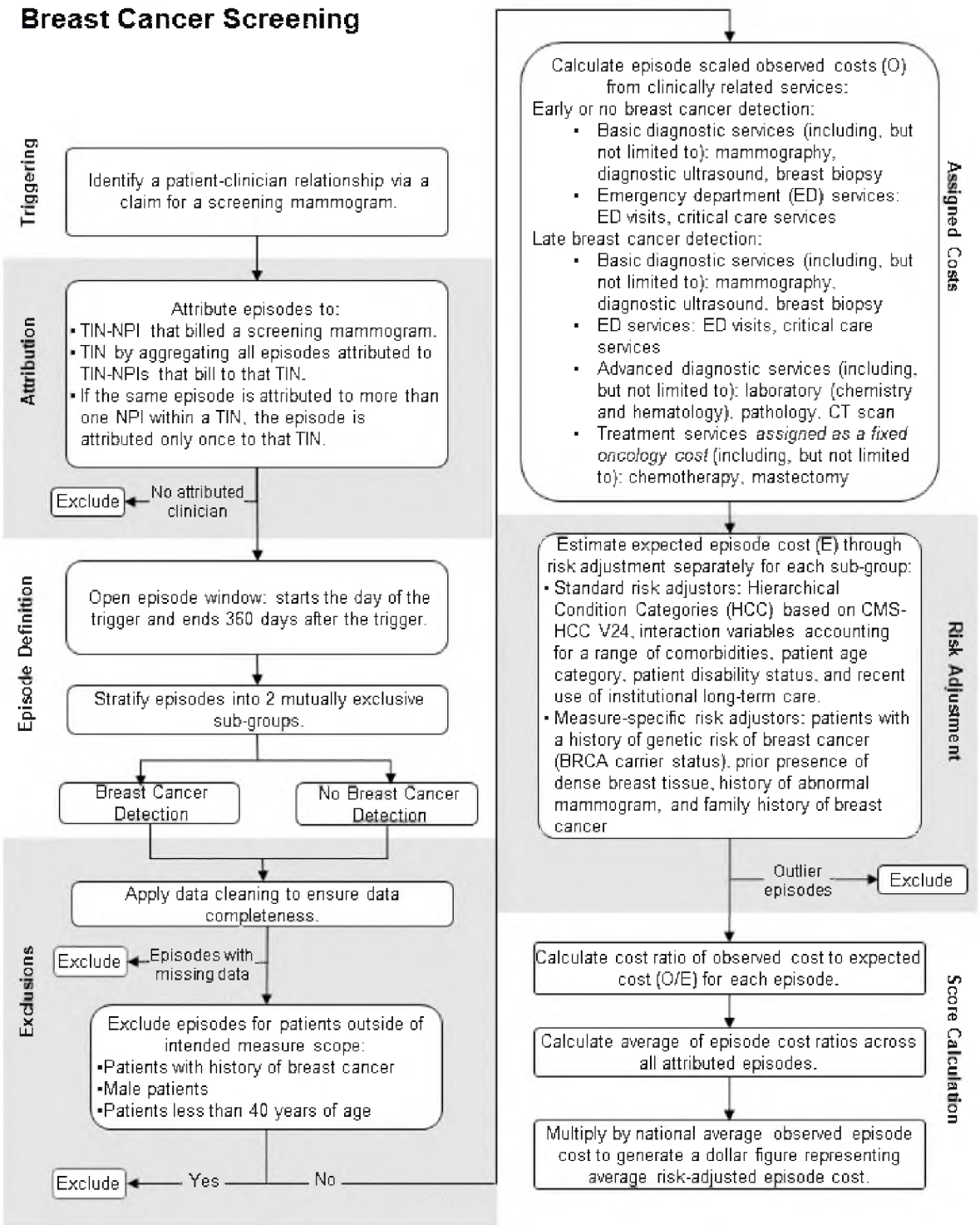
where:

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. Measure Flowchart for Breast Cancer Screening



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