2011 Medical Group Practice Supplemental QRUR User Guide

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The Physician Feedback Program and the CMS Episode Grouper

One of the principal goals of the Affordable Care Act (ACA) of 2010 is to enhance health care efficiency, with a particular focus on improving quality of care and reducing treatment cost. Physicians can affect the cost of care for Medicare patients through both direct and indirect avenues. Physicians can increase cost directly by performing either a higher quantity of or more expensive types of medical services. Indirect methods of altering the cost of care include decreasing inappropriate patient referrals to specialists for expensive care. Further, if the quality of care the health care professional provides is substandard or not well-coordinated, additional services (e.g., hospitalization, emergent care) may be required. To improve care efficiency and quality, Section 3003 of the ACA requires the Secretary of the Department of Health and Human Services (HHS) to develop an episode grouper. Episode grouping techniques have the potential to be developed into tools to measure efficiency by identifying practices whose cost per episode are significantly higher or lower than the national average.

Episode groupers are software programs that organize claims data into a set of clinically coherent episodes, usually linked by diagnoses or procedures. For fee-for-service Medicare's purposes, episodes of care represent a group of healthcare services (claims) for a health condition or procedure (e.g., pneumonia, coronary artery disease), over a defined period of time, and for which one or more medical groups can be held responsible. Coupled with attribution rules, an episode construct has the potential to be used to profile a group's use of resources.

Research funded by the Centers for Medicare & Medicaid Services (CMS) has found commercially available off-the-shelf software to be inadequate for Medicare usage because of the lack of transparency in the existing software as well as the high levels of co-morbidities, mortality rates, and utilization among Medicare beneficiaries. Therefore, in response to the ACA mandate, CMS has begun developing the "CMS Episode Grouper." A preliminary version of the CMS Episode Grouper was employed for a small number of conditions. The number of conditions will expand in upcoming years as the CMS Episode Grouper is more fully developed and tested and as feedback about the CMS Episode Grouper is incorporated into future versions.

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1 OVERVIEW OF THE 2011 SUPPLEMENTAL QRURS

This document provides a detailed methodology for the 2011 Supplemental Quality Use and Resource Reports (QRURs). In December 2012, fifty-four large medical group practices participating in the fee-for-service (FFS) Medicare Physician Quality Reporting System (PQRS) via the Group Practice Reporting Option (GPRO) web-based interface received the 2011 QRURs for medical practice groups (the "Group QRURs").[1] In mid-2013, CMS is making available to the same groups the 2011 Supplemental QRURs. The 2011 Supplemental QRURs used the first version of the CMS Episode Grouper to construct episodes of care and attribute them to medical group practices. The following sections introduce the goals and content of the 2011 Supplemental QRURs.

1.1 What are the goals of the 2011 Supplemental QRURs?

The aim of the 2011 Supplemental QRURs is to provide information that can support medical groups in efforts to improve the efficiency of medical care provided to the Medicare FFS patients they treat. The reports use the CMS Episode Grouper to provide an overall assessment of a medical group's costs for several important episodes of care and provide detailed information that can help identify sources of substantial variation from national averages.[2] The 2011 Supplemental QRURs were also designed to provide medical group practices with resource use information that they can use to improve care coordination and clinical quality. Finally, CMS intends for the 2011 Supplemental QRURs to prompt feedback about the initial version of the CMS Episode Grouper that will aid in the development of future versions.

1.2 What information is provided in the 2011 Supplemental QRURs?

The CMS Episode Grouper enabled the Supplemental QRURs to attribute episodes to medical practice groups and report the total number of episodes (categorized into five major types and twelve subtypes), the average episode costs, and national benchmarks for each episode type for comparison purposes. The 2011 Supplemental QRURs additionally display episode costs broken down into service categories (e.g., inpatient hospital and emergency room services). Episode costs were payment-standardized and risk-adjusted; both concepts are discussed in further detail below. The report also indicates if a group's results are statistically significantly above or below the national mean. The report additionally presents details of each beneficiary's episodes, such as the episode type, the episode start date, and the beneficiary's risk score (discussed in Section A.5 in the appendix).

[1] More information about the PQRS and the Group QRURs can be found at the CMS QRUR webpage: http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeedbackProgram/ReportTemplate.html

[2] In the 2011 Supplemental QRURs, the terms "cost," "spending," and "resource use" are used interchangeably, and all denote FFS Medicare paid claims. "Group costs" refer to services/costs that were provided or ordered by eligible professionals (EPs) billing Medicare under a single Tax Identification Number (TIN) for Medicare beneficiaries who have episodes that were attributed to the group based on claims submitted to and paid by FFS Medicare.

2 BACKGROUND

The 2011 Supplemental QRURs report information on twelve clinical episodes of care prevalent in the Medicare FFS population. An episode of care was defined as a discrete set of services provided for a patient related to the management of a particular clinical condition or medical intervention. The episodes of care in the 2011 Supplemental QRURs encompassed three categories: 1) acute episodes, 2) chronic episodes, and 3) procedural episodes. All medical services that were considered likely to be related to the management of the condition/intervention and its complications were included in the episode. This can include, for example, diagnostic testing, physician management services, rehabilitation services, or treatments such as injections.

The 2011 Supplemental QRURs report episodes for five primary medical conditions or procedures that were stratified into twelve episode types and subtypes based on concomitant or complicating medical occurrences. Episodes are included in both the overall main episode type and the relevant subtype. The twelve episodes reported are:

1. Pneumonia, additionally stratified into:
    2. Pneumonia without inpatient hospitalization,
    3. Pneumonia with inpatient hospitalization,
4. Acute myocardial infarction (AMI), additionally stratified into:
    5. AMI without percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG),
    6. AMI with PCI,
    7. AMI with CABG,
8. Coronary artery disease (CAD), additionally stratified into:
    9. CAD without acute myocardial infarction (AMI),
    10. CAD with AMI,
11. Percutaneous coronary intervention (PCI) without AMI, and
12. Coronary artery bypass graft (CABG) without AMI.

2.1 How can the information provided in the 2011 Supplemental QRURs be used to examine how a medical group treats certain conditions?

The 2011 Supplemental QRURs can be used to examine group-specific information on volume, actual and relative total costs, and how many physicians and others provided care for twelve episode types and subtypes. Within each episode type, the reports display the types, utilization, and costs of services provided and compare them to a national sample of Medicare beneficiaries' episodes. The reports include details about attributed episodes and the eligible professionals (EPs) who billed Medicare for care. In addition to providing amounts and proportions of total care that were billed by the medical group attributed the episode, the 2011 Supplemental QRURs also distinguish the portion of all episode costs and EPs that billed outside the attributed medical group. Groups can examine and compare the

number of EPs involved in each episode of care. The 2011 Supplemental QRURs also display details such as episode start date and cost by medical category. Such cost details, in addition to the numbers of EPs who provided services, can help the group understand the sources of cost discrepancies compared against the national average.

A medical group's episode costs can be investigated across patients with different medical conditions by comparing the group's performance against the national results. This information can then help direct improvement efforts by identifying possible factors contributing to higher than national average costs. Interventions could then be designed to address these findings.

2.2 How was the clinical logic in the 2011 Supplemental QRURs developed?

The clinical logic supporting each episode constructed by the CMS Episode Grouper was developed under the "Episode Grouper for Medicare" contract (contract number HHSM-500-2010-00065C) with Brandeis University. Clinical working groups consisting of expert clinicians and health policy experts reviewed and validated the code sets defining each episode condition that is included in the 2011 Supplemental QRURs. Two clinical expert committees, one for cardiac and one for pulmonary conditions, provided advice and feedback specific to episode clinical content, including episode trigger logic, episode length, and related services, which are discussed in further detail below. The CMS Episode Grouper clinical development followed the American Medical Association (AMA) Physician Consortium for Performance Improvement (PCPI) guidelines and protocols used for expert panels involved with development of quality measures. In addition to CMS clinical experts and Brandeis health policy and clinical experts, expert contributors also came from the Healthcare Incentives Improvement Institute, the American Board of Medical Specialties, the Research and Education Foundation, an AMA-convened Physician Consortium for Performance Improvement, Booz-Allen Hamilton, and Acumen, LLC.

2.3 Which beneficiaries were included in the 2011 Supplemental QRURs?

All Medicare FFS beneficiaries enrolled in Medicare Parts A and B who were treated by the fifty-four GPRO groups in 2011 were initially eligible to be included in the 2011 Supplemental QRURs. The 2011 Supplemental QRURs then applied the same exclusion criteria as the Group QRURs except for three exclusions. First, the 2011 Supplemental QRURs did not exclude beneficiaries who died because their healthcare costs reflect spending by Medicare. Second, the 2011 Supplemental QRURs did not exclude beneficiaries who used hospice services because the CMS Episode Grouper included hospice spending in episodes of care. Third, the 2011 Supplemental QRURs did not exclude Medicare beneficiaries enrolled in Medicare through the Railroad Retirement Board because their Medicare claims are paid the same way as other Medicare beneficiaries. The CMS Episode Grouper created episodes for the remaining beneficiaries, and each episode was attributed to one or more medical groups, as discussed in Section 3.4. Only episodes of care ending in 2011 were included in the 2011 Supplemental QRURs.[3]

[3] CAD episodes could be up to a year in length and could renew each year, as discussed in Section 3.1.3. Thus, the Supplemental QRURs include CADs with a quarter ending in 2011.

3 METHODOLOGY

The following sections provide additional detail on the methodology used both to construct the first version of the CMS Episode Grouper and to create the 2011 Supplemental QRURs. Section 3.1 defines the creation of episodes of care using the CMS Episode Grouper. Section 3.2 describes episode risk-adjustment, and Section 3.3 discusses payment standardization. Section 3.4 explains attribution of episodes to medical group practices, while Section 3.5 describes the identification of a suggested lead EP. Finally, Section 3.6 details the creation of national benchmarks for comparison purposes.

3.1 How were episodes of care constructed?

The CMS Episode Grouper is software that processes CMS claims into discrete sets of services related to a specific medical condition or intervention (i.e., episode) over a given length of time after episode onset. The CMS Episode Grouper system is patient-centric and focuses on all of the care provided for a beneficiary; patients may have multiple episodes of care for different conditions open at a time. Tables 1 through 5 below define the episode construction rules for each episode type. Episodes of care were constructed in the following three steps:

1. Episodes were opened by medical claims coding rules.

2. Relevant and related services were identified and grouped to the episode.

3. Each episode ended after a specified length of time or as a result of patient death or certain patient-dominant conditions or procedures.

The following sections describe each of these steps in turn.

3.1.1 Episodes were opened by medical claims coding rules.

The CMS Episode Grouper initiated an episode of care by examining patients' Medicare Part A and Part B claims. The criteria to trigger an episode aimed to balance sensitivity and specificity as to the occurrence of the clinical event or condition. The Grouper used similar trigger rules by condition type. For example, due to the diagnostic rule-out nature of medicine, two separate confirmations of an evaluation and management (E&M) service must have been present to trigger chronic conditions such as CAD. These encounters must have been separated by at least 30 days to avoid beginning an episode of care before diagnostic testing and evaluation was complete. Criteria used for specifying trigger rules could include provider or service type, number of code occurrences, and elapsed time between occurrences. PCI and CABG episodes began three days prior to the triggering (or index) hospital admission to capture diagnostic testing and procedures leading up to the surgery. Individual acute and procedural episodes could cause a concurrent episode for the chronic, underlying condition to open. In the 2011 Supplemental QRURs, AMI, PCI, and CABG episodes automatically caused a CAD episode to open for that patient. The second column of Tables 1 through 5 specifies the episode opening rules used for each episode type, and the third column shows the specific trigger codes that were used to open the

episode.

3.1.2 Relevant and related services were identified and grouped to the episode.

Once an episode was initiated, the Grouper software identified related service codes and aggregated their costs. The Grouper scanned the medical claims starting during the episode window (defined by start date and relevant episode length, as specified below) and summed the costs of each claim. A clinical working group consisting of clinical and health policy experts determined diagnostic, procedure, and service codes that, if submitted on medical claims during the episode window, would be likely to be related to the episode condition or procedure. The types of services relevant to the episode were the following:

- care for usual signs and symptoms (e.g., cough for pneumonia)
- complications of the condition (e.g., atrial fibrillation in pneumonia)
- treatments (e.g., antibiotic infusions for pneumonia)
- complications of treatment (e.g., allergic reaction to antibiotic during pneumonia episode)
- diagnostic tests (e.g., x-ray for pneumonia), and
- post-acute care (e.g., post-acute skilled nursing care after pneumonia hospitalization).[4]

Most services required two indications that the service should be included in the episode – first, relevance of the service to the episode type, and second, a related diagnosis on the same claim that indicated the service was provided for treatment of that condition. For example, a physician office visit could have been potentially relevant to a number of conditions, so the office visit had to be accompanied by a diagnosis for an open episode in order for it to have been grouped to that episode.

Some services were considered to be so specific to an episode that they did not require the validation of a related diagnosis code on the claim for the service. For example, an echocardiogram was considered relevant and suitable for assignment to an open AMI episode regardless of whether the service claim included a specific (AMI) diagnosis. Thus, in some cases, the relevance between the service and the condition was considered sufficient for assignment of a service to that episode.

Finally, a claim and its corresponding cost could be assigned to a single open episode or to multiple open episodes. Claims were grouped to multiple episodes in cases where the care may have been relevant to more than one open episode. For example, a beneficiary could have been hospitalized for an AMI but developed pneumonia while in the hospital. If the beneficiary subsequently required skilled nursing care, it is difficult to disentangle what share of the skilled nursing care is for each condition. Thus, the CMS Episode Grouper may have allocated the costs of the nursing care evenly between the two episodes.

[4] The full set of codes used to identify services related to an episode will be made available through the QRUR-Episodes website that is used to access the 2011 Supplemental QRURs (located at https://projects.programinfo.us/QRUR-Episodes).

3.1.3 Each episode ended after a specified length of time.

The CMS Episode Grouper scanned the claims to identify relevant services over a fixed window of time in relation to the trigger event date (or the date of the first claim, if two claims on separate dates were required). This time window, or episode length, was fixed for each condition based on how long medical care would be expected for that episode type. These episode lengths were discussed and validated by clinical experts during the episode clinical development process. Episodes ended when the episode length was over or the patient died. Certain patient-dominant conditions or procedures, including metastatic cancer, organ transplant, and end-stage renal disease, also ended all of a patient's episodes as they were expected to dominate the care of the patient and obscure care for any underlying conditions. In addition, chronic, ongoing CAD could become so well-managed that the patient infrequently would seek treatment. Thus, the CMS Episode Grouper accommodated services as infrequent as annual visits by extending the length of CAD episodes by one year with each occurrence of a trigger code. The fourth column in Tables 1 through 5 defines the episode closing rules for each episode type.

Table 1: Pneumonia Episode Construction Logic

Episode Subtype	Episode Beginning	Trigger Codes	Episode Ending
Pneumonia without inpatient hospitalization[5]	Two E&M visits with any pneumonia diagnosis at least one day but no more than thirty days apart	Pneumonia ICD-9 diagnosis codes: 480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 428.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0, 507.0, 507.1, 507.8, 073.0	90 days after first triggering E&M visit
Pneumonia with inpatient hospitalization	Inpatient hospital admission with primary pneumonia diagnosis; or two E&M visits with any pneumonia diagnosis at least one day but no more than thirty days apart	Pneumonia ICD-9 diagnosis codes: 480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 428.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0, 507.0, 507.1, 507.8, 073.0	90 days after discharge from trigger inpatient hospital stay or after first triggering E&M visit

[5] In rare cases, Medicare may not cover or may deny an inpatient hospital claim. When this occurred for pneumonia episodes, because no inpatient hospital claim was processed, the episode was categorized as pneumonia without inpatient hospitalization even though a medical group's records may have shown that the episode occurred in the inpatient hospital setting.

Table 2: AMI Episode Construction Logic

Episode Subtype	Episode Beginning	Trigger Codes	Episode Ending
AMI without PCI or CABG[6]	Inpatient hospital admission with AMI primary diagnosis	AMI ICD-9 diagnosis codes: 410.00, 410.01, 410.10, 410.11, 410.20, 410.21, 410.30, 410.31, 410.40, 410.41, 410.50, 410.51, 410.60, 410.61, 410.70, 410.71, 410.80, 410.81, 410.90, 410.91	30 days after discharge from trigger inpatient hospital stay
AMI with PCI	Inpatient hospital admission with AMI primary diagnosis	AMI ICD-9 diagnosis codes: 410.00, 410.01, 410.10, 410.11, 410.20, 410.21, 410.30, 410.31, 410.40, 410.41, 410.50, 410.51, 410.60, 410.61, 410.70, 410.71, 410.80, 410.81, 410.90, 410.91	30 days after discharge from trigger inpatient hospital stay
AMI with CABG[7]	Inpatient hospital admission with AMI primary diagnosis	AMI ICD-9 diagnosis codes: 410.00, 410.01, 410.10, 410.11, 410.20, 410.21, 410.30, 410.31, 410.40, 410.41, 410.50, 410.51, 410.60, 410.61, 410.70, 410.71, 410.80, 410.81, 410.90, 410.91	30 days after discharge from trigger inpatient hospital stay

Table 3: CAD Episode Construction Logic

Episode Subtype	Episode Beginning	Trigger Codes	Episode Ending
CAD without AMI	Inpatient hospital admission with CAD diagnosis; or two E&M visits with any CAD diagnosis at least 30 but no more than 365 days apart; or the opening of a PCI without AMI episode or CABG without AMI episode	CAD ICD-9 diagnosis codes: 411.1, 411.81, 411.89, 412, 413.0, 413.1, 413.9, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.2, 414.3, 414.8, 414.9, 429.2, V45.81, V45.82	365 days after discharge from trigger inpatient hospital stay or after first trigger E&M visit; extended 365 days with each occurrence of a trigger diagnosis code
CAD with AMI	Inpatient hospital admission with CAD diagnosis; or two E&M visits with any CAD diagnosis at least 30 but no more than 365 days apart; or the opening of an AMI, PCI, or CABG episode	CAD ICD-9 diagnosis codes: 411.1, 411.81, 411.89, 412, 413.0, 413.1, 413.9, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.2, 414.3, 414.8, 414.9, 429.2, V45.81, V45.82	365 days after discharge from trigger inpatient hospital stay or after first trigger E&M visit; extended 365 days with each occurrence of a trigger code

[6] AMI without PCI or CABG was defined as an AMI episode without any PCI or CABG trigger procedure code present in any position on any inpatient hospital or carrier claim grouped to the episode or any PCI trigger procedure code present in any position on any outpatient hospital claim grouped to the episode. Carrier claims are also known as Part B (PB) claims.

[7] In the case of an AMI with both a PCI and a CABG, the episode was considered only as an AMI with CABG. CABG episodes tended to be much more expensive than PCI episodes; therefore, categorizing the episode as AMI with PCI would have made it appear to be relatively much more expensive than other AMI with PCI episodes, which did not usually include a CABG. Categorizing AMI with PCI and CABG into only one AMI subtype avoids double-counting the episode.

Table 4: PCI without AMI Episode Construction Logic

Episode Type	Episode Beginning	Trigger Codes	Episode Ending
PCI without AMI	Inpatient hospital admission with PCI as primary procedure or outpatient admission with PCI as any procedure	PCI ICD-9 procedure codes (inpatient): 36.04, 36.06, 36.07, 36.09, 00.66 PCI CPT[8] codes (outpatient): 92973, 92974, 92975, 92980, 92981, 92982, 92984, 92995, 92996, G0290, G0291	From 3 days prior to trigger inpatient or outpatient hospital admission to 90 days after discharge

Table 5: CABG without AMI Episode Construction Logic

Episode Type	Episode Beginning	Trigger Codes	Episode Ending
CABG without AMI[9]	Inpatient hospital admission with CABG as primary procedure	CABG ICD-9 procedure codes: 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 36.2, 36.03	From 3 days prior to trigger inpatient hospital admission to 90 days after discharge

3.2 How were episode costs risk-adjusted?

The CMS Episode Grouper applied a risk-adjustment methodology to account for patient case-mix that was different than the 2011 Group QRUR risk-adjustment method. The CMS Episode Grouper risk model was developed separately from the Group QRUR risk model; however, the two models adjust for similar characteristics, such as health status using CMS's Condition Categories (CCs) or Hierarchical Condition Categories (HCCs), which are the building blocks for risk-adjustment in several CMS programs.

The CMS Episode Grouper risk-adjustment methodology calculated each episode's expected cost based on three factors: demographics, beneficiary type, and patient health status. Demographic information included the beneficiary's age and sex, and beneficiary type is an indicator for whether or not the beneficiary is a recent Medicare enrollee. To measure health status, the CMS Episode Grouper began by identifying patient comorbidities using CMS's CCs, which assign ICD-9 diagnosis codes into broader clinical groupings.[10] The CCs identify illnesses external to the episode but which have an effect on its costs and outcomes. CMS updates the crosswalk of ICD-9 codes to their corresponding CCs from year to year. In addition to CC comorbidities, the CMS Episode Grouper also used three types of severity

[8] CPT is a registered trademark of the American Medical Association. More information about the CPT coding system can be found here: http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt.page.

[9] In the exceptional case of a patient with both a PCI and CABG but no AMI, the episode was categorized based on which episode occurred first. Both treatments occur in less than 0.07 percent of cases.

[10] To prevent collinearity, the CMS Episode Grouper uses only fifty-four CCs. None of the diagnosis codes used to create these fifty-four CCs overlap with any of diagnosis codes used to create the severity indicators.

indicators which are discussed further in Section A.4 of the appendix: 58 typical condition indicators, 81 complications indicators, and an array of 18 procedures.[11] Using these factors, the risk-adjustment model calculated the predicted cost of an episode using only information available at the start of the episode for all episodes types except CAD. Using information available at the start of the episode precluded risk-adjusted costs being affected by changes in treatment patterns during an episode. Information about the beneficiary known at the start of the episode, however, will become less and less relevant to the episode the longer the episode is open. Because CAD is a chronic episode that could last an indefinite period of time, CAD episodes were risk-adjusted each quarter. The risk-adjusted payment amount was defined to be equal to the average episode cost nationally plus the difference between the episode spending level and the predicted spending level derived from the risk-adjustment model. All cost figures used in the risk-adjustment model were payment-standardized; payment standardization is discussed in detail below. Additional information on the risk-adjustment model is presented in Section A.6 in the appendix.

3.3 How were episode costs payment-standardized?

All costs were payment-standardized to eliminate geographic differences in rates paid within Medicare payment systems. Payment standardization assigns a standard payment for each service so that the price Medicare paid for a service is identical across all geographic regions. This analysis, in essence, removes regional variation in Medicare payment rules to determine a base payment rate for each service.[12] For example, expenditure calculations from the inpatient claim type remove the add-on Indirect Medical Education (IME) and Disproportionate Share Hospital (DSH) payments.

3.4 How were episodes attributed to medical groups?

The 2011 Supplemental QRURs attributed responsibility for the patient's care for each episode to a medical practice group. All episodes that were attributed to a medical group were included in that medical group's 2011 Supplemental QRUR. Episodes were attributed to medical practice groups for the 2011 Supplemental QRURs based on one or more of the following three criteria:

1. The performance of specific procedures,
2. The plurality or shared majority (35%) of physician fee schedule (PFS) costs billed during the episode, or
3. The plurality or shared majority (35%) of evaluation and management (E&M) visits during the episode.[13]

[11] Examples of procedure-based severity indicators include percutaneous coronary intervention (PCI) and coronary artery bypass surgery (CABG).

[12] A detailed description of the payment (or price) standardization methodology is available here: http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1228772057350

[13] E&M codes are defined as CPT codes 99201 to 99499. Outpatient office E&M codes include only CPT codes 99201 to 99205.

Each of these criteria attributed episodes to groups somewhat differently. The first criterion depended on who performed a single procedure, such as a surgery, that triggered, or began, an episode of care. In this case, the group (represented by a single tax identification number (TIN) under which all EPs in the group bill Medicare) billing for the surgery was assumed to be responsible for the episode of care. This criterion was used for the PCI and CABG episode types. The latter two criteria attributed episodes based on the group's relative amount of Medicare claims billed during the episode.

Attribution using the plurality of FFS Medicare claims submitted by EPs paid under the Medicare PFS was premised on groups and EPs who were paid larger amounts during the episode being likely to have interacted most with the patient and directed the patient's care. The PFS cost attribution criterion for attributing episodes excluded costs (i.e., claims) from laboratories and ambulances as well as from other types of settings and facilities to reduce the likelihood that non-clinicians would be attributed episodes.

The third criterion for attributing episodes, based on the plurality of E&M visits by EPs, assumed that EPs who most frequently visited a beneficiary/patient during an episode were likely to have significant responsibility for the services rendered during the episode. The chronic CAD episode type used only E&M visits for attribution, while the acute AMI and pneumonia episodes used both PFS costs and E&M visits. Table 6 presents a summary of each episode type's primary choice for attribution to one or more medical group practices. Section A.1 in the appendix describes the group attribution method in more detail.

Table 6: Summary of Criteria Used for Medical Group Attribution

Episode Type	Medical Group Attribution Criteria
Pneumonia	PFS costs and E&M visits
AMI	PFS costs and E&M visits
CAD	Outpatient E&M visits
PCI	Physician performing surgery
CABG	Physician performing surgery

3.5 How were suggested lead eligible professionals (EPs) identified?

The 2011 Supplemental QRURs also identify a suggested lead EP for each episode attributed to a medical group practice. CMS defines EPs to be those paid under or paid based on the Medicare PFS. These include Medicare EPs (including doctors of medicine, osteopathy, and others), practitioners (including physician assistants, nurse practitioners, and others), and therapists (including physical therapists, occupational therapists, and qualified speech-language therapists) who are paid for treating Medicare FFS beneficiaries.[14] The suggested lead EP in the Supplemental QRURs was identified for informational purposes, to foster quality of care improvements. Section A.3 in the appendix specifies which EPs were eligible to be identified as a suggested lead EP. The method of identifying an individual EP varied by episode type. Table 7 summarizes the initial method of identifying a suggested lead EP for

[14] More information on EPs can be found on the CMS PQRS webpage: http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/PQRS/How_To_Get_Started.html.

each episode type. Section A.2 in the appendix provides a comprehensive table that describes that identification method in detail.

Table 7: Summary of Method Used for Suggested Lead EP Identification

Episode Type	Suggested Lead EP Identification Method
Pneumonia	E&M visits
AMI	Attending on trigger inpatient hospital claim
CAD	Outpatient E&M visits
PCI	EP performing surgery
CABG	EP performing surgery

3.6 How was medical group performance benchmarked?

To help evaluate a group's performance relative to other medical groups, the reports also compare results to episodes nationally. To create these national benchmarks, the methodology used all FFS Medicare beneficiaries who met the enrollment criteria specified in Section 2.3 and had a claim with one of the trigger diagnoses or procedures for any of the target conditions in 2011. A nationwide random sample was selected from the identified beneficiaries; the total sample included over 547,000 beneficiaries during program year 2011. Next, the CMS Episode Grouper was applied to the claims data for all beneficiaries in this national sample. The average costs for each episode constructed from this sample of beneficiaries formed the bases for the nationwide benchmark for that episode of care.

4 FEEDBACK AND SUGGESTIONS FOR IMPROVEMENT

CMS is seeking feedback from the medical practice groups on their 2011 Supplemental QRURs to improve future versions of the CMS Episode Grouper and the supplemental reports. CMS is interested in feedback about the following topics:

- Episode Types and Subtypes: The main episode type and its stratification into important subtypes differing in expected resource use driven primarily by severity and risk.
- Episode Clinical Logic: The clinical reasoning used in the Grouper software, such as episode windows, condition or procedure code trigger rules, and the medical conditions, services, or procedures included and categorized within the episode.
- Medical Group Attribution: The assignment of episodes to the managing and responsible medical group.
- Identification of Suggested Lead EP: The assignment of episodes to a unique suggested lead EP within the medical group.

Feedback about the CMS Episode Grouper and the 2011 Supplemental QRURs will occur through the QRUR-Episodes website. The QRUR-website (located at https://projects.programinfo.us/QRUR-Episodes) features a discussion board that can be utilized if providers have comments or questions about the CMS Episode Grouper or their confidential reports that

require a response from CMS or the CMS-designated contractor (Acumen, LLC).

In the future, CMS will post (at http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeedbackProgram/index.html?redirect=/physicianfeedbackprogram) information about using episode grouping in QRURs and other physician feedback.

APPENDIX A: ADDITIONAL DETAILS

A.1 What are the criteria used for medical group attribution?

Attribution to a medical group varied by episode type. The five major episode types (pneumonia, acute myocardial infarction (AMI), coronary artery disease (CAD), percutaneous coronary intervention (PCI), and coronary artery bypass graft (CABG) were divided into three categories of episodes. The three categories of episodes analyzed in the 2011 Supplemental QRURs were the following:

1. Acute episodes, including pneumonia and AMI
2. Chronic episodes, including CAD
3. Procedural episodes, including PCI and CABG.

The following sections discuss attribution of episodes to medical groups for each episode category in turn, and Table 8 summarizes these rules.

A.1.1 Acute Episodes (Pneumonia and AMI)

Acute episodes were attributed to groups with at least 35 percent of E&M visits or at least 35 percent of professional costs billed to the FFS Medicare PFS. Because only AMI episodes that began during an inpatient hospital admission were included in the 2011 Supplemental QRURs, all of the attribution rules for AMI examined only claims billed during the episode's trigger inpatient hospital stay. In the less than 4 percent of cases for which no group billed either 35 percent of E&M visits or PFS costs, the acute episode was attributed using the following hierarchy:

1. The group with the plurality of E&M visits.
2. If several of these groups were tied for the plurality of E&M visits or if no E&M visits were made, the episode was attributed to the tied group with the plurality of PFS costs.
3. If multiple groups were tied for the plurality of PFS costs, then the entire episode was attributed to each of the tied groups.[15]

A.1.2 Chronic Episodes (CAD)

CAD is a chronic condition, and attribution for this episode type was based on whether a medical group had the plurality of E&M visits during the period. This logic assumed that the medical group with the most E&M visits is the one most likely to have guided the care of the entire chronic episode. Thus, CAD episodes were attributed to group(s) using the following steps:

[15] Approximately 21 percent of pneumonia episodes and 25 percent of AMI episodes were attributed to more than one medical group practice in the 2011 Supplemental QRURs.

1. Medical practice group(s) with at least 35 percent of outpatient E&M visits. CAD episode attribution was restricted to outpatient E&M visits to avoid attributing the episode to an inpatient hospital provider who may have cared for the patient only during an acute exacerbation of the underlying chronic condition (such as an AMI for a CAD patient).

2. If two groups were eligible based on the preceding attribution rule, the episode was attributed to each group billing in the first quarter of the episode because that group was more likely to have directed or influenced the course of care.

3. If no group had at least 35 percent of outpatient E&M visits (step 1), the episode was attributed to the group with the largest number of outpatient E&M visits.

4. If there were no outpatient E&M claims for an episode, then the above attribution rules were applied using all E&M claims billed during the entire episode. [16]

A.1.3 Procedural Episodes (PCI and CABG)

PCI and CABG episodes were designated as procedural episodes that revolved around a surgery and were attributed to the group that included the EP/surgeon(s) responsible for the surgery that triggered the episode. CABG and PCI episodes are always triggered in an inpatient or outpatient hospital setting. Thus, these episodes were attributed to the medical practice group(s) of the EP(s) billing as the performing surgeon for the procedure during the trigger hospital stay.[17] Because the performing surgeon is directly responsible for the episode and is easily identified in claims data, the surgeon's group was not required to hold a minimum percentage of costs or visits. In a small number of cases, more than one group may have been attributed the same episode if the surgery was performed by more than one surgeon or if there were multiple surgeries.[18]

Table 8 displays the rules that were used to attribute episodes to specific medical practice groups.

[16] Approximately 14 percent of CAD episodes were attributed to more than one medical group practice in the 2011 Supplemental QRURs.

[17] Because a CABG episode was only triggered in the inpatient setting but ICD-9 procedure codes do not appear on the carrier (PB) claims that were used in attribution, the following CPT codes indicating a CABG procedure were treated as triggers for a CABG episode: 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33530, 33533, 33534, 33535, and 33536.

[18] About 12 percent of CABG episodes and less than one percent of PCI episodes were attributed to multiple medical group practices in the 2011 Supplemental QRURs.

Table 8: Details of Criteria Used for Medical Group Attribution

Episode Category	Major Episode Type (*Subtypes*)	Medical Group Attribution Criteria
Acute	Pneumonia (*without inpatient hospitalization; with inpatient hospitalization*)	1. All groups with at least 35% of PFS costs or at least 35% of E&M visits. 2. If no group had either, the group with the plurality of E&M visits. 3. If multiple groups were tied for plurality of E&M visits, the tied group with the plurality of PFS costs and at least 1 E&M visit. 4. If these groups were tied for plurality of PFS costs, both groups.
Acute	AMI (*without PCI or CABG; with PCI; with CABG*)	Only carrier (PB) claims during the trigger inpatient stay were examined: 1. All groups with at least 35% of PFS costs or at least 35% of E&M visits. 2. If no groups had either, the group with the plurality of E&M visits. 3. If multiple groups were tied for plurality of E&M visits, the tied group with the plurality of PFS costs and at least 1 E&M visit. 4. If these groups were tied for plurality of PFS costs, both groups.
Chronic	CAD (*without AMI; with AMI*)	1. All groups with at least 35% of outpatient E&M visits. 2. If two, each group that billed in the first quarter of the episode. 3. If no group had at least 35% of outpatient E&M visits, the group with the plurality of outpatient E&M visits. 4. If no outpatient E&M visits occurred, attribution was begun at step 1 using all E&M visits.
Procedural	PCI without AMI	1. The group(s) of the performing surgeon(s) that billed during the trigger inpatient/outpatient hospital stay or within three days of admission. 2. If no performing surgeon, attending EP on inpatient hospital claim with concurrent carrier (PB) claim grouped to episode.
Procedural	CABG without AMI	1. The group(s) of the performing surgeon(s) that billed during the trigger inpatient hospital stay or within three days of admission. 2. If no performing surgeon, attending EP on inpatient hospital claim with concurrent carrier (PB) claim grouped to episode.

A.2 How were suggested lead EPs identified for an episode?

Once an episode was attributed to one or more medical practice groups, a single individual within each attributed group was then identified as the suggested lead EP using one or more of the three methods described above. EPs were identified using their National Provider Identifier (NPI). Section A.3 below describes which providers were eligible to be identified as an EP. The following sections describe the methodology to identify the suggested lead EP for each episode category, and Table 9 details the identification methods.

A.2.1 Acute Episodes (Pneumonia and AMI)

Within the attributed group, identification of an individual EP was slightly different for AMI and

pneumonia episodes. The suggested lead EP for AMI episodes was identified based on claims billed during the episode's trigger inpatient hospital stay, while the suggested lead EP for pneumonia episodes was identified using all claims billed during the episode. Because AMI episodes had to begin during an inpatient hospital admission under the 2011 Supplemental QRUR rules, AMI episodes were first assigned to the attending EP on the trigger inpatient hospital claim.[19] The attending EP was considered responsible for the AMI patient's care in the hospital. After this step, the remaining hierarchy for identification of the suggested lead EP was the same for AMI and pneumonia. The hierarchy was as follows:

1. Individual EP with the plurality of E&M visits, because this EP was assumed to have directed the patient's course of care.

2. If multiple EPs were tied based on plurality of E&M visits, the EP with the plurality of billed claim amounts under the PFS was identified as the suggested lead EP because this EP billed the largest share of costs during the patient's episode.

3. If multiple EPs were tied in E&M visits and PFS costs, the EP that billed earliest in the episode was identified as suggested lead EP as this EP was assumed to have had more influence in the patient's care and treatment.

A.2.2 Chronic Episodes (CAD)

The suggested lead EP for a CAD episode was identified as the EP with the plurality of outpatient E&M visits within the attributed group(s). In the case of a tie, the episode was assigned to the EP with the plurality of PFS costs from the outpatient E&M claims. If multiple EPs were still tied, the episode was attributed to the EP billing earliest in the episode as this EP was assumed to have had more influence.[20]

A.2.3 Procedural Episodes (PCI and CABG)

For PCI and CABG episodes, within the medical group(s) that were attributed the episode, the performing surgeon was identified as the suggested lead EP. If more than one EP within an attributed group was a performing surgeon on the triggering hospital stay, the episode was assigned to the EP with the plurality of PFS costs.[21] If multiple EPs were tied, the episode was assigned to the EP billing earliest in the episode.

Table 9 presents the methods for identifying the suggested lead EP.

[19] The EP was required to bill during the inpatient hospital stay, to ensure data validity.
[20] If there were no outpatient E&M claims for an episode then the above identification rules were applied using all E&M claims billed during the entire episode.
[21] If no performing surgeon could be identified using carrier (PB) claims, the attending EP from the triggering inpatient hospital stay was designated as the suggested lead EP. The physician group associated with that provider was determined using all of that EP's carrier (PB) claims grouped to episode, or from 2010 through 2012 for beneficiaries included in the analysis if that EP had no carrier (PB) claims grouped to the episode.

Table 9: Details of Method Used for Suggested Lead EP Identification

Episode Category	Major Episode Type (*Subtypes*)	Suggested Lead EP Identification Method
Acute	Pneumonia (*without inpatient hospitalization; with inpatient hospitalization*)	1. EP with the plurality of E&M visits. 2. If multiple EPs were tied or if no E&M visits were made, EP with the plurality of PFS costs. 3. If tied for PFS costs, EP billing earliest in the episode.
Acute	AMI (*without PCI or CABG; with PCI; with CABG*)	Only carrier (PB) claims during the trigger inpatient hospital stay were examined: 1. EP that is attending on trigger inpatient hospital claim. 2. If none, EP with the plurality of E&M visits. 3. If multiple EPs were tied or if no E&M visits were made, EP with plurality of PFS costs. 4. If tied for PFS costs, EP billing earliest in the episode.
Chronic	CAD (*without AMI; with AMI*)	1. EP with plurality of outpatient E&M visits. 2. If tied, EP with plurality of PFS costs from those outpatient E&M claims. 3. If tied, EP billing earliest in the episode.
Procedural	PCI without AMI	1. Performing surgeon. 2. If more than one, performing surgeon with plurality of PFS costs. 3. If tied, EP billing earliest in the episode.
Procedural	CABG without AMI	1. Performing surgeon. 2. If more than one, performing surgeon with plurality of PFS costs 3. If tied, EP billing earliest in the episode.

A.3 Who was eligible for identification as a suggested lead EP?

Only EPs with what were classified as clinically appropriate specialties were identified as suggested lead EP. For example, while a general practitioner was considered the lead EP for a pneumonia episode, he or she was not considered a lead EP for a PCI without AMI episode because PCI is a procedure normally performed by a physician specialist. EPs' specialty designations were based on their carrier (PB) claims.[22]

In the episode-level data presented in Exhibit 4 of the 2011 Supplemental QRURs, the EPs identified as treating the episode inside or outside of the group to which the episode was attributed include all EPs that had a claim grouped to the episode. Some of the EPs may have provided ancillary services such as laboratory or imaging services. Table 10 details the EP specialties that were considered to be clinically appropriate as a suggested lead EP for each episode type.

[22] For the rare cases in which an EP bills under more than one specialty during an episode, the first clinically appropriate specialty that is listed on the claim is used.

Table 10: EP Specialties Considered Clinically Appropriate for Lead EP Designation for Specific Episode Types

All EPs		Clinically Appropriate for Identification as Suggested Lead EP				
Provider or Supplier Specialty Description	**CMS Specialty Code**	**Pneumonia**	**AMI**	**CAD**	**PCI without AMI**	**CABG without AMI**
General Practice	1	**Yes**	**Yes**	**Yes**	*No*	*No*
General Surgery	2	**Yes**	*No*	*No*	*No*	*No*
Allergy/Immunology	3	**Yes**	*No*	*No*	*No*	*No*
Otolaryngology	4	**Yes**	*No*	*No*	*No*	*No*
Anesthesiology	5	**Yes**	**Yes**	*No*	*No*	*No*
Cardiology	6	**Yes**	**Yes**	**Yes**	**Yes**	*No*
Dermatology	7	*No*	*No*	*No*	*No*	*No*
Family Practice	8	**Yes**	**Yes**	**Yes**	*No*	*No*
Interventional Pain Management	9	**Yes**	*No*	*No*	*No*	*No*
Gastroenterology	10	**Yes**	**Yes**	**Yes**	*No*	*No*
Internal Medicine	11	**Yes**	**Yes**	**Yes**	*No*	*No*
Osteopathic Manipulative Therapy	12	**Yes**	*No*	*No*	*No*	*No*
Neurology	13	**Yes**	*No*	*No*	*No*	*No*
Neurosurgery	14	**Yes**	*No*	*No*	*No*	*No*
Speech Language Pathologists	15	*No*	*No*	*No*	*No*	*No*
Obstetrics/Gynecology	16	**Yes**	*No*	*No*	*No*	*No*
Hospice and Palliative Care	17	**Yes**	*No*	*No*	*No*	*No*
Ophthalmology	18	**Yes**	*No*	*No*	*No*	*No*
Oral Surgery (Dentists Only)	19	*No*	*No*	*No*	*No*	*No*
Orthopedic Surgery	20	**Yes**	*No*	*No*	*No*	*No*
Cardiac Electrophysiology	21	*No*	**Yes**	*No*	*No*	*No*
Pathology	22	*No*	*No*	*No*	*No*	*No*
Sports Medicine	23	*No*	*No*	*No*	*No*	*No*
Plastic and Reconstructive Surgery	24	**Yes**	*No*	*No*	*No*	*No*
Physical Medicine and Rehabilitation	25	**Yes**	*No*	*No*	*No*	*No*
Psychiatry	26	*No*	*No*	*No*	*No*	*No*
Geriatric Psychiatry	27	*No*	*No*	*No*	*No*	*No*
Colorectal Surgery (Formerly Proctology)	28	**Yes**	*No*	*No*	*No*	*No*
Pulmonary Disease	29	**Yes**	**Yes**	**Yes**	*No*	*No*
Diagnostic Radiology	30	*No*	*No*	*No*	*No*	*No*
Anesthesiologist Assistant	32	*No*	*No*	*No*	*No*	*No*
Thoracic Surgery	33	**Yes**	*No*	*No*	*No*	**Yes**
Urology	34	**Yes**	*No*	*No*	*No*	*No*
Chiropractor, Licensed	35	*No*	*No*	*No*	*No*	*No*

Table 10 (continued): EP Specialties Considered Clinically Appropriate for Lead EP Designation for Specific Episode Types

All EPs		Clinically Appropriate for Identification as Suggested Lead EP				
Provider or Supplier Specialty Description	**CMS Specialty Code**	**Pneumonia**	**AMI**	**CAD**	**PCI without AMI**	**CABG without AMI**
Nuclear Medicine	36	*No*	*No*	*No*	*No*	*No*
Pediatric Medicine	37	**Yes**	*No*	*No*	*No*	*No*
Geriatric Medicine	38	**Yes**	**Yes**	**Yes**	*No*	*No*
Nephrology	39	**Yes**	**Yes**	**Yes**	*No*	*No*
Hand Surgery	40	*No*	*No*	*No*	*No*	*No*
Optometrist	41	*No*	*No*	*No*	*No*	*No*
Certified Nurse Midwife	42	*No*	*No*	*No*	*No*	*No*
Certified Registered Nurse Anesthesiologist	43	*No*	*No*	*No*	*No*	*No*
Infectious Disease	44	**Yes**	**Yes**	*No*	*No*	*No*
Endocrinology	46	**Yes**	**Yes**	**Yes**	*No*	*No*
Podiatry	48	*No*	*No*	*No*	*No*	*No*
Nurse Practitioner	50	**Yes**	**Yes**	**Yes**	*No*	*No*
Clinical Psychologist (Billing Independently)	62	*No*	*No*	*No*	*No*	*No*
Audiologist (Billing Independently)	64	*No*	*No*	*No*	*No*	*No*
Physical Therapist (Independently Practicing)	65	*No*	*No*	*No*	*No*	*No*
Rheumatology	66	**Yes**	*No*	**Yes**	*No*	*No*
Occupational Therapist (Independently Practicing)	67	*No*	*No*	*No*	*No*	*No*
Clinical Psychologist	68	*No*	*No*	*No*	*No*	*No*
Single or Multispecialty Clinic or Group Practice	70	**Yes**	*No*	*No*	*No*	*No*
Registered Dietician/Nutrition Professional	71	*No*	*No*	*No*	*No*	*No*
Pain Management	72	**Yes**	*No*	*No*	*No*	*No*
Peripheral Vascular Disease	76	*No*	*No*	*No*	*No*	*No*
Vascular Surgery	77	**Yes**	*No*	*No*	*No*	**Yes**
Cardiac Surgery	78	**Yes**	**Yes**	*No*	**Yes**	**Yes**
Addiction Medicine	79	*No*	*No*	*No*	*No*	*No*
Licensed Clinical Social Worker	80	*No*	*No*	*No*	*No*	*No*
Critical Care (Intensivists)	81	**Yes**	**Yes**	*No*	*No*	*No*
Hematology	82	**Yes**	*No*	*No*	*No*	*No*
Hematology/Oncology	83	**Yes**	**Yes**	*No*	*No*	*No*
Preventive Medicine	84	**Yes**	*No*	**Yes**	*No*	*No*
Maxillofacial Surgery	85	*No*	*No*	*No*	*No*	*No*

Table 10 (continued): EP Specialties Considered Clinically Appropriate for Lead EP Designation for Specific Episode Types

All EPs		Clinically Appropriate for Identification as Suggested Lead EP				
Provider or Supplier Specialty Description	**CMS Specialty Code**	**Pneumonia**	**AMI**	**CAD**	**PCI without AMI**	**CABG without AMI**
Neuropsychiatry	86	*No*	*No*	*No*	*No*	*No*
Certified Clinical Nurse Specialist	89	*No*	*No*	*No*	*No*	*No*
Medical Oncology	90	**Yes**	*No*	*No*	*No*	*No*
Surgical Oncology	91	**Yes**	*No*	*No*	*No*	*No*
Radiation Oncology	92	**Yes**	*No*	*No*	*No*	*No*
Emergency Medicine	93	*No*	**Yes**	*No*	*No*	*No*
Interventional Radiology	94	*No*	*No*	*No*	*No*	*No*
Physician Assistant	97	**Yes**	**Yes**	*No*	*No*	*No*
Gynecologist/Oncologist	98	*No*	*No*	*No*	*No*	*No*
Unknown Physician	99	*No*	*No*	*No*	*No*	*No*
Sleep Medicine	C0	*No*	*No*	*No*	*No*	*No*

A.4 How were episodes risk-adjusted?

The CMS Episode Grouper risk-adjustment model relied on a two-stage approach using all payment-standardized Medicare costs. Risk-adjustment occurred at the major episode type level. The first stage used a logistic regression model to estimate the likelihood of the episode (or episode quarter, in the case of chronic conditions) having positive costs based on the patient's health status, demographics, and enrollment status. The patient's health status was measured using 54 CCs, 58 typical condition indicators, 81 complication indicators, and an array of 18 procedures, as well as the expected probability the patient would die within the next three months (estimated separately using a logistic model, based on the patient's other health status indicators, demographics, and enrollment status). In the second stage, the model estimated the conditional expected episode cost, given that it is positive, using the same risk factors.

The first stage estimated the following probability using logistic regression:

$$P(Y > 0 \mid H, X) \tag{1.1}$$

where

Y = the cost of the episode

H = health status explanatory variables

X = non-health beneficiary explanatory variables

The second stage estimated the following using ordinary least squares (OLS) using only those episodes (or episode quarters) with positive cost:

$$E(Y \mid Y > 0, H, X) \tag{1.2}$$

The expected cost of the episode was then calculated as follows.

$$E(Y \mid H, X) = P(Y > 0 \mid H, X) \cdot E(Y \mid Y > 0, H, X) \tag{1.3}$$

The final risk-adjusted amount, Y_{RA}, for an episode is equal to:

$$Y_{RA} = \overline{Y} + \{Y - E(Y \mid H, X)\} \tag{1.4}$$

where

$\overline{Y}$ = average predicted spending across all episodes of that major type nationally.[23]

The risk model was first calibrated on the national sample described in Section 3.6. The coefficients from the model were used to risk-adjust episode costs for the episodes attributed to the medical group practices. The full set of health status variables will be made available through the QRUR-website (located at https://projects.programinfo.us/QRUR-Episodes).

A.5 How were the beneficiary risk scores calculated?

The 2011 Supplemental QRURs provide beneficiary risk score percentiles in Exhibit 4 as a relative measure of the beneficiary's predicted health care spending based on the risk-adjustment model described above. The beneficiary's risk score percentile nationally was calculated by comparing the beneficiary's predicted cost, using the risk-adjustment model, to the predicted cost for all episodes of the same type nationally. A higher risk score percentile indicates that the beneficiary was predicted, based on his or her risk factors, to have relatively high health care costs for the episode compared to other episodes of the same subtype nationally.

A.6 How were average episode costs identified as statistically significantly different from the national mean?

In the 2011 Supplemental QRURs, a medical practice group's average costs for a given episode type are displayed as the same as or statistically significantly different from the national benchmark in Exhibit 1. Medical practice groups will be able to examine Medicare Part A and Part B costs across categories of services to determine patterns of relatively higher or lower costs for the Medicare beneficiaries who were attributed to their group within the episodes of interest. Average episode costs that are statistically significantly higher than the national benchmark may indicate potential opportunities for

[23] After the exclusion of clinically invalid episodes (such as $0 episodes), national predicted spending is not equal to national actual spending. Thus, risk-adjusted cost uses the national predicted spending.

future care coordination and cost savings. Average episode costs that are statistically significantly lower than were reflected in the national benchmark indicate that fewer services were used (on average) than the national benchmark. To determine statistical significance, the medical group's average cost for an episode (or episode subtype) was compared against the national benchmark for that episode (or episode subtype) using a two-sided, one-sample Student's t-test. A one-sample test is appropriate because the national sample was sufficiently large to be assumed to be representative of the actual population.

The t-statistic, *t*, for a given EP group's episodes of type *i* was calculated as follows:

$$t_i = \frac{\bar{x}_i - \mu_i}{s_i / \sqrt{n_i}} \quad (1.5)$$

where $\bar{x}_i$ is the mean cost of the group's episodes of subtype *i*, s_i is the standard deviation of the cost of the group's episodes of type *i*, and n_i is the number of episodes of that type attributed to that group. In this equation, μ_i represents the national sample average cost for episode type *i*. Results that are statistically significantly higher or lower than the national benchmark at a significance level of five percent are indicated in the 2011 Supplemental QRURs.

A medical practice group's average episode costs should only be compared against the national benchmark if at least ten episodes of a given major episode type were attributed to the group. Although all summary statistics were reported for groups with fewer than ten episodes of any episode type, these results should be interpreted with caution. Small numbers of episodes do not provide enough information for comparison purposes because they could skew the average episode cost for a group.

A.7 How were the service categories identified?

The 2011 Supplemental QRURs break down episode costs by the same categories of services as were used in the 2011 Group QRURs that were distributed in December 2012. These categories follow FFS Medicare payment schedules and can be identified from Medicare claims. Table 11 provides a crosswalk to how each service was identified from claims. Exhibit 5 of the 2011 Supplemental QRURs also provides this information.

Table 11: Identifying Service Categories

Category	Claim Type	Criteria for Including Claim (Line Item) in Category		
		BETOS[24] Criterion	Place of Service Criterion	Specialty Criterion
Professional E&M Services in All Non-Emergency Settings	Carrier minus ambulatory surgical center (ASC) claims	All M codes	Carrier place of service not equal to 23 (emergency room)	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Procedures in All Non-Emergency Settings	Carrier (minus ASC)	All P codes, except for P0	Carrier place of service not equal to 23 (emergency room)	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Inpatient Hospital Facility Services	Inpatient	Not applicable	Provider number ends in {0001-0899} or {1300-1399}	Not applicable
Outpatient Hospital Facility Services	Outpatient, carrier (ASC only)	All M, P (except for P0), I, or T codes	Carrier place of service not equal to 23; outpatient revenue center code NOT in {0450-0459, 0981} (emergency room)	Carrier specialty = 49 (ASC)
Emergency Services: Emergency Visits	Outpatient, carrier (minus ASC)	All M codes	Carrier place of service = 23 or outpatient revenue center line code in {0450-0459, 0981}	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Emergency Services: Procedures	Outpatient, carrier (minus ASC)	All P codes, except for P0	Carrier place of service = 23 or outpatient revenue center line code in {0450-0459, 0981}	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Emergency Services: Laboratory and Other Tests	Outpatient, carrier (minus ASC)	All T codes	Carrier place of service = 23 or outpatient revenue center line code in {0450-0459, 0981}	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Emergency Services: Imaging services	Outpatient, carrier (minus ASC)	All I codes	Carrier place of service = 23 or outpatient revenue center line code in {0450-0459, 0981}	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B

[24] More information about the Berenson-Eggers Type of Service codes can be found at http://www.cms.gov/Medicare/Coding/HCPCSReleaseCodeSets/BETOS.html.

Table 11 (continued): Identifying Service Categories

Category	Claim Type	Criteria for Including Claim (Line Item) in Category		
		BETOS[25] Criterion	Place of Service Criterion	Specialty Criterion
Ancillary Services: Laboratory and Other Tests	Carrier (minus ASC)	All T codes	Carrier place of service not equal to 23	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Ancillary Services: Imaging Services	Carrier (minus ASC)	All I codes	Carrier place of service not equal to 23	Carrier specialty NOT in {45, 47, 49, 51-54, 58-61, 63, 69, 73-75, 87, 88} AND NOT beginning with A or B
Ancillary Services: Durable Medical Equipment	Durable medical equipment	All codes except for O1D and O1E	Not applicable	Not applicable
Post-Acute: Skilled Nursing Facility	Skilled nursing facility	Not applicable	Not applicable	Not applicable
Post-Acute: Psychiatric, Rehabilitation, or Other Long-Term Facility	Inpatient	Not applicable	Provider number ends in {2000-2299, 3025-3099, 4000-4499} or its third position is in {M, R, S, T}	Not applicable
Post-Acute: Hospice	Hospice	Not applicable	Not applicable	Not applicable
Post-Acute: Home Health	Home health	Not applicable	Not applicable	Not applicable
Other Services: Ambulance Services	Outpatient, carrier	O1A	Not applicable	Not applicable
Other Services: Chemo. and Part B Drugs	Outpatient, carrier, durable medical equipment	O1D, O1E	Not applicable	Not applicable
Other Services: All Other Services	Remainder of total costs from claims files (except Part D)	Not applicable	Not applicable	Not applicable

[25] More information about the Berenson-Eggers Type of Service codes can be found at http://www.cms.gov/Medicare/Coding/HCPCSReleaseCodeSets/BETOS.html.