MATHEMATICA Policy Research

REPORT

2016 Measure Updates and Specifications Report

Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy:

A Quality Measure for Profiling Facility Performance Using Claims Data

Version 2.0

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Prepared by:

Mathematica Policy Research under subcontract to Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (CORE)

Prepared for:

Centers for Medicare & Medicaid Services

Table of Contents

List of Tables

List of Figures

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1. How to Use This Report

This report describes updates that have been made to the Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy measure (henceforth referred to as the colonoscopy measure) during annual reevaluation and following CMS's confidential national reporting period (dry run) of colonoscopy measure results in July 2015. The report provides background information about the measure and its development, a description of each update made since July 2015, the impacts of the changes on the measure cohort and outcome, and overall measure results.

Specifically, the report includes the following sections:

- **Section 2 – Background and Overview of Measure Methodology:**
  - Background on colonoscopy measure
  - Overview of methodology
    - Cohort – inclusions and exclusions
    - Outcomes
    - Planned admission algorithm
    - Risk-adjustment variables
    - Data sources
    - Measure calculation
    - Categorizing facility performance

- **Section 3 – 2016 Measure Updates:**
  - Background and rationale for measure updates
  - Detailed discussion of measure updates
    - Inclusion/exclusion criteria updates
    - Updates to cohort procedure codes
    - Planned admission algorithm updates
  - Impact of measure updates

- **Section 4 - Summary of Measure Performance After Updates:**
  - Colonoscopy model parameters and performance

- **Section 5 - Glossary**

The Appendices contain detailed measure information, including:

- The statistical approach to calculating risk-standardized hospital visit rates (Appendix A);
- A summary of annual updates to the measure by year (Appendix B);
- Detailed measure specification (Appendix C); and
- A detailed description of the colonoscopy planned admission algorithm (Appendix D).

For additional references, the original measure technical report and the 2015 measure specifications report are available on the Hospitals - Outpatient measures page of QualityNet and the Ambulatory Surgical Centers measures page of QualityNet:

- Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy Measure Technical Report (Methodology Report, 2014)
- Colonoscopy Measure Specifications Report (2015)

2. Background and Overview of Measure Methodology

2.1. Background on Colonoscopy Measure

CORE developed the colonoscopy measure for CMS under a contract supporting the development of ambulatory care outcome measures. The measure received NQF endorsement in 2014 (NQF #2539). In 2015, CMS held a national confidential reporting period (dry run) for the measure. CMS contracted with CORE and Mathematica Policy Research to update the measure. The measure is reevaluated annually in order to make improvements based on stakeholder input and to incorporate advances in science or changes in coding. The 2016 updates reflect the information gathered during the dry run in preparation for measure implementation for the calendar year 2018 payment determination for the Hospital Outpatient Quality Reporting (OQR) and Ambulatory Surgical Center Quality Reporting (ASCQR) programs.

2.2. Overview of Measure Methodology

The colonoscopy measure was developed to improve the quality of care delivered to patients undergoing outpatient colonoscopy procedures. In brief, the colonoscopy measure includes all non-federal acute care hospital outpatient departments (HOPDs) and ambulatory surgical centers (ASCs) that performed qualifying colonoscopies during the performance period[1]. The measure will be calculated separately for each facility type. This section provides a high-level summary of the current measure specification, including updates from the 2016 reevaluation, which are discussed in detail in Section 3. Further information on the measure development process is available in the Measure Technical Report located at https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Measure-Methodology.html

2.2.1. Cohort

Inclusion Criteria

The target population for this measure is Medicare fee-for-service (FFS) patients aged 65 years or older undergoing outpatient colonoscopies:

[1] PPS-exempt cancer hospitals and non-acute hospitals (such as long-term care hospitals) performing qualifying colonoscopies are included in the calculations in this report, but will not be included in the calculations when the measure is implemented for the OQR program.

- Identified using Healthcare Common Procedure Coding System (HCPCS) codes and Common Procedural Terminology (CPT) codes (see Appendix C, Table C.1). Qualifying colonoscopy procedures were not included in the measure if they were concurrently billed with a high-risk colonoscopy procedure code (see Appendix C, Table C.2).

  Rationale: These codes identify a clinically coherent group of patients undergoing low-risk outpatient colonoscopy for colorectal cancer screening, diagnostic evaluation for symptoms and signs of disease, and biopsies or removal of pre-cancerous lesions or polyps.

- For patients who are aged 65 or over at the time of the procedure.

  Rationale: Medicare beneficiaries under age 65 typically are a highly diverse group with a higher burden of disability, and it is therefore difficult to adequately risk adjust for the under 65 population.

- For patients with continuous enrollment in Medicare FFS Parts A and B in the 12 months prior to the procedure.

  Rationale: Patients with full enrollment have all claims available for identifying comorbidities for risk adjustment.

Exclusion Criteria

The exclusions for the colonoscopy measure are narrowly targeted and necessary to ensure that the cohort is clinically coherent and has complete data available to capture outcomes that occur following the colonoscopy. The measure's exclusions rely on clinical rationale and prevent unfair distortion of performance results. After exclusions were applied, the measure captures the majority of qualifying colonoscopies at both HOPDs (91%) and ASCs (93%) (Figures 4.2.1 and 4.2.2, respectively). All claims-based codes used to define exclusion criteria are listed in Appendix C, Table C.3-Table C.5. The measure excludes:

- Procedures for patients who lack continuous enrollment in Medicare FFS Parts A and B in the seven (7) days after the procedure.

  Rationale: We exclude these patients to ensure all patients have full data available for outcome assessment.

- Colonoscopies that occur concurrently with high-risk upper gastrointestinal (GI) endoscopies.

Rationale: Patients undergoing concurrent high-risk upper GI endoscopies, such as upper GI endoscopies for control of bleeding or treatment of esophageal varices, are at higher risk for hospital visits than patients undergoing a typical colonoscopy. Patients undergoing these procedures are often unwell and have a higher risk profile than typical colonoscopy patients.

- Colonoscopies for patients with a history of inflammatory bowel disease (IBD) or diverticulitis in the year preceding the colonoscopy, or a diagnosis of these conditions at the time of the index colonoscopy and/or on a claim for a hospital visit within 7 days of the colonoscopy.

  Rationale: Patients with a history or diagnosis of IBD or diverticulitis at the time of colonoscopy often include both stable and actively unwell patients, and we likely could not fully characterize and adjust for their pre-procedure risk of needing a post-procedure hospital visit.

- Colonoscopies followed by a subsequent outpatient colonoscopy procedure within 7 days.

  Rationale: In these situations, the two colonoscopies are considered part of a single episode of care, for which the subsequent colonoscopy is considered the index procedure.

- Colonoscopies that are billed on the same hospital outpatient claim as an emergency department (ED) visit (applies to colonoscopies at HOPDs only).

  Rationale: In these situations, it is not possible to use claims data to determine whether the colonoscopy was the cause of, subsequent to, or during the ED visit.

- Colonoscopies that are billed on the same hospital outpatient claim as an observation stay (applies to colonoscopies at HOPDs only).

  Rationale: In these situations, it is not possible to use claims data to determine whether the colonoscopy was the cause of, subsequent to, or during the observation stay.

- Colonoscopies that occur on the same day and at the same hospital as an ED visit that is billed on a different claim than the index colonoscopy (applies to colonoscopies at HOPDs only).

Rationale: It is unclear whether the same-day ED visit occurred before or after the colonoscopy. However, for ED visits billed on the same day but at a different facility, it is unlikely that a patient would experience an ED visit for an acute diagnosis at one facility and then travel to another facility for a routine colonoscopy on the same day. Therefore, these colonoscopies are not excluded because they likely represent a routine procedure followed by a complication of care.

2.2.2. Outcome

Unplanned Hospital Visits

The measure defines the outcome as any (i.e., one or more) unplanned hospital visit within 7 days of an outpatient colonoscopy; a hospital visit includes any ED visit, observation stay, or unplanned inpatient admission. The measure focuses on the outcome of unplanned hospital visits for several reasons. First, hospital visits are a broad outcome that captures the full range of potentially serious adverse events related to preparing for, undergoing, and recovering from the colonoscopy. Second, hospital visits are easily identifiable and measurable from claims data. Third, this broad outcome is consistent with a patient-centered view of care that prompts providers to fully account for and minimize to the fullest extent all acute complications, such as syncope or abdominal pain, not just those narrowly related to procedural technique. Finally, hospital visits are costly; reducing hospital visits following colonoscopy may lead to substantial healthcare savings.

The measure defines ED visits and observation stays using billing codes or revenue center codes identified in Medicare Part B outpatient hospital claims. Table C.6 in Appendix C provides the specific codes used to identify ED visits and observation stays.

7-Day Time Frame

The measure limits the outcome of hospital visits to 7 days, as existing literature suggests that the vast majority of adverse events after colonoscopy occur within the first 7 days following the procedure,[2] and our empirical analyses during measure development indicated that the highest rates of hospital visits were within 7 days of colonoscopy. Thus, based on existing literature and empirical findings, as well as input from the Technical Expert Panel (TEP) and public comment, the measure development team concluded that unplanned hospital visits within 7 days is the

[2] Rabeneck L, Saskin R, Paszat LF. Onset and clinical course of bleeding and perforation after outpatient colonoscopy: a population-based study. Gastrointest Endosc. Mar 2011;73(3):520-523.

optimal outcome to ensure capture of procedure-related adverse events and to minimize capture of hospital visits unrelated to the procedure.

2.2.3. Planned Admission Algorithm

The measure includes only unplanned admissions in the measure outcome. "Planned" admissions are those planned by providers for anticipated medical treatment or procedures that must be provided in the inpatient setting. The measure does not count these in the outcome because variation in planned admissions does not reflect quality differences.

Since it is not possible to use claims to identify planned admissions directly, the measure uses an adapted version of an algorithm developed for CMS's hospital readmission measures, CMS's Planned Readmission Algorithm version 4.0. In brief, the algorithm uses the procedure codes and principal discharge diagnosis code on each inpatient hospital claim to identify admissions that are typically planned and may occur after a colonoscopy. A few specific, limited types of care are always considered planned (e.g., major organ transplant, rehabilitation, or maintenance chemotherapy). Otherwise, a planned admission is defined as a non-acute admission for a scheduled procedure (e.g., total hip replacement or cholecystectomy). Admissions for an acute illness or for complications of care are never considered planned. Also, the measure never considers ED visits or observation stays as planned. Appendix D provides a detailed description of the planned admission algorithm adapted for the colonoscopy measure.

2.2.4. Risk-Adjustment Variables

The measure specifications include 15 risk-adjustment variables (age, concomitant upper GI endoscopy, polypectomy during procedure, and 12 comorbidity variables). Appendix Table C.7 presents the definition of these variables, based on CMS hierarchical condition categories (CCs). The measure does not include acute diagnoses that occur only at the time of the colonoscopy procedure toward risk-adjustment because these diagnoses may represent complications of care; see Appendix C, Table C.8 for a summary of these diagnoses. For a detailed description of the development of the risk-adjustment model, see the Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy Measure Technical Report (Methodology Report, 2014), available on QualityNet.

2.2.5. Data Sources

CMS uses paid Medicare claims to identify colonoscopies performed in the outpatient setting and subsequent hospital visits, as well as CMS enrollment and demographic data. Patient history is also assessed using claims data collected in the 12 months prior to the colonoscopy procedure.

The measure includes outpatient colonoscopy procedures identified using Healthcare Common Procedure Coding System (HCPCS) codes and Common Procedural Terminology (CPT) codes (see Appendix C, Table C.1). ASC-based colonoscopies are identified from Part B ASC facility claims. HOPD-based colonoscopies are identified using physician bills for outpatient-based colonoscopies matched to hospital bills.[3]

2.2.6. Measure Calculation

Measure scores are calculated by fitting the hierarchical logistic regression model to the data. The measure calculates a score for each outpatient facility by computing the ratio of the number of predicted unplanned hospital visits to the number of expected unplanned hospital visits. To transform this facility-specific ratio into a rate for ease of interpretation, it is multiplied by the unplanned hospital visit rate for the entire national cohort. See Appendix A for more information on the statistical risk-adjustment model and the calculation of a facility risk-standardized rate. The data used for measure calculation contains 100% of qualifying colonoscopies at each facility and provides adequate sample size for a reliable measure score.

2.2.7. Categorizing Facility Performance

To further categorize relative performance, the measure classifies facilities into three performance categories using the approach CMS employs for reporting similarly structured hospital outcome measures on the website Hospital Compare (http://www.medicare.gov/hospitalcompare/). Specifically, it uses bootstrapping to empirically construct a 95% interval estimate for each risk-standardized hospital visit rate (Appendix A, Sections A2-A3). If the facility's entire interval estimate is below the national observed 7-day unplanned hospital visit rate, the measure classifies the facility as having better than expected performance. If the entire interval estimate is above the national rate, it classifies the facility as having worse than expected performance. If the facility's interval estimate includes the national rate, it classifies it as no different than expected. Since this approach calculates a relative performance rate, the rates calculated separately for HOPDs and ASCs in Section 4 should not be compared directly; this is because they are standardized to a different national rate within each type of facility.

[3] This includes a small number of physician bills that are matched to inpatient hospital bills and have a colonoscopy procedure date within the three days prior to and including the inpatient admission date, to identify colonoscopies that were billed according to the CMS 3-day billing rule.

3. Updates to Measure for 2016

3.1. Background and Rationale for Measure Updates

The measure aims to improve the quality of care delivered to patients undergoing outpatient colonoscopy procedures. As developed, the measure excluded: (1) colonoscopies for patients with a history of IBD or diverticulitis in the year preceding the colonoscopy; (2) colonoscopies that occur concurrently with high-risk upper gastrointestinal (GI) endoscopies; and (3) colonoscopies for patients who lacked continuous enrollment in Medicare FFS Parts A and B for at least 30 days after the procedure.

CMS made refinements to the exclusion criteria prior to the dry run in July 2015. These refinements included: (1) adding a new exclusion for same-claim ED visits (applies to colonoscopies at HOPDs only); (2) adding a new exclusion for colonoscopies followed by a subsequent procedure within 7 days; and (3) revising the exclusion for colonoscopies for patients lacking continuous enrollment in Medicare FFS Parts A and B for 30 days by changing the time period to 7 days. These updates are described in the Colonoscopy Measure Specifications Report (2015).

During the dry run in July 2015, facilities highlighted various cases in their data that indicated the need to further refine and/or create additional measure exclusions to ensure that all index procedures and outcomes align with the intent of the measure. Section 3.2 below details the measure updates instituted during the measure reevaluation period following the dry run as well as the impact of these updates on the measure cohort and outcome.

3.2. Detailed Discussion of Measure Updates

3.2.1. Addition of Exclusion for Same-Claim Observation Stay Outcomes

The measure now excludes colonoscopies that are billed on the same hospital outpatient claim as an observation stay, which represents an expansion of the preexisting exclusion for colonoscopies occurring on the same hospital outpatient claim as an ED visit, and applies to HOPDs only. During dry run, facilities identified cases of colonoscopies that were coded on the same claim as an observation stay, which often represented instances in which the colonoscopy was performed after the patient was placed into observation status for acute GI symptoms. The measure now excludes these colonoscopies from the measure calculation because the sequence of events in these cases is not clear. It is not possible to use claims data to determine whether the colonoscopy was the cause of, subsequent to, or during the observation stay.

3.2.2. Expansion of Exclusions for Patients with IBD or Diverticulitis

The original measure specifications excluded colonoscopies for patients with a history of IBD or diverticulitis in the year preceding the colonoscopy. During the dry run, facilities noted instances where a diagnosis of IBD or diverticulitis appeared on the index colonoscopy claim, but not in the patient's medical history from the prior year. The measure will now also exclude colonoscopies where the diagnosis of IBD or diverticulitis appears on the index colonoscopy claim or on a subsequent hospital visit outcome claim.[4] IBD and diverticulitis are serious conditions that, if diagnosed during the colonoscopy, may result in an admission that does not reflect the quality or safety of the colonoscopy. Additionally, a post-index diagnosis of IBD or diverticulitis, which represents a very small fraction of cases (less than 0.5% of the cohort) in the measure population, indicates that the condition was likely present at the time of the index colonoscopy but not coded.

3.2.3. Addition of Exclusion for Same-Day, Same-Facility, but Separate-Claim ED Visits

The measure previously excluded colonoscopies that appeared on the same hospital outpatient claim as an ED visit since it is not possible to determine the order of events using claims in these cases. During the dry run, facilities reported instances in which the measure counted same-day ED visits billed on separate claims ("same-day, separate-claim" cases) as outcomes, including ED visits that occurred before the colonoscopy procedure. Analysis of the dry run data indicated that the diagnoses on many of these same-day, separate-claim ED visits could be outcomes related to the colonoscopy bowel preparation or effects of the procedure. Consistent with the same-claim ED exclusion, the measure will now also exclude colonoscopies in which a patient had an ED visit on the same day at the same facility, but the ED visit was billed on a different claim, because we cannot tell the order of events.

However, the measure does not exclude instances where an ED visit occurred at a *different* facility on the same day as the colonoscopy, because it seems unlikely that a patient would present to the ED for an acute diagnosis at one facility and then travel to another facility for a routine colonoscopy on the same day. This ensures that the measure continues to capture outcomes occurring at a second facility for complications related to a colonoscopy performed at the first facility.

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[4] In addition, for HOPD colonoscopies, the measure will look for an IBD or diverticulitis diagnosis on the facility claim as well as matched physician claim.

3.2.4. *Addition of Procedure Codes to the Measure Cohort*

The measure specifications now include additional procedure codes based on review of updates to CPT/HCPCS coding that took effect following the dry run, as well as identification of a few additional existing codes for high-risk colonoscopies, as described below.

Addition of three high-risk colonoscopy procedure codes to the list of excluded procedures:

Review of the HCPCS code lists for the measure identified three codes for high-risk colonoscopies ('via stoma' or artificial opening) that were not originally in the list of excluded procedures. Because the measure is intended to assess quality of care during and following low-risk colonoscopy procedures, these three codes are not appropriate for inclusion in the measure cohort and are now excluded. Specifically, the measure now excludes colonoscopies that are billed in conjunction with code 44390, 44391, or 44397 (Appendix C, Table C.2).

Addition of new (added in 2015 or later) procedure codes for index low-risk colonoscopies, high-risk colonoscopies, and upper GI endoscopy exclusions:

Review of the code lists for the measure identified two new low-risk colonoscopy codes and several high-risk colonoscopy and upper GI endoscopy codes that are new in 2015 and 2016. The addition of these codes is consistent with the intent of the measure to include only low-risk colonoscopy procedures. Specifically, the measure cohort now includes CPT/HCPCS codes 45388 and G6024 (Appendix C, Table C.1). New high-risk colonoscopy codes include 44401-44408, 45389, 45390, 45393, 45398, 45319, G6019, G6020, and G6025 (Appendix C, Table C.2). New codes for high-risk upper GI endoscopies include 43180 and 43210 (Appendix C, Table C.3). The results in this report do not include any of these codes since they were not in use during the dry run data period ending in 2014.

3.2.5. *Updates to the Planned Admission Algorithm*

The colonoscopy measure outcome does not include planned inpatient admissions because they are not a signal of poor quality care. The planned admission algorithm excludes inpatient admissions occurring within 7 days of the colonoscopy if:

- The inpatient claim contains a procedure code or primary diagnosis that maps to an AHRQ CCS procedure or diagnosis category that is considered "always planned" (Appendix D, Tables PA1 and PA2); or
- The inpatient claim contains a procedure code that maps to an AHRQ CCS procedure category that is considered "potentially planned" (Appendix D, Table PA3), and the principal diagnosis on the claim is not in an AHRQ CCS diagnosis group or an individual ICD-9 code that is considered acute (Appendix D, Table PA4).

Colonoscopy Measure-Specific Updates to the Planned Admission Algorithm

During the dry run, facilities raised three scenarios that suggested the need to refine the measure's planned admission algorithm. In each scenario, facilities indicated that the patient had been admitted for a planned procedure, but that the measure classified the admission as unplanned:

- Scenario 1: The patient was admitted to address a condition found during the colonoscopy (e.g., cancer).
- Scenario 2: The patient underwent a colonoscopy as part of the pre-operative work-up for a planned procedure (e.g., colectomy, ileostomy take-down, and rectoplexy).
- Scenario 3: The patient underwent a routine colonoscopy in the 7 days prior to a planned, unrelated surgery (e.g., renal artery stent surgery).

Analysis of these scenarios included identifying the specific cases that facilities had noted as planned and summarizing the claim procedure and diagnosis codes for the subsequent inpatient admissions. Based on these cases, the planned admission algorithm for the colonoscopy measure was updated to add 14 CCS procedure categories to the set of potentially planned procedures (see Appendix D, Table PA3):

- 70 "Upper gastrointestinal endoscopy; biopsy"
- 72 "Colostomy; temporary and permanent"
- 73 "Ileostomy and other enterostomy"
- 75 "Bowel resection"
- 77 "Proctoscopy and anorectal biopsy"
- 90 "Excision; lysis peritoneal adhesions"
- 92 "Other bowel diagnostic procedures"
- 93 "Other non-OR upper GI therapeutic procedures"
- 94 "Other OR upper GI therapeutic procedures"
- 95 "Other non-OR lower GI therapeutic procedures"
- 96 "Other OR lower GI therapeutic procedures"
- 97 "Other gastrointestinal diagnostic procedures"
- 98 "Other non-OR gastrointestinal therapeutic procedures"
- 194 "Diagnostic ultrasound of gastrointestinal tract"

These additional procedure categories are largely GI-related, and, as facilities noted, many of the associated diagnoses could be either the reason for the colonoscopy procedure or related to the procedure findings. In addition, the algorithm now includes two new diagnoses, atrial fibrillation and perforation of intestine, on the list of "acute diagnoses" to ensure that admissions for these conditions are never considered planned (Appendix D, Table PA4).

Planned Readmission Algorithm Updates – Version 4.0

The colonoscopy measure uses an adapted version of a planned readmission algorithm developed for CMS's hospital readmission measures. The planned readmission algorithm version 4.0 was modified from version 3.0 for 2016 public reporting. Version 4.0 incorporates improvements made following a validation study of the algorithm that used data from a medical record review of 634 charts at seven hospitals and then review of the results of that study by clinical experts. To align with the version 4.0 planned readmission algorithm, the planned admission algorithm for the colonoscopy measure now also excludes the following AHRQ CCS procedure categories from the list of potentially planned procedures (Appendix D, Table PA3):

- 47 "Diagnostic cardiac catheterization; coronary arteriography"
- 48 "Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator"
- 62 "Other diagnostic cardiovascular procedures"
- 157 "Amputation of lower extremity"
- 169 "Debridement of wound; infection or burn"

The version 4.0 planned readmission algorithm now adds the following AHRQ CCS procedure category to the list of potentially planned procedures:

- 1 "Incision and excision of the Central Nervous System (CNS)

Additional information about the rationale for the changes to the Planned Readmission Algorithm is located in Appendix D.

3.3. Impact of Measure Updates

3.3.1. Assessment of Measure Updates

We conducted reevaluation analyses with updated specifications to reflect the changes above using the July 1, 2011-June 30, 2014 claims data from the dry run. Our analyses calculate the measure separately for HOPDs and ASCs to align with separate calculations when the measure is implemented in the OQR and ASCQR programs, respectively, for the calendar year 2018 payment determination. The calculations in this section dropped a small proportion of colonoscopies (4%) performed in physician offices that were included in the combined calculations in the dry run. Further, the results in this section reflect refinements to strengthen the claims-processing algorithms to attribute colonoscopies to HOPD facilities. All results below are based on data after implementing these changes. Also note that while the specifications tables in Appendices C and D reflect mappings from ICD-9 to ICD-10 codes and mappings from

version 12 to version 22 of CMS CC groups, the analyses in this report are based only on the ICD-9, v12 CC specifications of the measure. The mappings in this report should be considered preliminary and may be revised following testing on ICD-10 data.

We examined the impact of each individual change to the measure and then reproduced measure calculations using the finalized specifications. We assessed the impact of each cohort change by summarizing how the size of the cohort changed with each update individually. The results of these analyses are presented in Section 3.3.2. We also compared the overall observed unplanned and planned hospital visit rates between the original and the updated versions of the planned admission algorithm (based on the revised cohort). The impact of these changes is presented in Section 3.3.3.

3.3.2. Colonoscopy Cohort Updates

The impact of each change described above on the size of the colonoscopy measure cohort in the July 2011-June 2014 dataset is presented in Table 3.3.2.1. Colonoscopies may be counted more than once because these categories are not mutually exclusive. The starting cohort for this table includes low-risk outpatient colonoscopies for Medicare FFS patients aged 65 or over enrolled in Medicare Parts A and B for the 12 months prior to the date of the colonoscopy.

First, three existing high-risk colonoscopy codes were added to the measure inclusion criteria. For HOPDs, this change reduced the size of the measure cohort by 51 cases. For ASCs, this change reduced the size of the cohort by 9 cases.

The expansion of the exclusion for IBD and diverticulitis reduced the cohort by 49,004 cases for HOPDs and by 32,287 cases for ASCs. Excluding same-claim observation stays and same-day/same-facility/separate-claim ED visits (both apply to HOPDs only) reduced the cohort by 12,178 and 4,435 cases, respectively.

Overall, the changes to the cohort reduce the number of cases by 58,121 (2.53%) for HOPDs and 32,024 (1.30%) for ASCs.

See Figures 3.3.2.1 and 3.3.2.2 for an illustration of the way cases are selected for the final measure cohort as well as total counts for all exclusions, for HOPDs and ASCs, respectively.

Table 3.3.2.1. Impact of Changes to Measure Exclusions

Inclusion/Exclusion Updates	Number of cases excluded with original exclusions	Number of cases excluded with updated exclusions	Net Change
Hospital Outpatient Departments			
Addition of 3 high-risk colonoscopy procedures that determine the included colonoscopies	19,414	19,465	51
Expansion of IBD and diverticulitis exclusion[2]	123,048	172,052	49,004
Addition of exclusion for same-claim observation stay outcomes (HOPDs only)[2]	0	12, 178	12,178
Addition of exclusion for same-day, same-facility, but separate-claim ED visits (HOPDs only) [2]	0	4,435	4,435
All exclusions	1,084,739	1,142,860[1]	58,121
Ambulatory Surgical Centers			
Addition of 3 high-risk colonoscopy procedures that determine the included colonoscopies	11,472	11,481	9
Expansion of IBD and diverticulitis exclusion[2]	123,543	155,830	32,287
All exclusions	898,474	930,498	32,024

[1]The net change in this row includes an increase in high-risk procedures identified as a result of also using information from the facility claim (a total of 5,125 more excluded cases).

[2]This exclusion is summarized after all final inclusion criteria (including the 3 new high-risk codes) have been applied. Each exclusion row is not mutually exclusive; that is, an observation could have more than one exclusion condition.

Figure 3.3.2.1. Revised Colonoscopy Cohort Exclusions: HOPDs

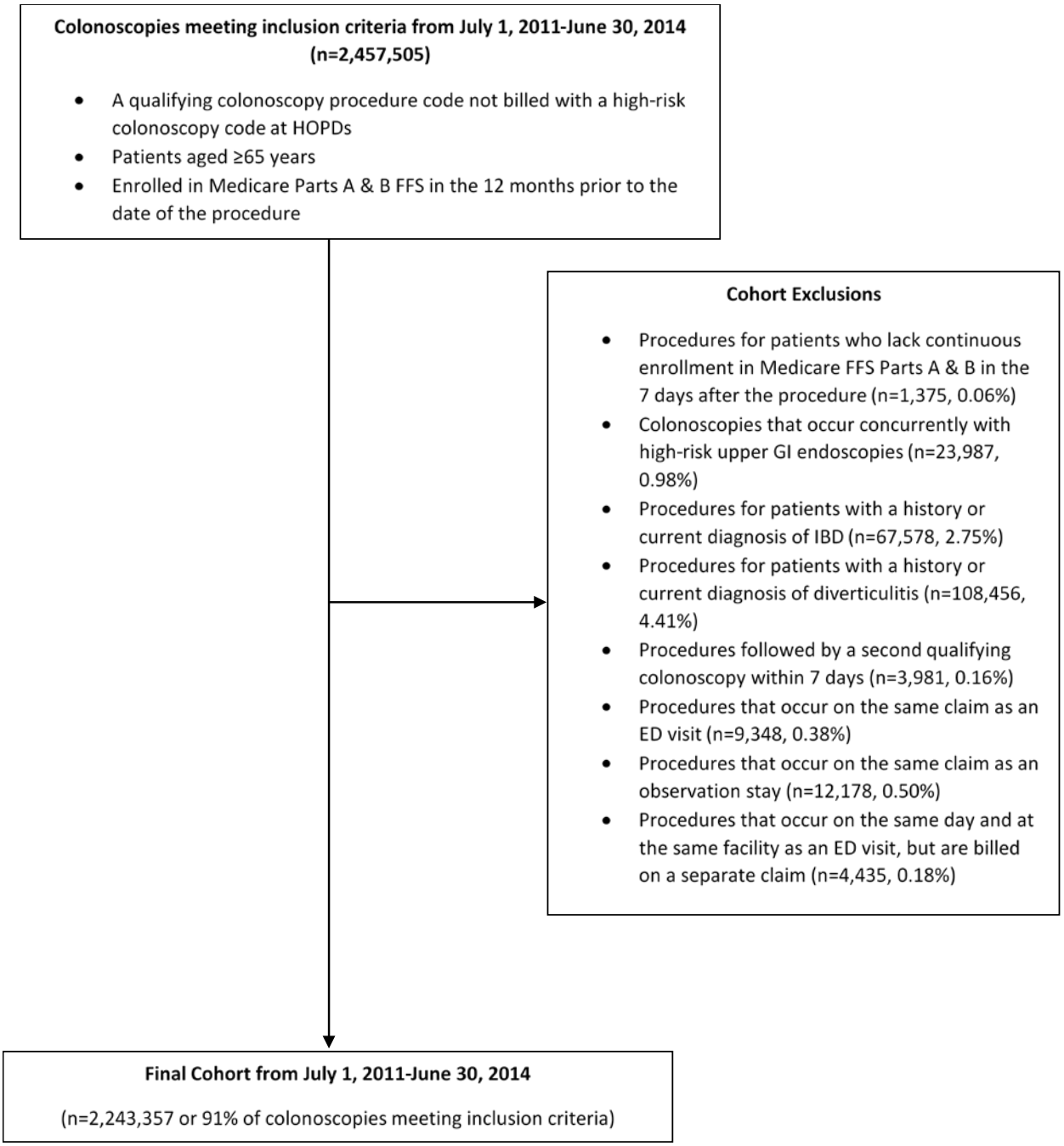
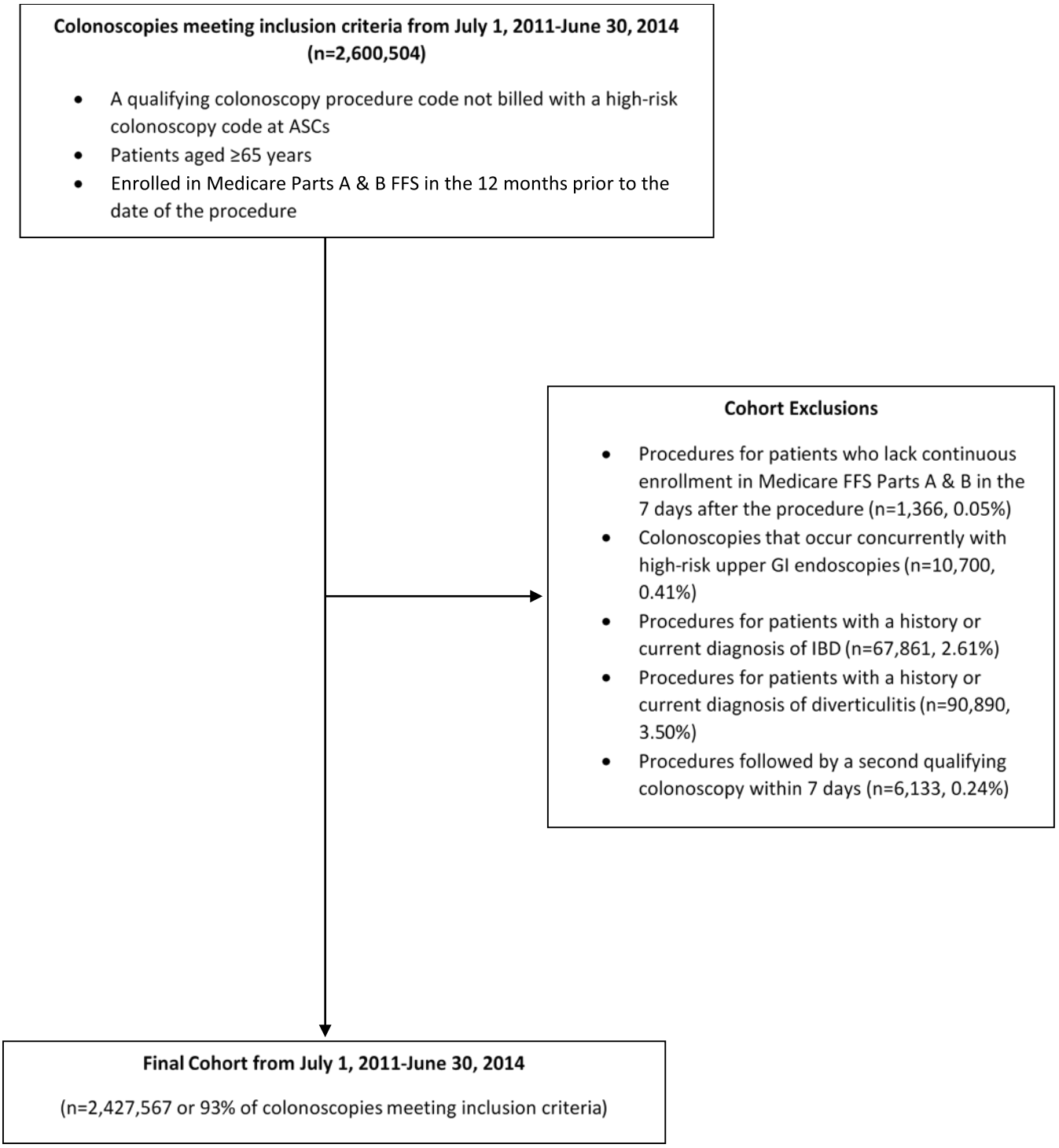


Figure 3.3.2.2. Revised Colonoscopy Cohort Exclusions: ASCs



3.3.3. Planned Admission Algorithm Updates

Table 3.3.3.1 summarizes the impact of changes to the planned admission algorithm on the rate of unplanned hospital visits for both HOPDs and ASCs. Updating the planned admission

algorithm with colonoscopy measure-specific changes and changes to align with v4.0 of the planned readmission algorithm (PRA) reduced the number of unplanned hospital visit outcomes by 5,264 in the HOPD cohort and by 1,869 in the ASC cohort (Table 3.3.3.1, column D). Most of the change is from the colonoscopy-specific updates introduced to address issues raised during the dry run, as seen in the shift from Column A to B. The shifts related to aligning with v4.0 of the PRA increased the number of unplanned visits slightly since the change removed a small number of categories from the potentially planned procedures (Column B to C).

The overall unplanned hospital visit rate per 1,000 colonoscopies was reduced by 2.34 visits per 1,000 colonoscopies for HOPDs and by 0.77 visits per 1,000 colonoscopies for ASCs. The revised overall unplanned hospital visit rate for HOPDs is 17.32 and for ASCs is 13.64 (Table 3.3.3.1, Column C).

Table 3.3.3.1. Impact of Changes to the Planned Admission Algorithm (PAA)

Outcome	(A) Colonoscopy measure prior to changes to PAA	(B) Colonoscopy measure after colonoscopy-specific changes to PAA	(C) Colonoscopy measure after colonoscopy-specific changes to PAA and aligning with version 4.0 of the PRA	(D) Net change
Hospital Outpatient Departments				
Number of hospital visits	49,731	49,731	49,731	0
Number of unplanned hospital visits	44,115	38,677	38,851	-5,264
Unplanned hospital visit rate (per 1,000)	19.66	17.24	17.32	-2.34
Number of planned hospital visits	5,616	11,054	10,880	5,264
Planned hospital visit rate (per 1,000)	2.50	4.93	4.85	2.35
% of hospital visits that are planned	11.29	22.23	21.88	10.59
Ambulatory Surgical Centers				
Number of hospital visits	38,446	38,446	38,446	0
Number of unplanned hospital visits	34,993	32,978	33,124	-1,869
Unplanned hospital visit rate (per 1,000)	14.41	13.58	13.64	-0.77
Number of planned hospital visits	3,453	5,468	5,322	1,869
Planned hospital visit rate (per 1,000)	1.42	2.25	2.19	0.77
% of hospital visits that are planned	8.98	14.22	13.84	4.86

Note: all changes to hospital visits are calculated among the revised cohort presented in Section 4.2.

4. Summary of Measure Performance After Updates

This section presents updated information on the frequency and effect of model risk factors, model performance, facility-level colonoscopy volume, and risk-standardized rates across facilities after incorporating the changes described in Section 3. All analyses used the July 2011-June 2014 dry run dataset and were stratified by facility type.

We computed two summary statistics to assess model performance: the predictive ability and the area under the receiver operating characteristic (ROC) curve (c-statistic). To test model predictive ability, we calculated observed hospital visit rates in the lowest and highest deciles on the basis of predicted hospital visit probabilities. The c-statistic is an indicator of the model's discriminant ability or ability to correctly classify those who did and did not have an unplanned hospital visit within 7 days of the colonoscopy. Potential values range from 0.5, meaning no better than chance, to 1.0, meaning perfect discrimination. A c-statistic of 1.0 indicates perfect prediction, implying patients' outcomes can be predicted completely by their risk factors, and physicians and facilities play no role in patients' outcomes. The frequency of model risk factors and model parameters and performance are presented in Section 4.1. In Section 4.2, we present the distributions of colonoscopy procedure volumes and risk-standardized hospital visit rates across facilities.

4.1. Colonoscopy Model Parameters and Performance

Table 4.1.1 shows the frequency of risk factors used in the risk-adjustment model, stratified by facility type. In general, patients at HOPDs are older and have a higher prevalence of risk factors than patients at ASCs. Table 4.1.2 presents the colonoscopy coefficients from the hierarchical logistic regression model, and Table 4.1.3 presents the corresponding odds ratios (ORs) and 95% confidence intervals (CIs). The coefficients and associated odds ratios for the HOPD and ASC cohorts are similar, and all variables are statistically significant with the exception of the interaction of age 70-74 with arrhythmia. Table 4.1.4 presents the colonoscopy model performance values, which indicate similar model performance across the two cohorts.

Table 4.1.1. Frequency of Colonoscopy Model Risk Factors (%)

Variable (CC)	HOPDs (%)	ASCs (%)
Concomitant Endoscopy	17.44	16.56
Polypectomy during Procedure	34.76	34.72
Congestive Heart Failure (CC 80)	10.26	6.69
Ischemic Heart Disease (CC 81-84)	24.87	22.06
Stroke/Transient Ischemic Attack (TIA) (CC 95-97)	10.55	9.91
Chronic Lung Disease (CC 108-110)	18.78	14.95
Metastatic Cancer (CC 7-9)	5.20	4.58
Liver Disease (CC 25-30)	7.21	6.37
Iron Deficiency Anemia (CC 47)	26.09	23.32
Disorders of Fluid, Electrolyte, Acid Base (CC 23)	10.77	8.17
Pneumonia (CC 111-113)	5.59	3.95
Psychiatric Disorders (CC 54-56, 58-60)	15.53	12.28
Drug and Alcohol Abuse/Dependence (CC 51-53)	5.97	4.16
Arrhythmia (CC 92-93)	20.36	16.65
Age 65-69	30.62	32.01
Age 70-74	31.42	32.83
Age 75-79	21.80	21.66
Age 80-84	11.40	10.13
Age 85+	4.77	3.37

Notes: Results based on July 1, 2011-June 30, 2014 performance period. Risk-factor definitions in this table are based on the v12 CC definitions.

Table 4.1.2. Coefficients for Colonoscopy Hierarchical Logistic Regression Model

Variable (CC)	HOPDs	ASCs
Concomitant Endoscopy	0.31	0.28
Polypectomy during Procedure	0.24	0.30
Congestive Heart Failure (CC 80)	0.29	0.28
Ischemic Heart Disease (CC 81-84)	0.24	0.23
Stroke/Transient Ischemic Attack (TIA) (CC 95-97)	0.19	0.15
Chronic Lung Disease (CC 108-110)	0.24	0.21
Metastatic Cancer (CC 7-9)	0.18	0.12
Liver Disease (CC 25-30)	0.31	0.30
Iron Deficiency Anemia (CC 47)	0.20	0.19
Disorders of Fluid, Electrolyte, Acid Base (CC 23)	0.23	0.21
Pneumonia (CC 111-113)	0.26	0.21
Psychiatric Disorders (CC 54-56, 58-60)	0.20	0.25
Drug and Alcohol Abuse/Dependence (CC 51-53)	0.32	0.34
Age by Arrhythmia Interaction	--	--
Among those without Arrhythmia (CC 92-93)	--	--
Age 70-74 v. Age 65-69	0.07	0.08
Age 75-79 v. Age 65-69	0.22	0.21
Age 80-84 v. Age 65-69	0.42	0.44
Age 85+ v. Age 65-69	0.75	0.68
Among those with Arrhythmia (CC 92-93)	--	--
Age 70-74 v. Age 65-69	-0.01	0.04
Age 75-79 v. Age 65-69	0.08	0.19
Age 80-84 v. Age 65-69	0.18	0.30
Age 85+ v. Age 65-69	0.44	0.51

Notes: Results based on July 1, 2011-June 30, 2014 performance period. Risk-factor definitions in this table are based on the v12 CC definitions.

Table 4.1.3. Adjusted ORs and 95% CIs for the Colonoscopy Hierarchical Logistic Regression Model

Variable (CC)	HOPDs OR (95% CI)	ASCs OR (95% CI)
Concomitant Endoscopy	1.37 (1.34,1.40)	1.32 (1.29,1.36)
Polypectomy during Procedure	1.28 (1.25,1.30)	1.35 (1.32,1.38)
Chronic Heart Failure (CC 80)	1.34 (1.30,1.37)	1.32 (1.27,1.37)
Ischemic Heart Disease (CC 81-84)	1.27 (1.24,1.29)	1.26 (1.23,1.30)
Stroke/Transient Ischemic Attack (TIA) (CC 95-97)	1.21 (1.17,1.24)	1.16 (1.12,1.20)
Chronic Lung Disease (CC 108-110)	1.27 (1.24,1.30)	1.23 (1.20,1.26)
Metastatic Cancer (CC 7-9)	1.20 (1.16,1.24)	1.13 (1.08,1.18)
Liver Disease (CC 25-30)	1.36 (1.32,1.39)	1.35 (1.31,1.39)
Iron Deficiency Anemia (CC 47)	1.22 (1.18,1.27)	1.21 (1.16,1.27)
Disorders of Fluid, Electrolyte, Acid Base (CC 23)	1.26 (1.22,1.30)	1.24 (1.19,1.29)
Pneumonia (CC 111-113)	1.29 (1.26,1.32)	1.23 (1.20,1.26)
Psychiatric Disorders (CC 54-56, 58-60)	1.22 (1.18,1.27)	1.28 (1.22,1.33)
Drug and Alcohol Abuse/Dependence (CC 51-53)	1.38 (1.35,1.41)	1.41 (1.37,1.45)
Age by Arrhythmia Interaction	--	--
Among those without Arrhythmia (CC 92-93)	--	--
Age 70-74 v. Age 65-69	1.07 (1.04,1.11)	1.08 (1.04,1.12)
Age 75-79 v. Age 65-69	1.24 (1.20,1.29)	1.23 (1.19,1.27)
Age 80-84 v. Age 65-69	1.52 (1.46,1.58)	1.56 (1.49,1.62)
Age 85+ v. Age 65-69	2.11 (2.00,2.22)	1.97 (1.85,2.09)
Among those with Arrhythmia (CC 92-93)	--	--
Age 70-74 v. Age 65-69	0.99 (0.94,1.05)	1.04 (0.98,1.11)
Age 75-79 v. Age 65-69	1.08 (1.03,1.14)	1.21 (1.14,1.29)
Age 80-84 v. Age 65-69	1.20 (1.13,1.27)	1.35 (1.26,1.44)
Age 85+ v. Age 65-69	1.55 (1.46,1.65)	1.67 (1.54,1.81)

Notes: Results based on July 1, 2011-June 30, 2014 performance period. Risk-factor definitions in this table are based on the v12 CC definitions.

Table 4.1.4. Colonoscopy Generalized Linear Model (Logistic Regression) Performance

Characteristic	HOPDs	ASCs
Predictive ability, % (lowest decile – highest decile)	0.53 – 4.57	0.55 – 3.02
c-statistic	0.68	0.65

Note: Results based on July 1, 2011-June 30, 2014 performance period.

4.2. Distribution of Facility-Level Measure Score

Table 4.2.1 presents the number of index colonoscopies for each facility type. There were 4,220 HOPDs with at least one qualifying index colonoscopy and 2,336 ASCs with at least one qualifying index colonoscopy. The median number of qualifying procedures was 253 (interquartile range (IQR) 74 – 639) for HOPDs and 655.5 (IQR 181 – 1552.5) for ASCs.

Table 4.2.2 shows the mean and median risk-standardized hospital visit (RSHV) rates for each facility type. The median HOPD RSHV rate was 17.29 hospital visits per 1,000 colonoscopies

(IQR 16.67 – 18.02). The median ASC RSHV rate was 13.59 hospital visits per 1,000 colonoscopies (IQR 13.01 – 14.34). Figures 4.2.1 and 4.2.2 show the overall distribution of RSHV rates for HOPDs and ASCs, respectively. The wide variations in performance across facilities highlight continuing opportunities for quality improvement.

Finally, Table 4.2.3 presents the between-facility variance by facility type. Between-facility variance for HOPDs was 1.86 (SE: 0.02) and 1.65 (SE: 0.03) for ASCs. If there were no systematic differences between facilities within each group, the between-facility variances would be 0.

Table 4.2.1. Distribution of Colonoscopy Cohort Volumes

Characteristic	HOPDs	ASCs
Number of facilities	4,420	2,336
Mean number of colonoscopies (SD)	507.5 (731.9)	1,039.2 (1,168.0)
Range (min – max)	1 – 11,604	1 – 10,830
25th percentile	74	181
50th percentile (median)	253	655.5
75th percentile	639	1552.5

Note: Results based on July 1, 2011-June 30, 2014 performance period.

Table 4.2.2. Distribution of RSHV Rates

Characteristic	HOPDs	ASCs
Number of facilities	4,420	2,336
Mean RSHV rate (SD)	17.37 (1.36)	13.70 (1.28)
Range (min – max)	11.87 – 25.03	9.63 – 19.87
25th percentile	16.67	13.01
50th percentile (median)	17.29	13.59
75th percentile	18.02	14.34

Note: Results based on July 1, 2011-June 30, 2014 performance period.

Table 4.2.3. Between-Facility Variance

--	HOPDs	ASCs
Between-facility variance (SE)	1.86 (0.02)	1.65 (0.03)

Note: Results based on July 1, 2011-June 30, 2014 performance period.

Figure 4.2.1. Distribution of RSHV Rates for HOPDs

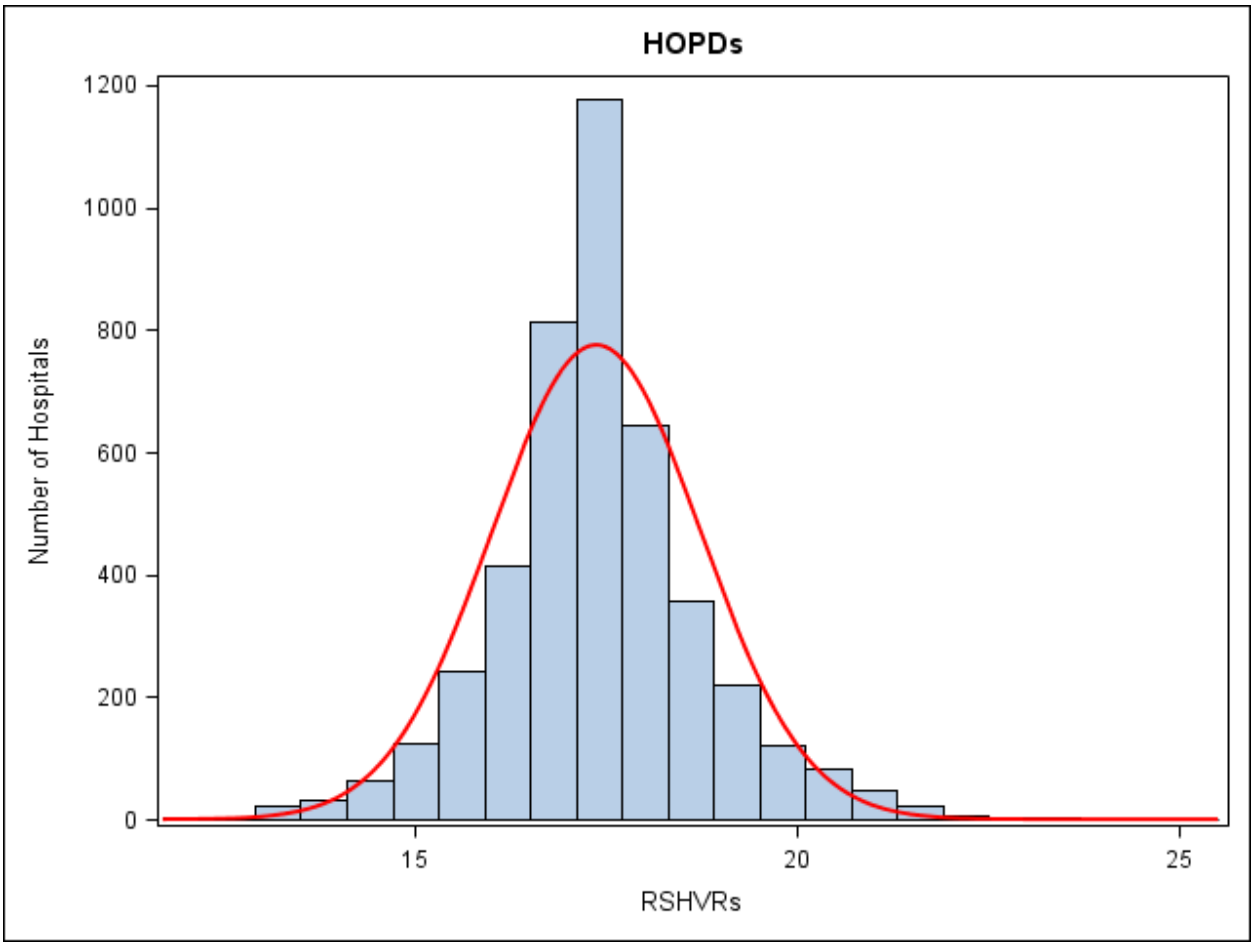
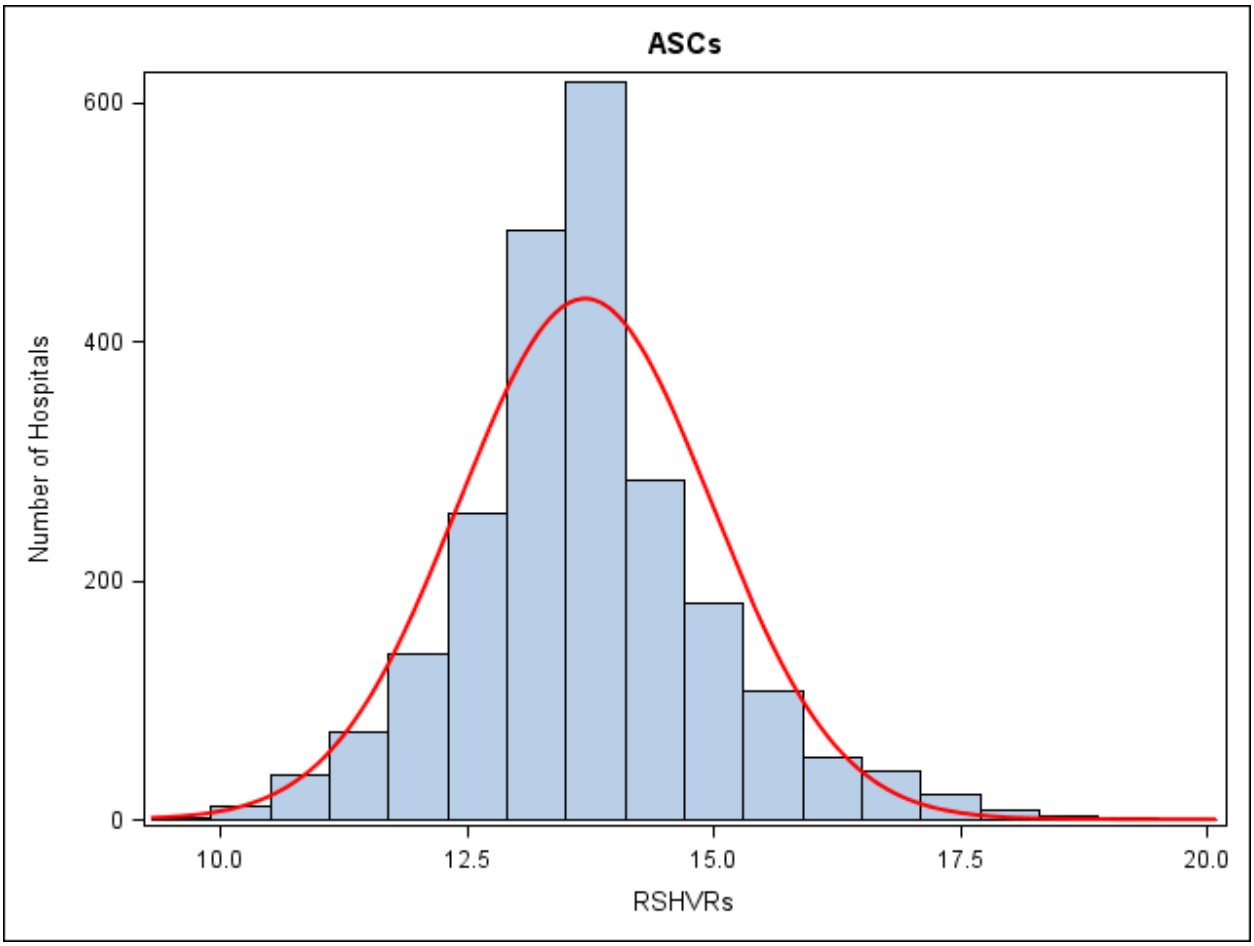


Figure 4.2.2. Distribution of RSHV Rates for ASCs



5. Glossary

Case mix: The particular comorbidity profile and age characteristics of patients with index colonoscopies at a given facility.

Cohort: The index colonoscopy procedures used to calculate the measure after inclusion and exclusion criteria have been applied.

Complications: Medical conditions that likely occurred as a consequence of care rendered during the index procedure.

Comorbidities: Medical conditions that the patient had in addition to his/her primary reason for receiving a colonoscopy.

Condition Categories (CCs): Groupings of diagnosis codes in clinically relevant categories, from the Hierarchical Condition Categories (HCCs) system. The measure uses the grouping but not the hierarchical logic of the system to create risk factor variables. Description of the CCs can be found at http://www.cms.hhs.gov/Reports/downloads/pope_2000_2.pdf.

Expected hospital visits: The number of visits expected based on average facility performance with a given facility's case mix.

Hierarchical model: A widely accepted statistical method that enables fair evaluation of relative facility performance by accounting for patient risk factors as well as the number of patients a facility treats. This statistical model accounts for the structure of the data (patients clustered within facilities) and calculates (1) how much variation in facility hospital visit rates overall is accounted for by patients' individual risk factors (such as age and medical conditions); and (2) how much variation is accounted for by facility contribution to hospital visit risk.

Facility-specific intercept: A measure of the facility quality of care calculated based on the facility's actual hospital visit rate relative to facilities with similar patients, considering how many patients it served, its patients' risk factors, and how many experienced a subsequent unplanned hospital visit. The facility-specific effect will be negative for a better-than-average facility, positive for a worse-than-average facility, and close to zero for an average facility. The facility-specific effect is used in the numerator to calculate "predicted" hospital visits.

Index colonoscopy: Any colonoscopy included in the measure calculation as the procedure to which the outcome is attributed.

Medicare fee-for-service (FFS): Original Medicare plan in which providers receive a fee or payment for each individual service provided directly from Medicare. All services rendered are

unbundled and paid for separately. Only beneficiaries in Medicare FFS, not in managed care (Medicare Advantage), are included in the measure.

National observed 7-day unplanned hospital visit rate: All included colonoscopies with the outcome divided by all included colonoscopies.

Outcome: The result of a broad set of healthcare activities that affect patients' well-being. For this measure, the outcome is hospital visit (ED visit, observation stay, or inpatient admission) within 7 days of the index procedure.

Planned hospital visits: A hospital visit within 7 days of the index procedure that is a scheduled part of the patient's plan of care. Planned hospital visits are not counted as outcomes in this measure.

Predicted hospital visits: The number of hospital visits within 7 days predicted based on the facility's performance with its observed case mix.

Procedure category: A group of related procedure codes, as grouped by the Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS).

Risk-adjustment variables: Patient demographics and comorbidities used to standardize rates for differences in case mix across facilities.

Unplanned hospital visits: Acute clinical events a patient experiences that require urgent hospital visits. Unplanned hospital visits are counted as outcomes in the measure.

6. Appendices

Appendix A: Statistical Approach to Calculating Risk-Standardized Hospital Visit Rate

The measure uses a hierarchical generalized linear model (HGLM), which accounts for the clustering of observations within facilities and variation in sample size across facilities. We assume the outcome is a known exponential family distribution and is related linearly to the covariates via a known link function, *h*. For our model, we assumed a binomial distribution and a logit link function. Further, we accounted for the clustering within facility by estimating a facility-specific effect, α_i, which is assumed to follow a normal distribution with mean μ and variance τ^2, the between-facility variance component. The HGLM is defined by the following equations:

$$h\left(Y_{ij}\right)=\alpha_i+\beta Z_{ij} \quad (1)$$

$$\alpha_i=\mu+\omega_i;\omega_i\sim N\left(0,\tau^2\right) \quad (2)$$

$$i=1...I;j=1...n_i$$

where Y_{ij} denotes the outcome (equal to 1 if patient has an eligible hospital visit within 7 days of a colonoscopy, 0 otherwise) for the *j-th* patient who had a colonoscopy at the *i-th* facility; $Z_{ij}=\left(Z_{1ij},Z_{2ij}...,Z_{pij}\right)$ is a set of *p* patient-specific covariates derived from the data; and *I* denotes the total number of facilities and n_i the number of colonoscopies performed at facility *i*. The facility-specific intercept of the *i-th* facility, α_i, defined above, is comprised of μ, the adjusted average intercept over all facilities in the sample and ω_i the facility-specific intercept deviation from μ. A point estimate of ω_i, greater or less than 0, determines if facility performance is worse or better compared to the adjusted average outcome.
Modeling is performed separately for HOPDs and ASCs. The HGLM is estimated using the SAS software system (GLIMMIX procedure).

A1. Provider Performance Reporting

Using the HGLM defined by Equations (1) - (2), we estimate the parameters $\hat{u}$, $\left(\hat{a}_1,\hat{a}_2,...,\hat{a}_1\right)$, $\hat{\beta}$, and $\hat{\tau}^2$. We calculate a standardized outcome, S_i, for each facility by computing the ratio of the number of predicted hospital visits to the number of expected hospital visits, multiplied by the unadjusted overall hospital visit rate, $\bar{y}$. Specifically, we calculate:

Predicted $$\hat{y}_{ij}(Z) = h^{-1}(\hat{a} + \hat{\beta} Z_{ij}) \quad (3)$$

Expected $$\hat{e}_{ij}(Z) = h^{-1}(\hat{\mu} + \hat{\beta} Z_{ij}) \quad (4)$$

$$\hat{s}_i(Z) = \frac{\sum_{j=1}^{n_i} \hat{y}_{ij}(Z)}{\sum_{j=1}^{n_i} \hat{e}_{ij}(Z)} x\, \overline{y} \quad (5)$$

If the "predicted" number of hospital visits is higher (lower) than the "expected" number of hospital visits, then that facility's $\hat{s}_i$ will be higher (lower) than the unadjusted average.

Note that standardized rates are calculated separately for HOPDs and ASCs. For each facility type, HOPD and ASC, $\overline{y}$ is calculated as the mean within that facility type.

A2. Outlier Evaluation

Because the statistic described in Equation (5) is a complex function of parameter estimates, we use re-sampling and simulation techniques to derive an interval estimate to determine if a facility is performing better than, worse than, or no different from its expected rate. A facility is considered as better than expected if its entire confidence interval falls below the expected rate, and considered worse if the entire confidence interval falls above the expected rate. It is considered no different if the confidence interval overlaps the expected rate.

More specifically, we use a bootstrapping procedure to compute confidence intervals. Because the theoretical-based standard errors are not easily derived, and to avoid making unnecessary assumptions, we use the bootstrap to empirically construct the sampling distribution for each facility-level risk-standardized rate. The bootstrapping algorithm is described below.

A3. Bootstrapping Algorithm

Let *I* denote the total number of facilities in the sample. We repeat steps 1 – 4 below for b = 1,2,…B times:

1. Sample *I* facilities with replacement.
2. Fit the hierarchical logistic regression model using all patients within each sampled facility. We use as starting values the parameter estimates obtained by fitting the model to all facilities. If some facilities are selected more than once in a bootstrapped sample, we treat them as distinct so that we have *I* random effects to estimate the variance components. At the conclusion of Step 2, we have:

a. $\hat{\beta}^{(b)}$ (the estimated regression coefficients of the risk factors).

b. The parameters governing the random effects, facility-adjusted outcomes, distribution, $\hat{\mu}^{(b)}$ and $\hat{\tau}^{2(b)}$.

c. The set of facility-specific intercepts and corresponding variances: $\left\{\hat{a}_i^{(b)}, \hat{\text{var}}\left(a_i^{(b)}\right); i=1,2,...,I\right\}$.

3. We generate a facility random effect by sampling from the distribution of the facility-specific distribution obtained in Step 2c. We approximate the distribution for each random effect by a normal distribution. Thus, we draw $a_i^{(b^*)} \sim N\left(\hat{a}_i^{(b)}, \hat{\text{var}}\left(\hat{a}_i^{(b)}\right)\right)$ for the unique set of facilities sampled in Step 1.

4. Within each unique facility *i* sampled in Step 1, and for each case *j* in that facility, we calculate $\hat{y}_{ij}^{(b)}$, $\hat{e}_{ij}^{(b)}$, and $\hat{s}_i\left(Z\right)^{(b)}$ where $\hat{\beta}^{(b)}$ and $\hat{\mu}^{(b)}$ are obtained from Step 2 and $\hat{a}_i^{(b^*)}$ is obtained from Step 3.

Ninety-five percent interval estimates (or alternative interval estimates) for the facility-standardized outcome can be computed by identifying the 2.5th and 97.5th percentiles of a randomly selected half of the B estimates (or the percentiles corresponding to the alternative desired intervals).

Bootstrapping is performed separately for HOPDs and ASCs.

Appendix B: Annual Updates to Measure Since Measure Development

Annual updates of the measure can be found in the annual updates and specifications reports available on QualityNet. For convenience, we have listed all prior updates here under the calendar year and corresponding report.

2016

2016 Measure Updates and Specifications Report

1. Addition of three high-risk colonoscopy procedure codes to the list of excluded procedures
   Rationale: Because the measure is intended to assess quality of care during and following low-risk colonoscopy procedures, these three codes are not appropriate for inclusion in the measure cohort
2. Addition of new (added in 2015 or later) procedure codes for index low-risk colonoscopies, high-risk colonoscopies, and upper GI endoscopy exclusions
   Rationale: These new codes are consistent with the intent of the measure to include only low-risk procedures and reflect current code sets
3. Expansion of the exclusions for inflammatory bowel disease (IBD) and diverticulitis to include current diagnoses of IBD and diverticulitis as well as a history of either condition
   Rationale: IBD and diverticulitis are serious conditions that, if diagnosed during the colonoscopy, would likely result in an admission that does not reflect the quality or safety of the colonoscopy
4. Addition of an exclusion for colonoscopies that are billed on the same hospital outpatient claim as an observation stay
   Rationale: In these situations, it is not possible to use claims data to determine whether the colonoscopy was the cause of, subsequent to, or during the observation stay
5. Exclude colonoscopies on the same-day, but on a separate-claim, as an ED visit occurring at the same facility
   Rationale: It is unclear whether a same-day ED visit occurred before or after a colonoscopy. However, it is unlikely that a patient would experience an ED visit for an acute diagnosis at one facility and then travel to another facility for a routine colonoscopy on the same day; therefore, ED visits at different facilities are not excluded because they likely represent complications of care
6. Updated the planned admission algorithm with measure-specific changes and to align with CMS's Planned Readmission Algorithm version 4.0
   Rationale: These changes improve the accuracy of the algorithm by decreasing the number of hospital visits that the algorithm mistakenly designated as unplanned or planned

2015

Colonoscopy Measure Specifications Report (2015)

1. Addition of the exclusion for same-claim ED visits (applies to colonoscopies at HOPDs only)
   Rationale: In these situations, it is not possible to use claims data to determine whether the colonoscopy was the cause of, subsequent to, or during the ED visit
2. Addition of exclusion for colonoscopies followed by a subsequent procedure within 7 days
   Rationale: In these situations, the two colonoscopies are considered part of a single episode of care, for which the subsequent colonoscopy is considered the index procedure
3. (Revision to an original exclusion) Exclude colonoscopies for patients who are not continuously enrolled in Medicare FFS Parts A and B for at least 7 days instead of 30 after the qualifying colonoscopy
   Rationale: Because the outcome time frame is 7 days, the requirement for continuous enrollment was shortened in order to exclude as few index procedures as necessary

Appendix C: Measure Specification

The measure specifications are described in more detail in Section 2.

Cohort

The measure includes:

- Outpatient colonoscopy procedures identified using Healthcare Common Procedure Coding System (HCPCS) codes and Common Procedural Terminology (CPT) codes (see Table C.1). Qualifying colonoscopy procedures were not included in the measure if they were concurrently billed with a high-risk colonoscopy procedure code (see Table C.2).
- Colonoscopies for patients who are aged 65 or over at the time of the procedure.
- Patients with continuous enrollment in Medicare FFS Parts A and B in the 12 months prior to the procedure.

The measure excludes:

- Procedures for patients who lack continuous enrollment in Medicare FFS Parts A and B in the seven (7) days after the procedure.
- Colonoscopies that occur concurrently with high-risk upper GI endoscopies (Table C.3).
- Colonoscopies for patients with a history of inflammatory bowel disease (IBD) or diverticulitis in the year preceding the colonoscopy, or a diagnosis of these conditions at the time of the index colonoscopy and/or on a claim for a hospital visit within 7 days of the colonoscopy (Tables C.4 and C.5).
- Colonoscopies followed by a subsequent outpatient colonoscopy procedure within 7 days.
- Colonoscopies that are billed on the same hospital outpatient claim as an emergency department (ED) visit (applies to colonoscopies at HOPDs only).
- Colonoscopies that are billed on the same hospital outpatient claim as an observation stay (applies to colonoscopies at HOPDs only).
- Colonoscopies that occur on the same day and at the same hospital as an ED visit that is billed on a different claim than the index colonoscopy (applies to colonoscopies at HOPDs only).

Table C.1: CPT and HCPCS Codes That Define "Low-Risk" Colonoscopy Procedures

Code	Description
G0121	Colonoscopy on individual not meeting criteria for high risk
G0105	Colonoscopy on individual at high risk of colorectal cancer
45378	Diagnostic colonoscopy
45380	Colonoscopy with biopsy
45381	Colonoscopy, with directed submucosal injection, any substance
45383	Colonoscopy with ablation of lesion(s)/polypectomy by other techniques (i.e., techniques other than 45384/45385)
45384	Colonoscopy with ablation of lesion(s)/polypectomy by hot biopsy forceps or bipolar cautery
45385	Colonoscopy with ablation of lesion(s)/polypectomy by snare
45388	Colonoscopy, flexible; with ablation of tumor(s), polyp(s), or other lesion(s) (includes pre- and post-dilation and guide wire passage, when performed)
G6024	Colonoscopy, flexible; proximal to splenic flexure; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique

Table C.2: CPT and HCPCS Codes That Define "High-Risk" Colonoscopy Procedures

Code	Description
G6019	Colonoscopy through stoma; with ablation of tumor(s), polyp(s) or other lesion(s), not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique
G6020	Colonoscopy through stoma; with transendoscopic stent placement (includes predilation)
G6025	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic stent placement (includes predilation)
44388	Colonoscopy through stoma; diagnostic colonoscopy
44389	Colonoscopy through stoma; with biopsy
44390	Colonoscopy through stoma; Foreign body(s) removal
44391	Colonoscopy through stoma; Control of bleeding
44392	Colonoscopy through stoma; with ablation of lesion(s)/polypectomy by hot biopsy forceps or bipolar cautery
44393	Colonoscopy through stoma; with ablation of lesion(s)/polypectomy by other techniques (i.e., techniques other than 45384/45385)
44394	Colonoscopy through stoma; with ablation of lesion(s)/polypectomy by snare
44397	Colonoscopy through stoma; with transendoscopic stent placement (includes predilation)
44401	Colonoscopy through stoma with balloon dilation, guide wire insertion and ablation.
44402	Colonoscopy through stoma with pre- and post-dilation and guide wire passage.
44403	Colonoscopy through stoma w/EMR
44404	C-stoma w/submucosal injection
44405	C-stoma w/dilation
44406	C-stoma w/ultrasound
44407	C-stoma w/US-guided FNA
44408	C-stoma w/decompression
45355	Colonoscopy performed via transabdominal surgical incision (not stoma)
45379	Colonoscopy with removal of foreign body
45382	Colonoscopy for control of bleeding (i.e., endoscopic homeostasis)
45386	Colonoscopy with balloon dilation
45387	Colonoscopy with stent placement
45389	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic stent placement (includes predilation
45390	Endoscopic mucosal resection (EMR)
45391	Colonoscopy with endoscopic ultrasound
45393	Decompression
45398	Band ligation
45399	Unlisted procedure, colon

Table C.3: CPT Codes That Define "High-Risk" Upper GI Endoscopy Procedures

Code	Description
43180	Esophagoscopy, rigid, transoral with diverticulectomy of hypopharynx or cervical esophagus (eg, Zenker's diverticulum), with cricopharyngeal myotomy, includes use of telescope or operating microscope and repair, when performed
43204	Esophagoscopy, flexible, transoral; injection sclerosis, varices
43205	Esophagoscopy, flexible, transoral; band ligation, varices
43210	Esophagogastroduodenoscopy, flexible, transoral; with esophagogastric fundoplasty, partial or complete, includes duodenoscopy when performed
43215	Esophagoscopy, flexible, transoral; foreign body removal
43216	Esophagoscopy, flexible, transoral; lesion removal by hot forcept or bipolar cautery
43217	Esophagoscopy, flexible, transoral; snare lesion removal
43219	Esophagoscopy with insertion of plastic tube or stent
43227	Esophagoscopy with control of bleeding, any method
43228	Esophagoscopy with ablation of tumor(s), polyp(s), or other lesion(s), not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique
43231	Esophagoscopy with endoscopic ultrasound examination
43232	Esophagoscopy with transendoscopic ultrasound-guided fine needle aspiration/biopsy(s)
43237	Esophagogastroduodenoscopy, flexible, transoral; EUS limited to esophagus,stomach OR duodenum
43238	Esophagogastroduodenoscopy, flexible, transoral; EUS with FNA limited to esophagus, stomach OR duodenum
43240	Esophagogastroduodenoscopy, flexible, transoral; transmural drainage, pseudocyst
43241	Esophagogastroduodenoscopy, flexible, transoral; intraluminal tube or catheter insertion
43242	Esophagogastroduodenoscopy, flexible, transoral; EUS with FNA of esophagus, stomach AND duodenum
43243	Esophagogastroduodenoscopy, flexible, transoral; injection sclerosis of esophageal/gastric varices
43244	Esophagogastroduodenoscopy, flexible, transoral; band ligation of esophageal/gastric varices
43245	Esophagogastroduodenoscopy, flexible, transoral; dilation of gastric/duodenal stricture(s)
43246	Esophagogastroduodenoscopy, flexible, transoral; place gastrostomy tube
43247	Esophagogastroduodenoscopy, flexible, transoral; foreign body removal
43250	Esophagogastroduodenoscopy, flexible, transoral; removal of tumor(s), polyp(s) or other lesion(s) by hot biopsy or bipolar cautery
43251	Esophagogastroduodenoscopy, flexible, transoral; snare lesion removal
43255	Esophagogastroduodenoscopy, flexible, transoral; control of bleeding, any method
43256	Upper gastrointestinal endoscopy with transendoscopic stent placement (includes predilation)
43257	Esophagogastroduodenoscopy, flexible, transoral; thermal energy to LES and/or cardia, for GERD

Code	Description
43258	Upper gastrointestinal endoscopy with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique
43259	Esophagogastroduodenoscopy, flexible, transoral; EUS of esophagus, stomach AND duodenum
43458	Dilation of esophagus with balloon (30 mm diameter or larger) for achalasia

Table C.4: ICD-9-CM and ICD-10-CM Codes That Define IBD

ICD-9-CM Code	Description	ICD-10-CM Code	Description
555.0	Regional enteritis of small intestine	K50.0X	Crohn's disease of small intestine
555.1	Regional enteritis of large intestine	K50.1X	Crohn's disease of large intestine
555.2	Regional enteritis of small intestine with large intestine	K50.8X	Crohn's disease of both small and large intestine
555.9	Regional enteritis of unspecified site	K50.9X	Crohn's disease, unspecified, without complications
556.0	Ulcerative (chronic) enterocolitis	K51.80	Other ulcerative colitis without complications
556.1	Ulcerative (chronic) ileocolitis	K51.8X	Other ulcerative colitis without complications
556.2	Ulcerative (chronic) proctitis	K51.2X	Ulcerative (chronic) proctitis without complications
556.3	Ulcerative (chronic) proctosigmoiditis	K51.3X	Ulcerative (chronic) rectosigmoiditis without complications
556.4	Pseudopolyposis of colon	K51.4X	Inflammatory polyps of colon without complications
556.5	Left-sided ulcerative (chronic) colitis	K51.5X	Left sided colitis without complications
556.6	Universal ulcerative (chronic) colitis	K51.0X	Ulcerative (chronic) pancolitis without complications
556.8	Other ulcerative colitis	K51.8X	Other ulcerative colitis without complications
556.9	Ulcerative colitis, unspecified	K51.9X	Ulcerative colitis, unspecified, without complications

Table C.5: ICD-9-CM and ICD-10-CM Codes That Define Diverticulitis

ICD-9-CM Code	Description	ICD-10-CM Code	Description
562.11	Diverticulitis of colon (without mention of hemorrhage)	K57.20	Diverticulitis of large intestine with perforation and abscess without bleeding
		K57.32	Diverticulitis of large intestine without perforation or abscess without bleeding
		K57.40	Diverticulitis of both small and large intestine with perforation and abscess without bleeding
		K57.52	Diverticulitis of both small and large intestine without perforation or abscess without bleeding
		K57.80	Diverticulitis of intestine, part unspecified, with perforation and abscess without bleeding
		K57.92	Diverticulitis of intestine, part unspecified, without perforation or abscess without bleeding
562.13	Diverticulitis of colon with hemorrhage	K57.21	Diverticulitis of large intestine with perforation and abscess with bleeding
		K57.33	Diverticulitis of large intestine without perforation or abscess with bleeding
		K57.41	Diverticulitis of both small and large intestine with perforation and abscess with bleeding
		K57.53	Diverticulitis of both small and large intestine without perforation or abscess with bleeding
		K57.81	Diverticulitis of intestine, part unspecified, with perforation and abscess with bleeding
		K57.93	Diverticulitis of intestine, part unspecified, without perforation or abscess with bleeding

Outcome

The measure outcome is any (i.e., one or more) unplanned hospital visit within 7 days of an outpatient colonoscopy; a hospital visit includes any emergency department (ED) visit, observation stay, or unplanned inpatient admission. Table C.6 provides the codes used to identify ED visits and observation stays. The outcome includes all-cause hospital visits because from a patient perspective, an unplanned visit for any cause is an adverse event.

The outcome includes only unplanned inpatient admissions, since planned admissions are not a signal of quality of care. All ED visits and observation stays are considered unplanned. See Section 2 and Appendix D for more detail on the definition of unplanned versus planned hospital admissions.

Table C.6: Revenue Center and HCPCS Codes That Define ED Visits and Observation Stays

Revenue Center or HCPCS Code*	Description
0450	Emergency Room
0451	Emergency Room: EM/EMTALA
0452	Emergency Room: ER/Beyond EMTALA
0456	Emergency Room: Urgent care
0459	Emergency Room: Other emergency room
0981	Professional fees (096x) Emergency room
0762	Observation stay
G0378†	Hospital observation service, per hour

*Identified in Medicare Part B outpatient hospital claims.

†Denotes HCPCS code; all other codes are revenue center codes.

Risk Adjustment

Table C.7: Risk-Adjustment Model Variable Definitions

Risk variable	CC Version 12	CC Version 22
Congestive Heart Failure	CC 80	CC 85
Ischemic Heart Disease	CC 81-84	CC 86-89
Arrhythmias	CC 92-93	CC 96-97
Stroke/Transient Ischemic Attack (TIA)	CC 95-97	CC 99-101
Chronic Lung Disease	CC 108-110	CC 111-113
Metastatic Cancer	CC 7-9	CC 8-11
Liver Disease	CC 25-30	CC 27-32
Iron Deficiency Anemia	CC 47	CC 49
Disorders of Fluid/Electrolyte/Acid-Base	CC 23	CC 24
Pneumonia	CC 111-113	CC 115-116
Psychiatric Disorders	CC 54-56, 58-60	CC 57-59, 61-63
Drug and Alcohol Abuse/Dependence	CC 51-53	CC 54-56

Table C.8: Condition Categories (CCs) for Complications That Are Not Risk-Adjusted For If They Occur Only at the Time of the Procedure

Description	CC Version 12	CC Version 22
Disorders of Fluid/Electrolyte/Acid-Base	23	24
Acute Liver Failure/Disease	28	30
Congestive Heart Failure	80	85
Acute Myocardial Infarction	81	86
Unstable Angina and Other Acute Ischemic Heart Disease	82	87
Specified Heart Arrhythmias	92	96
Other Heart Rhythm and Conduction Disorders	93	97
Cerebral Hemorrhage	95	99
Ischemic or Unspecified Stroke	96	100
Precerebral Arterial Occlusion and Transient Cerebral Ischemia	97	101
Aspiration and Specified Bacterial Pneumonias	111	114
Pneumococcal Pneumonia, Emphysema, Lung Abscess	112	115

Appendix D: CMS Planned Readmission Algorithm Version 4.0, Adapted to Identify Planned Admissions After Outpatient Colonoscopy

D.1. Planned Admission Algorithm Overview

The planned admission algorithm for the colonoscopy measure is adapted from the CMS Planned Readmission Algorithm Version 4.0. The algorithm is a set of criteria for classifying admissions within 7 days of a colonoscopy as planned or unplanned using Medicare claims. CMS seeks to count only unplanned admissions in the measure outcome, because variation in planned admissions does not reflect quality differences. Section 3 provides detail on the changes made to the algorithm based on reevaluation following the 2015 dry run. Section D.2 of this Appendix provides further detail on the changes from v3.0 to v4.0 of the Planned Readmission Algorithm that were also adopted for the colonoscopy measure updates.

The algorithm classifies admissions as planned or unplanned using a flow chart (Figure PA1) and four tables of procedures and conditions (Table PA1-Table PA4). Table PA1 identifies procedures that, if present in an admission, classify the admission as planned. Table PA2 identifies principal discharge diagnoses that classify admissions as planned. Table PA3 identifies procedures that, if present, classify an admission as planned as long as that admission does not have an acute (unplanned) principal discharge diagnosis. Table PA4 lists the acute (unplanned) principal discharge diagnoses that disqualify admissions with a potentially planned procedure in Table PA3 as planned.

The algorithm uses the Agency for Healthcare Research and Quality's (AHRQ's) Clinical Classification Software (CCS) (http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp) codes to group thousands of individual procedure and diagnosis ICD-9-CM/ICD-10-CM codes into clinically coherent, mutually exclusive procedure CCS categories and mutually exclusive diagnosis CCS categories, respectively.

In applying the algorithm to the colonoscopy population, a team of clinical experts reviewed the general population version of the planned readmission algorithm in the context of the colonoscopy population. Where clinically indicated, we adapted the content of the tables to better reflect the likely clinical experience of the colonoscopy measure cohort. Specifically, for the colonoscopy population, we originally added CCS 76 (Colonoscopy and biopsy) to the list of potentially planned procedures. As part of 2016 measure reevaluation, we also added 14 additional procedure categories relevant to colonoscopy to the set of potentially planned procedures as well as two new acute diagnosis codes (these changes are detailed in Section 3 of this report).

D.2. Detailed Description of Planned Admission Algorithm - Colonoscopy Population

The colonoscopy population algorithm uses the flow chart (Figure PA1) and Table PA1-Table PA4, adapted for the colonoscopy population, to identify specific procedure categories and discharge diagnosis categories to classify admissions as planned or unplanned. As illustrated in the flow chart (Figure PA1), admissions that include certain procedures (Table PA1) or are for certain diagnoses (Table PA2) are always considered planned. If the admission does not include a procedure or diagnosis in Table PA1 or Table PA2 that is always considered planned, the algorithm checks whether the admission has at least one procedure that is considered potentially planned (Table PA3). If the admission has no procedures from Table PA3, the admission is considered unplanned. Table PA3 includes 70 AHRQ procedure CCS categories from among 231 AHRQ procedure CCS categories and 11 individual ICD-9-CM procedure codes (which map to numerous ICD-10-PCS codes as shown in the table). Examples of potentially planned procedures are total hip replacement (Procedure CCS 153) and hernia repair (Procedure CCS 85).

If the admission has at least one potentially planned procedure from Table PA3, the algorithm checks for a principal discharge diagnosis that is considered acute (Table PA4). If the admission has an acute principal discharge diagnosis from Table PA4, the admission is considered unplanned. Otherwise, it is considered planned. The list of acute principal discharge diagnoses includes 101 diagnosis groups from among 285 AHRQ condition categories and six groupings of individual ICD-9-CM diagnosis codes that represent cardiac diagnoses that would not be associated with a planned admission. Examples of acute principal discharge diagnoses that identify admissions with potentially planned procedures as unplanned are pneumonia (Diagnosis CCS 122) and cardiac arrest (Diagnosis CCS 107).

D.3. Figures and Tables for Planned Admission Algorithm - Colonoscopy Population

Figure PA1: Planned Admission Algorithm – Colonoscopy Population – Flow Chart

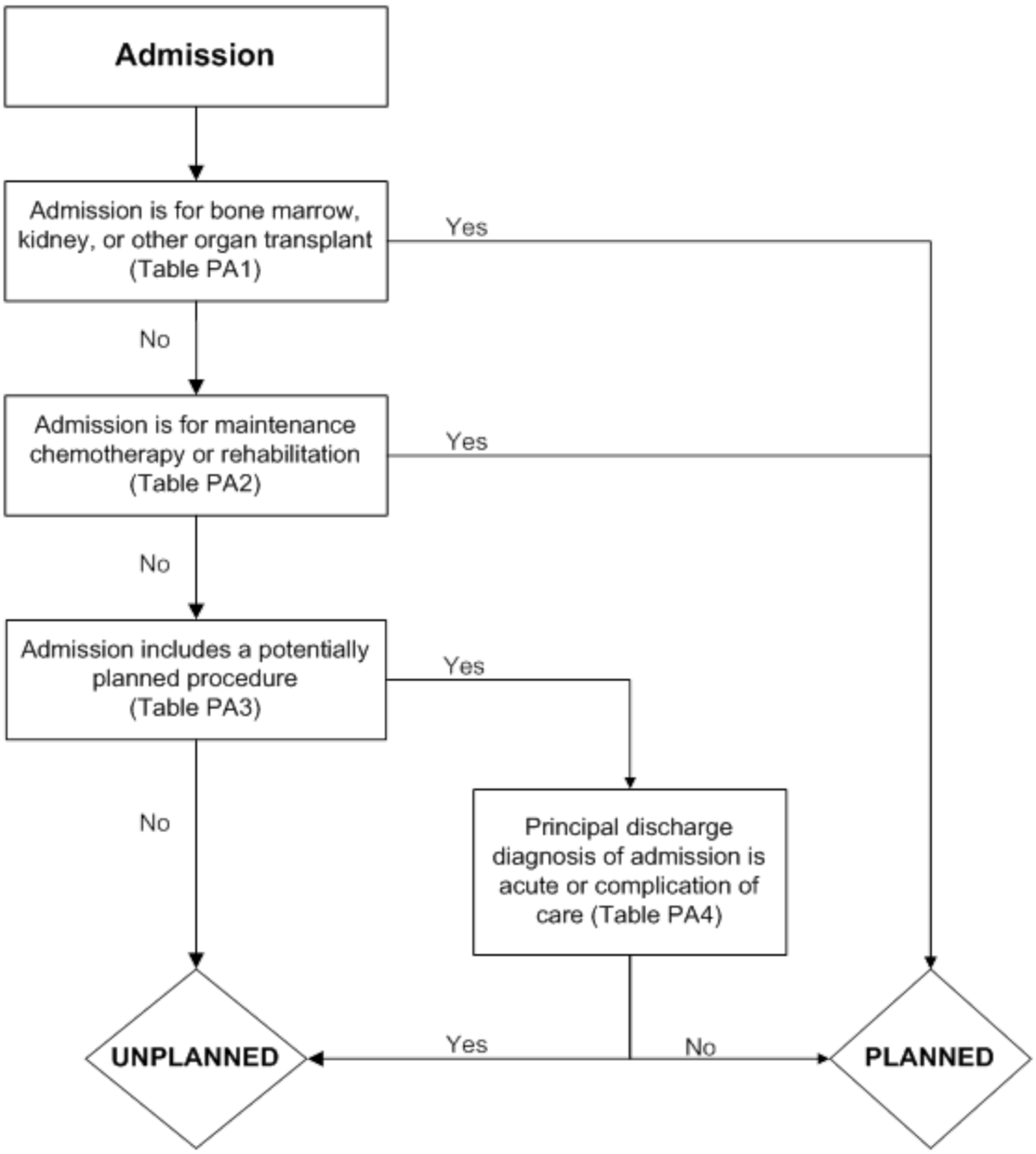


Table PA1: Procedure Categories that are Always Planned (Based on Planned Readmission Algorithm Version 4.0) – Adapted for Colonoscopy Population

Procedure CCS	Description
64	Bone marrow transplant
105	Kidney transplant
176	Other organ transplantation (other than bone marrow corneal or kidney)

Note: the AHRQ CCS category labels are based on the ICD-10 version.

Table PA2: Diagnosis Categories that are Always Planned (Based on Planned Readmission Algorithm Version 4.0) – Adapted for Colonoscopy Population

Diagnosis CCS	Description
45	Maintenance chemotherapy
254	Rehabilitation

Table PA3: Potentially Planned Procedure Categories (Based on Planned Readmission Algorithm Version 4.0) – Adapted for Colonoscopy Population

ICD-9 Procedure CCS (ICD-9)	Description	ICD-10 Procedure CCS (ICD-10)	Description
1	Incision and excision of the Central Nervous System (CNS)	1	Incision and excision of the Central Nervous System (CNS)
3	Laminectomy; excision intervertebral disc	3	Excision, destruction or resection of intervertebral disc
5	Insertion of catheter or spinal stimulator and injection into spinal	5	Insertion of catheter or spinal stimulator and injection into spinal
9	Other OR therapeutic nervous system procedures	9	Other OR therapeutic nervous system procedures
10	Thyroidectomy; partial or complete	10	Thyroidectomy; partial or complete
12	Other therapeutic endocrine procedures	12	Therapeutic endocrine procedures
33	Other OR therapeutic procedures on nose; mouth and pharynx	33	Other OR therapeutic procedures of mouth and throat
36	Lobectomy or pneumonectomy	36	Lobectomy or pneumonectomy
38	Other diagnostic procedures on lung and bronchus	38	Other diagnostic procedures on lung and bronchus
40	Other diagnostic procedures of respiratory tract and mediastinum	40	Other diagnostic procedures of respiratory tract and mediastinum
43	Heart valve procedures	43	Heart valve procedures
44	Coronary artery bypass graft (CABG)	44	Coronary artery bypass graft (CABG)
45	Percutaneous transluminal coronary angioplasty (PTCA)	45	Percutaneous transluminal coronary angioplasty (PTCA) with or without stent
49	Other OR heart procedures	49	Other OR heart procedures
51	Endarterectomy; vessel of head and neck	51	Endarterectomy; vessel of head and neck
52	Aortic resection; replacement or anastomosis	52	Aortic resection; replacement or anastomosis
53	Varicose vein stripping; lower limb	53	Varicose vein stripping; lower limb
55	Peripheral vascular bypass	55	Peripheral vascular bypass
56	Other vascular bypass and shunt; not heart	56	Other vascular bypass and shunt; not heart
59	Other OR procedures on vessels of head and neck	59	Other OR procedures on vessels of head and neck
66	Procedures on spleen	66	Procedures on spleen
67	Other therapeutic procedures; hemic and lymphatic system	67	Other therapeutic procedures; hemic and lymphatic system
70	Upper gastrointestinal endoscopy; biopsy	70	Upper gastrointestinal endoscopy; biopsy
72	Colostomy; temporary and permanent	72	Colostomy; temporary and permanent
73	Ileostomy and other enterostomy	73	Ileostomy and other enterostomy
74	Gastrectomy; partial and total	74	Gastrectomy; partial and total

ICD-9	Description	ICD-10	Description
75	Small bowel resection	75	Small bowel resection
76	Colonoscopy and biopsy	76	Colonoscopy and biopsy
77	Proctoscopy and anorectal biopsy	77	Proctoscopy and anorectal biopsy
78	Colorectal resection	78	Colorectal resection
79	Local excision of large intestine lesion (not endoscopic)	79	Excision of large intestine lesion (not endoscopic)
84	Cholecystectomy and common duct exploration	84	Cholecystectomy and common duct exploration
85	Inguinal and femoral hernia repair	85	Inguinal and femoral hernia repair
86	Other hernia repair	86	Other hernia repair
90	Excision; lysis peritoneal adhesions	90	Excision; lysis peritoneal adhesions
92	Other bowel diagnostic procedures	92	Other bowel diagnostic procedures
93	Other non-OR upper GI therapeutic procedures	93	Other non-OR upper GI therapeutic procedures
94	Other OR upper GI therapeutic procedures	94	Other OR upper GI therapeutic procedures
95	Other non-OR lower GI therapeutic procedures	95	Other non-OR lower GI therapeutic procedures
96	Other OR lower GI therapeutic procedures	96	Other OR lower GI therapeutic procedures
97	Other gastrointestinal diagnostic procedures	97	Other gastrointestinal diagnostic procedures
98	Other non-OR gastrointestinal therapeutic procedures	98	Other non-OR gastrointestinal therapeutic procedures
99	Other OR gastrointestinal therapeutic procedures	99	Other OR gastrointestinal therapeutic procedures
104	Nephrectomy; partial or complete	104	Nephrectomy; partial or complete
106	Genitourinary incontinence procedures	106	Genitourinary incontinence procedures
107	Extracorporeal lithotripsy; urinary	107	Extracorporeal lithotripsy; urinary
109	Procedures on the urethra	109	Procedures on the urethra
112	Other OR therapeutic procedures of urinary tract	112	Other OR therapeutic procedures of urinary tract
113	Transurethral resection of prostate (TURP)	113	Transurethral resection of prostate (TURP)
114	Open prostatectomy	114	Open prostatectomy
119	Oophorectomy; unilateral and bilateral	119	Oophorectomy; unilateral and bilateral
120	Other operations on ovary	120	Other operations on ovary
124	Hysterectomy; abdominal and vaginal	124	Hysterectomy; abdominal and vaginal
129	Repair of cystocele and rectocele; obliteration of vaginal vault	129	Repair of cystocele and rectocele; obliteration of vaginal vault
132	Other OR therapeutic procedures; female organs	132	Other OR therapeutic procedures; female organs
142	Partial excision bone	142	Partial excision bone
152	Arthroplasty knee	152	Arthroplasty knee
153	Hip replacement; total and partial	153	Hip replacement; total and partial

ICD-9	Description	ICD-10	Description
154	Arthroplasty other than hip or knee	154	Arthroplasty other than hip or knee
158	Spinal fusion	158	Spinal fusion
159	Other diagnostic procedures on musculoskeletal system	159	Other diagnostic procedures on musculoskeletal system
166	Lumpectomy; quadrantectomy of breast	166	Lumpectomy; quadrantectomy of breast
167	Mastectomy	167	Mastectomy
170	Excision of skin lesion	--	--
172	Skin graft	172	Skin graft
n.a.	n.a.	175	Other OR therapeutic procedures on skin subcutaneous tissue fascia and breast
194	Diagnostic ultrasound of gastrointestinal tract	194	Diagnostic ultrasound of gastrointestinal tract
ICD-9 Codes	**Description**	**ICD-10 Codes**	**Description**
30.1	Hemilaryngectomy	0CBS0ZZ	Excision of Larynx, Open Approach
		0CBS3ZZ	Excision of Larynx, Percutaneous Approach
		0CBS4ZZ	Excision of Larynx, Percutaneous Endoscopic Approach
		0CBS7ZZ	Excision of Larynx, Via Natural or Artificial Opening
		0CBS8ZZ	Excision of Larynx, Via Natural or Artificial Opening Endoscopic
30.29	Other partial laryngectomy	0CBS0ZZ	Excision of Larynx, Open Approach
		0CBS3ZZ	Excision of Larynx, Percutaneous Approach
		0CBS4ZZ	Excision of Larynx, Percutaneous Endoscopic Approach
		0CBS7ZZ	Excision of Larynx, Via Natural or Artificial Opening
30.29	Other partial laryngectomy	0CBS8ZZ	Excision of Larynx, Via Natural or Artificial Opening Endoscopic
30.3	Complete laryngectomy	0B110F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Open Approach
		0B110Z4	Bypass Trachea to Cutaneous, Open Approach
		0B113F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Approach
		0B113Z4	Bypass Trachea to Cutaneous, Percutaneous Approach

ICD-9	Description	ICD-10	Description
30.3	Complete laryngectomy	0B114F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Endoscopic Approach
		0B114Z4	Bypass Trachea to Cutaneous, Percutaneous Endoscopic Approach
		0CTS0ZZ	Resection of Larynx, Open Approach
		0CTS4ZZ	Resection of Larynx, Percutaneous Endoscopic Approach
		0CTS7ZZ	Resection of Larynx, Via Natural or Artificial Opening
		0CTS8ZZ	Resection of Larynx, Via Natural or Artificial Opening Endoscopic
30.4	Radical laryngectomy	0B110F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Open Approach
		0B110Z4	Bypass Trachea to Cutaneous, Open Approach
		0B113F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Approach
		0B113Z4	Bypass Trachea to Cutaneous, Percutaneous Approach
		0B114F4	Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Endoscopic Approach
		0B114Z4	Bypass Trachea to Cutaneous, Percutaneous Endoscopic Approach
		0CTS0ZZ	Resection of Larynx, Open Approach
		0CTS4ZZ	Resection of Larynx, Percutaneous Endoscopic Approach
		0CTS7ZZ	Resection of Larynx, Via Natural or Artificial Opening
		0CTS8ZZ	Resection of Larynx, Via Natural or Artificial Opening Endoscopic
30.4	Radical laryngectomy	0GTG0ZZ	Resection of Left Thyroid Gland Lobe, Open Approach
		0GTG4ZZ	Resection of Left Thyroid Gland Lobe, Percutaneous Endoscopic Approach
		0GTH0ZZ	Resection of Right Thyroid Gland Lobe, Open Approach
		0GTH4ZZ	Resection of Right Thyroid Gland Lobe, Percutaneous Endoscopic Approach
		0GTK0ZZ	Resection of Thyroid Gland, Open Approach
		0GTK4ZZ	Resection of Thyroid Gland, Percutaneous Endoscopic Approach

ICD-9	Description	ICD-10	Description
30.4	Radical laryngectomy	0WB60ZZ	Excision of Neck, Open Approach
		0WB63ZZ	Excision of Neck, Percutaneous Approach
		0WB64ZZ	Excision of Neck, Percutaneous Endoscopic Approach
		0WB6XZZ	Excision of Neck, External Approach
31.74	Revision of tracheostomy	0BW10FZ	Revision of Tracheostomy Device in Trachea, Open Approach
		0BW13FZ	Revision of Tracheostomy Device in Trachea, Percutaneous Approach
		0BW14FZ	Revision of Tracheostomy Device in Trachea, Percutaneous Endoscopic Approach
		0WB6XZ2	Excision of Neck, Stoma, External Approach
		0WQ6XZ2	Repair Neck, Stoma, External Approach
34.6	Scarification of pleura	0B5N0ZZ	Destruction of Right Pleura, Open Approach
		0B5N3ZZ	Destruction of Right Pleura, Percutaneous Approach
		0B5N4ZZ	Destruction of Right Pleura, Percutaneous Endoscopic Approach
		0B5P0ZZ	Destruction of Left Pleura, Open Approach
		0B5P3ZZ	Destruction of Left Pleura, Percutaneous Approach
		0B5P4ZZ	Destruction of Left Pleura, Percutaneous Endoscopic Approach
38.18	Endarterectomy, lower limb arteries	04CK0ZZ	Extirpation of Matter from Right Femoral Artery, Open Approach
		04CK3ZZ	Extirpation of Matter from Right Femoral Artery, Percutaneous Approach
		04CK4ZZ	Extirpation of Matter from Right Femoral Artery, Percutaneous Endoscopic Approach
		04CL0ZZ	Extirpation of Matter from Left Femoral Artery, Open Approach
		04CL3ZZ	Extirpation of Matter from Left Femoral Artery, Percutaneous Approach
		04CL4ZZ	Extirpation of Matter from Left Femoral Artery, Percutaneous Endoscopic Approach
		04CM0ZZ	Extirpation of Matter from Right Popliteal Artery, Open Approach
		04CM3ZZ	Extirpation of Matter from Right Popliteal Artery, Percutaneous Approach

ICD-9	Description	ICD-10	Description
38.18	Endarterectomy, lower limb arteries	04CM4ZZ	Extirpation of Matter from Right Popliteal Artery, Percutaneous Endoscopic Approach
		04CN0ZZ	Extirpation of Matter from Left Popliteal Artery, Open Approach
		04CN3ZZ	Extirpation of Matter from Left Popliteal Artery, Percutaneous Approach
		04CN4ZZ	Extirpation of Matter from Left Popliteal Artery, Percutaneous Endoscopic Approach
		04CP0ZZ	Extirpation of Matter from Right Anterior Tibial Artery, Open Approach
		04CP3ZZ	Extirpation of Matter from Right Anterior Tibial Artery, Percutaneous Approach
		04CP4ZZ	Extirpation of Matter from Right Anterior Tibial Artery, Percutaneous Endoscopic Approach
		04CQ0ZZ	Extirpation of Matter from Left Anterior Tibial Artery, Open Approach
		04CQ3ZZ	Extirpation of Matter from Left Anterior Tibial Artery, Percutaneous Approach
		04CQ4ZZ	Extirpation of Matter from Left Anterior Tibial Artery, Percutaneous Endoscopic Approach
		04CR0ZZ	Extirpation of Matter from Right Posterior Tibial Artery, Open Approach
		04CR3ZZ	Extirpation of Matter from Right Posterior Tibial Artery, Percutaneous Approach
		04CR4ZZ	Extirpation of Matter from Right Posterior Tibial Artery, Percutaneous Endoscopic Approach
		04CS0ZZ	Extirpation of Matter from Left Posterior Tibial Artery, Open Approach
		04CS3ZZ	Extirpation of Matter from Left Posterior Tibial Artery, Percutaneous Approach
		04CS4ZZ	Extirpation of Matter from Left Posterior Tibial Artery, Percutaneous Endoscopic Approach
		04CT0ZZ	Extirpation of Matter from Right Peroneal Artery, Open Approach

ICD-9	Description	ICD-10	Description
38.18	Endarterectomy, lower limb arteries	04CT3ZZ	Extirpation of Matter from Right Peroneal Artery, Percutaneous Approach
		04CT4ZZ	Extirpation of Matter from Right Peroneal Artery, Percutaneous Endoscopic Approach
		04CU0ZZ	Extirpation of Matter from Left Peroneal Artery, Open Approach
		04CU3ZZ	Extirpation of Matter from Left Peroneal Artery, Percutaneous Approach
		04CU4ZZ	Extirpation of Matter from Left Peroneal Artery, Percutaneous Endoscopic Approach
		04CV0ZZ	Extirpation of Matter from Right Foot Artery, Open Approach
		04CV3ZZ	Extirpation of Matter from Right Foot Artery, Percutaneous Approach
		04CV4ZZ	Extirpation of Matter from Right Foot Artery, Percutaneous Endoscopic Approach
		04CW0ZZ	Extirpation of Matter from Left Foot Artery, Open Approach
		04CW3ZZ	Extirpation of Matter from Left Foot Artery, Percutaneous Approach
		04CW4ZZ	Extirpation of Matter from Left Foot Artery, Percutaneous Endoscopic Approach
		04CY0ZZ	Extirpation of Matter from Lower Artery, Open Approach
		04CY3ZZ	Extirpation of Matter from Lower Artery, Percutaneous Approach
		04CY4ZZ	Extirpation of Matter from Lower Artery, Percutaneous Endoscopic Approach
55.03	Percutaneous nephrostomy without fragmentation	0T9030Z	Drainage of Right Kidney with Drainage Device, Percutaneous Approach
		0T9040Z	Drainage of Right Kidney with Drainage Device, Percutaneous Endoscopic Approach
		0T9130Z	Drainage of Left Kidney with Drainage Device, Percutaneous Approach
		0T9140Z	Drainage of Left Kidney with Drainage Device, Percutaneous Endoscopic Approach

ICD-9	Description	ICD-10	Description
55.03	Percutaneous nephrostomy without fragmentation	0TC03ZZ	Extirpation of Matter from Right Kidney, Percutaneous Approach
		0TC04ZZ	Extirpation of Matter from Right Kidney, Percutaneous Endoscopic Approach
		0TC13ZZ	Extirpation of Matter from Left Kidney, Percutaneous Approach
		0TC14ZZ	Extirpation of Matter from Left Kidney, Percutaneous Endoscopic Approach
55.04	Percutaneous nephrostomy with fragmentation	0TF33ZZ	Fragmentation in Right Kidney Pelvis, Percutaneous Approach
		0TF34ZZ	Fragmentation in Right Kidney Pelvis, Percutaneous Endoscopic Approach
		0TF43ZZ	Fragmentation in Left Kidney Pelvis, Percutaneous Approach
		0TF44ZZ	Fragmentation in Left Kidney Pelvis, Percutaneous Endoscopic Approach
94.26	Subconvulsive electroshock therapy	GZB4ZZZ	Other Electroconvulsive Therapy
94.27	Other electroshock therapy	GZB0ZZZ	Electroconvulsive Therapy, Unilateral-Single Seizure
		GZB1ZZZ	Electroconvulsive Therapy, Unilateral-Multiple Seizure
		GZB2ZZZ	Electroconvulsive Therapy, Bilateral-Single Seizure
		GZB3ZZZ	Electroconvulsive Therapy, Bilateral-Multiple Seizure
		GZB4ZZZ	Other Electroconvulsive Therapy

Table PA4: Acute Diagnosis Categories (Based on Planned Readmission Algorithm Version 4.0) – Adapted for Colonoscopy Population

ICD-9 Diagnosis CCS (ICD-9)	Description	ICD-10 Diagnosis CCS (ICD-10)	Description
1	Tuberculosis	1	Tuberculosis
2	Septicemia (except in labor)	2	Septicemia (except in labor)
3	Bacterial infection; unspecified site	3	Bacterial infection; unspecified site
4	Mycoses	4	Mycoses
5	HIV infection	5	HIV infection
7	Viral infection	7	Viral infection
8	Other infections; including parasitic	8	Other infections; including parasitic
9	Sexually transmitted infections (not HIV or hepatitis)	9	Sexually transmitted infections (not HIV or hepatitis)
54	Gout and other crystal arthropathies	54	Gout and other crystal arthropathies
55	Fluid and electrolyte disorders	55	Fluid and electrolyte disorders
60	Acute posthemorrhagic anemia	60	Acute posthemorrhagic anemia
61	Sickle cell anemia	61	Sickle cell anemia
63	Diseases of white blood cells	63	Diseases of white blood cells
76	Meningitis (except that caused by tuberculosis or sexually transmitted disease)	76	Meningitis (except that caused by tuberculosis or sexually transmitted disease)
77	Encephalitis (except that caused by tuberculosis or sexually transmitted disease)	77	Encephalitis (except that caused by tuberculosis or sexually transmitted disease)
78	Other CNS infection and poliomyelitis	78	Other CNS infection and poliomyelitis
82	Paralysis	82	Paralysis
83	Epilepsy; convulsions	83	Epilepsy; convulsions
84	Headache; including migraine	84	Headache; including migraine
85	Coma; stupor; and brain damage	85	Coma; stupor; and brain damage
87	Retinal detachments; defects; vascular occlusion; and retinopathy	87	Retinal detachments; defects; vascular occlusion; and retinopathy
89	Blindness and vision defects	89	Blindness and vision defects
90	Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)	90	Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)
91	Other eye disorders	91	Other eye disorders
92	Otitis media and related conditions	92	Otitis media and related conditions
93	Conditions associated with dizziness or vertigo	93	Conditions associated with dizziness or vertigo
99	Hypertension with complications and secondary hypertension	99	Hypertension with complications and secondary hypertension

ICD-9	Description	ICD-10	Description
100	Acute myocardial infarction (with the exception of ICD-9 codes 410.x2)	100	Acute myocardial infarction
102	Nonspecific chest pain	102	Nonspecific chest pain
104	Other and ill-defined heart disease	104	Other and ill-defined heart disease
107	Cardiac arrest and ventricular fibrillation	107	Cardiac arrest and ventricular fibrillation
109	Acute cerebrovascular disease	109	Acute cerebrovascular disease
112	Transient cerebral ischemia	112	Transient cerebral ischemia
116	Aortic and peripheral arterial embolism or thrombosis	116	Aortic and peripheral arterial embolism or thrombosis
118	Phlebitis; thrombophlebitis and thromboembolism	118	Phlebitis; thrombophlebitis and thromboembolism
120	Hemorrhoids	120	Hemorrhoids
122	Pneumonia (except that caused by TB or sexually transmitted disease)	122	Pneumonia (except that caused by TB or sexually transmitted disease)
123	Influenza	123	Influenza
124	Acute and chronic tonsillitis	124	Acute and chronic tonsillitis
125	Acute bronchitis	125	Acute bronchitis
126	Other upper respiratory infections	126	Other upper respiratory infections
127	Chronic obstructive pulmonary disease and bronchiectasis	127	Chronic obstructive pulmonary disease and bronchiectasis
128	Asthma	128	Asthma
129	Aspiration pneumonitis; food/vomitus	129	Aspiration pneumonitis; food/vomitus
130	Pleurisy; pneumothorax; pulmonary collapse	130	Pleurisy; pneumothorax; pulmonary collapse
131	Respiratory failure; insufficiency; arrest (adult)	131	Respiratory failure; insufficiency; arrest (adult)
135	Intestinal infection	135	Intestinal infection
137	Diseases of mouth; excluding dental	137	Diseases of mouth; excluding dental
139	Gastroduodenal ulcer (except hemorrhage)	139	Gastroduodenal ulcer (except hemorrhage)
140	Gastritis and duodenitis	140	Gastritis and duodenitis
142	Appendicitis and other appendiceal conditions	142	Appendicitis and other appendiceal conditions
145	Intestinal obstruction without hernia	145	Intestinal obstruction without hernia
146	Diverticulosis and diverticulitis	146	Diverticulosis and diverticulitis
148	Peritonitis and intestinal abscess	148	Peritonitis and intestinal abscess
153	Gastrointestinal hemorrhage	153	Gastrointestinal hemorrhage
154	Noninfectious gastroenteritis	154	Noninfectious gastroenteritis
157	Acute and unspecified renal failure	157	Acute and unspecified renal failure
159	Urinary tract infections	159	Urinary tract infections
165	Inflammatory conditions of male genital organs	165	Inflammatory conditions of male genital organs

ICD-9	Description	ICD-10	Description
168	Inflammatory diseases of female pelvic organs	168	Inflammatory diseases of female pelvic organs
172	Ovarian cyst	172	Ovarian cyst
197	Skin and subcutaneous tissue infections	197	Skin and subcutaneous tissue infections
198	Other inflammatory condition of skin	198	Other inflammatory condition of skin
225	Joint disorders and dislocations; trauma-related	225	Joint disorders and dislocations; trauma-related
226	Fracture of neck of femur (hip)	226	Fracture of neck of femur (hip)
227	Spinal cord injury	227	Spinal cord injury
228	Skull and face fractures	228	Skull and face fractures
229	Fracture of upper limb	229	Fracture of upper limb
230	Fracture of lower limb	230	Fracture of lower limb
232	Sprains and strains	232	Sprains and strains
233	Intracranial injury	233	Intracranial injury
234	Crushing injury or internal injury	234	Crushing injury or internal injury
235	Open wounds of head; neck; and trunk	235	Open wounds of head; neck; and trunk
237	Complication of device; implant or graft	237	Complication of device; implant or graft
238	Complications of surgical procedures or medical care	238	Complications of surgical procedures or medical care
239	Superficial injury; contusion	239	Superficial injury; contusion
240	Burns	240	Burns
241	Poisoning by psychotropic agents	241	Poisoning by psychotropic agents
242	Poisoning by other medications and drugs	242	Poisoning by other medications and drugs
243	Poisoning by nonmedicinal substances	243	Poisoning by nonmedicinal substances
244	Other injuries and conditions due to external causes	244	Other injuries and conditions due to external causes
245	Syncope	245	Syncope
246	Fever of unknown origin	246	Fever of unknown origin
247	Lymphadenitis	247	Lymphadenitis
249	Shock	249	Shock
250	Nausea and vomiting	250	Nausea and vomiting
251	Abdominal pain	251	Abdominal pain
252	Malaise and fatigue	252	Malaise and fatigue
253	Allergic reactions	253	Allergic reactions
259	Residual codes; unclassified	259	Residual codes; unclassified
650	Adjustment disorders	650	Adjustment disorders
651	Anxiety disorders	651	Anxiety disorders
652	Attention-deficit, conduct, and disruptive behavior disorders	652	Attention-deficit

ICD-9	Description	ICD-10	Description
653	Delirium, dementia, and amnestic and other cognitive disorders	653	Delirium
656	Impulse control disorders, NEC	656	Impulse control disorders
658	Personality disorders	658	Personality disorders
660	Alcohol-related disorders	660	Alcohol-related disorders
661	Substance-related disorders	661	Substance-related disorders
662	Suicide and intentional self-inflicted injury	662	Suicide and intentional self-inflicted injury
663	Screening and history of mental health and substance abuse codes	663	Screening and history of mental health and substance abuse codes
670	Miscellaneous disorders	670	Miscellaneous disorders
Acute ICD-9 codes within Dx CCS 97	**Peri-; endo-; and myocarditis; cardiomyopathy**	**Acute ICD-10 codes within Dx CCS 97**	**Peri-; endo-; and myocarditis; cardiomyopathy**
3282	Diphtheritic myocarditis	A3681	Diphtheritic cardiomyopathy
3640	Meningococcal carditis nos	A3950	Meningococcal carditis, unspecified
3641	Meningococcal pericarditis	A3953	Meningococcal pericarditis
3642	Meningococcal endocarditis	A3951	Meningococcal endocarditis
3643	Meningococcal myocarditis	A3952	Meningococcal myocarditis
7420	Coxsackie carditis nos	B3320	Viral carditis, unspecified
7421	Coxsackie pericarditis	B3323	Viral pericarditis
7422	Coxsackie endocarditis	B3321	Viral endocarditis
7423	Coxsackie myocarditis	B3322	Viral myocarditis
11281	Candidal endocarditis	B376	Candidal endocarditis
11503	Histoplasma capsulatum pericarditis	B394	Histoplasmosis capsulati, unspecified*
11503	Histoplasma capsulatum pericarditis	I32	Pericarditis in diseases classified elsewhere*
11504	Histoplasma capsulatum endocarditis	B394	Histoplasmosis capsulati, unspecified*
11504	Histoplasma capsulatum endocarditis	I39	Endocarditis and heart valve disorders in diseases classified elsewhere*
11513	Histoplasma duboisii pericarditis	B395	Histoplasmosis duboisii*
11513	Histoplasma duboisii pericarditis	I32	Pericarditis in diseases classified elsewhere*
11514	Histoplasma duboisii endocarditis	B395	Histoplasmosis duboisii*
11514	Histoplasma duboisii endocarditis	I39	Endocarditis and heart valve disorders in diseases classified elsewhere*
11593	Histoplasmosis pericarditis	B399	Histoplasmosis, unspecified*
11593	Histoplasmosis pericarditis	I32	Pericarditis in diseases classified elsewhere*
11594	Histoplasmosis endocarditis	I39	Endocarditis and heart valve disorders in diseases classified elsewhere*

ICD-9	Description	ICD-10	Description
11594	Histoplasmosis endocarditis	B399	Histoplasmosis, unspecified*
1303	Toxoplasma myocarditis	B5881	Toxoplasma myocarditis
3910	Acute rheumatic pericarditis	I010	Acute rheumatic pericarditis
3911	Acute rheumatic endocarditis	I011	Acute rheumatic endocarditis
3912	Acute rheumatic myocarditis	I012	Acute rheumatic myocarditis
3918	Acute rheumatic heart disease nec	I018	Other acute rheumatic heart disease
3919	Acute rheumatic heart disease nos	I019	Acute rheumatic heart disease, unspecified
3920	Rheumatic chorea w heart involvement	I020	Rheumatic chorea with heart involvement
3980	Rheumatic myocarditis	I090	Rheumatic myocarditis
39890	Rheumatic heart disease nos	I099	Rheumatic heart disease, unspecified
39899	Rheumatic heart disease nec	I0989	Other specified rheumatic heart diseases
4200	Acute pericarditis in other disease	I32	Pericarditis in diseases classified elsewhere
42090	Acute pericarditis nos	I309	Acute pericarditis, unspecified
42091	Acute idiopath pericarditis	I300	Acute nonspecific idiopathic pericarditis
42099	Acute pericarditis nec	I308	Other forms of acute pericarditis
4210	Acute/subacute bacterial endocarditis	I330	Acute and subacute infective endocarditis
4211	Acute endocarditis in other diseases	I39	Endocarditis and heart valve disorders in diseases classified elsewhere
4219	Acute/subacute endocarditis nos	I339	Acute and subacute endocarditis, unspecified
4220	Acute myocarditis in other diseases	I41	Myocarditis in diseases classified elsewhere
42290	Acute myocarditis nos	I409	Acute myocarditis, unspecified
42291	Idiopathic myocarditis	I400	Infective myocarditis
		I401	Isolated myocarditis
42292	Septic myocarditis	I400	Infective myocarditis
42293	Toxic myocarditis	I408	Other acute myocarditis
42299	Acute myocarditis nec	--	--
4230	Hemopericardium	I312	Hemopericardium, not elsewhere classified
4231	Adhesive pericarditis	I310	Chronic adhesive pericarditis
4232	Constrictive pericarditis	I311	Chronic constrictive pericarditis
4233	Cardiac tamponade	I314	Cardiac tamponade
42731	Atrial fibrillation	I48.1	Persistent atrial fibrillation
42731	Atrial fibrillation	I48.2	Chronic atrial fibrillation
42731	Atrial fibrillation	I48.0	Paroxysmal atrial fibrillation
42731	Atrial fibrillation	I48.91	Unspecified atrial fibrillation

ICD-9	Description	ICD-10	Description
4290	Myocarditis nos	I514	Myocarditis, unspecified
Acute ICD-9 codes within Dx CCS 105	**Conduction disorders**	**Acute ICD-10 codes within Dx CCS 105**	**Conduction disorders**
4260	Atrioventricular	I442	Atrioventricular block, complete
42610	Atrioventricular block nos	I4430	Unspecified atrioventricular block
42611	Atrioventricular block-1st degree	I440	Atrioventricular block, first degree
42612	Atrioventricular block-mobitz ii	I441	Atrioventricular block, second degree
42613	Atrioventricular block-2nd degree nec	--	--
4262	Left bundle branch hemiblock	I4469	Other fascicular block
4262	Left bundle branch hemiblock	I444	Left anterior fascicular block
4262	Left bundle branch hemiblock	I445	Left posterior fascicular block
4262	Left bundle branch hemiblock	I4460	Unspecified fascicular block
4263	Left bundle branch block nec	I447	Left bundle-branch block, unspecified
4264	Right bundle branch block	I4510	Unspecified right bundle-branch block
42650	Bundle branch block nos	I4430	Unspecified atrioventricular block
42650	Bundle branch block nos	I4439	Other atrioventricular block
42650	Bundle branch block nos	I454	Nonspecific intraventricular block
42651	Right bundle branch block/left posterior fascicular block	I452	Bifascicular block
42652	Right bundle branch block/left ant fascicular block	--	--
42653	Bilateral bundle branch block nec	--	--
42654	Trifascicular block	I453	Trifascicular block
4266	Other heart block	I455	Other specified heart block
4267	Anomalous atrioventricular excitation	I456	Pre-excitation syndrome
42681	Lown-ganong-levine syndrome	--	--
42682	Long qt syndrome	I4581	Long QT syndrome
4269	Conduction disorder nos	I459	Conduction disorder, unspecified
Acute ICD-9 codes within Dx CCS 106	**Dysrhythmia**	**Acute ICD-10 codes within Dx CCS 106**	**Dysrhythmia**
4272	Paroxysmal tachycardia nos	I479	Paroxysmal tachycardia, unspecified
7850	Tachycardia nos	R000	Tachycardia, unspecified
42789	Cardiac dysrhythmias nec	I498	Other specified cardiac arrhythmias
42789	Cardiac dysrhythmias nec	R001	Bradycardia, unspecified
4279	Cardiac dysrhythmia nos	I499	Cardiac arrhythmia, unspecified
42769	Premature beats nec	I4949	Other premature depolarization
Acute ICD-9 codes within Dx CCS 108	**Congestive heart failure; nonhypertensive**	**Acute ICD-10 codes within Dx CCS 108**	**Congestive heart failure; nonhypertensive**
39891	Rheumatic heart failure	I0981	Rheumatic heart failure

ICD-9	Description	ICD-10	Description
4280	Congestive heart failure	I509	Heart failure, unspecified
4281	Left heart failure	I501	Left ventricular failure
42820	Unspecified systolic heart failure	I5020	Unspecified systolic (congestive) heart failure
42821	Acute systolic heart failure	I5021	Acute systolic (congestive) heart failure
42823	Acute on chronic systolic heart failure	I5023	Acute on chronic systolic (congestive) heart failure
42830	Unspecified diastolic heart failure	I5030	Unspecified diastolic (congestive) heart failure
42831	Acute diastolic heart failure	I5031	Acute diastolic (congestive) heart failure
42833	Acute on chronic diastolic heart failure	I5033	Acute on chronic diastolic (congestive) heart failure
42840	Unspec combined syst & dias heart failure	I5040	Unsp combined systolic and diastolic (congestive) hrt fail
42841	Acute combined systolic & diastolic heart failure	I5041	Acute combined systolic (congestive) and diastolic (congestive) heart failure
42843	Acute on chronic combined systolic & diastolic heart failure	I5043	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
4289	Heart failure nos	I509	Heart failure, unspecified
Acute ICD-9 codes within Dx CCS 149	**Biliary tract disease**	**Acute ICD-10 codes within Dx CCS 149**	**Biliary tract disease**
5740	Calculus of gallbladder with acute cholecystitis	--	--
57400	Calculus of gallbladder with acute cholecystitis without mention of obstruction	K8000	Calculus of gallbladder w acute cholecyst w/o obstruction
57401	Calculus of gallbladder with acute cholecystitis with obstruction	K8001	Calculus of gallbladder w acute cholecystitis w obstruction
5743	Calculus of bile duct with acute cholecystitis	--	--
57430	Calculus of bile duct with acute cholecystitis without mention of obstruction	K8042	Calculus of bile duct w acute cholecystitis w/o obstruction
57431	Calculus of bile duct with acute cholecystitis with obstruction	K8043	Calculus of bile duct w acute cholecystitis with obstruction
5746	Calculus of gallbladder and bile duct with acute cholecystitis	--	--
57460	Calculus of gallbladder and bile duct with acute cholecystitis without mention of obstruction	K8062	Calculus of GB and bile duct w acute cholecyst w/o obst
57461	Calculus of gallbladder and bile duct with acute cholecystitis with obstruction	K8063	Calculus of GB and bile duct w acute cholecyst w obstruction
5748	Calculus of gallbladder and bile duct with acute and chronic cholecystitis	--	--

ICD-9	Description	ICD-10	Description
57480	Calculus of gallbladder and bile duct with acute and chronic cholecystitis without mention of obstruction	K8066	Calculus of GB and bile duct w ac and chr cholecyst w/o obst
57481	Calculus of gallbladder and bile duct with acute and chronic cholecystitis with obstruction	K8067	Calculus of GB and bile duct w ac and chr cholecyst w obst
5750	Acute cholecystitis	K810	Acute cholecystitis
57512	Acute and chronic cholecystitis	K812	Acute cholecystitis with chronic cholecystitis
5761	Cholangitis	K830	Cholangitis
Acute ICD-9 codes with Dx CCS 152	**Pancreatic disorders**	**Acute ICD-10 codes with Dx CCS 152**	**Pancreatic disorders**
5770	Acute Pancreatitis	K859	Acute pancreatitis, unspecified
Acute ICD-9 codes with Dx CCS Group 155	**Other gastrointestinal disorders**	**Acute ICD-10 codes with Dx CCS Group 155**	**Other gastrointestinal disorders**
56983	Perforation of Intestine	K631	Perforation of intestine (nontraumatic)

* The multiple ICD-10 codes mapped from the same ICD-9 code must occur together to reflect the original ICD-9 condition.

D.4 Detailed Information on Updates to the v4.0 Planned Readmission Algorithm

CORE developed the planned readmission algorithm under contract to CMS based on a hospital-wide (not condition-specific) cohort of patients. The planned readmission algorithm version 4.0 was modified from version 3.0 for 2016 public reporting. Version 4.0 incorporates improvements made following a validation study of the algorithm that used data from a medical record review of 634 charts at seven hospitals and then review of the results of that study by clinical experts. These updates resulted in the removal of five AHRQ CCS categories from the 'potentially' planned group and the addition of one AHRQ CCS category to this group.

Removal of Potentially Planned Procedure Categories

As noted above, the removal of the five AHRQ CCS procedure categories from version 4.0 of the planned readmission algorithm was based on a medical record validation study and subsequent review by clinical experts. The validation study revealed that they were very often found to be unplanned in medical record review. We determined that any potential change in the algorithm warranted review by clinical experts in order to reverse the decision of the development working group to include these procedure categories on the list of potentially planned procedures. Two panels of cardiology experts, including interventional cardiologists and electrophysiologists, were convened. Removal of these procedure categories was confirmed by the panels.

Note that AHRQ CCS 169 was previously made an exception in stroke; it was always considered unplanned in the stroke readmission measure. With this update, AHRQ CCS 169 is now not considered a potentially planned procedure category for all five condition-specific readmission measures.

Addition of Potentially Planned Procedures Category

Version 4.0 of the planned readmission algorithm adds AHRQ CCS procedure category 1, Incision and excision of CNS (central nervous system), to the potentially planned procedure list (Table PA3).

A stakeholder suggested that CMS add AHRQ CCS procedure category 1, Incision and excision of CNS, to the list of potentially planned procedures because procedures within this CCS category are usually performed during planned admissions. The stakeholder suggested that initial hospitalizations in which CNS tumors are diagnosed are often followed by a period of diagnostic testing after which patients are electively readmitted for resection. A clinical expert panel was convened and confirmed the observations of this single stakeholder, and recommended inclusion of AHRQ CCS 1 on the planned readmission algorithm's potentially planned procedures list.

Full descriptions of the rationale for each change are listed in Table D.1.

Table D.1 – Updates to Planned Readmission Algorithm Version 3.0

Action	Procedure category	Rationale
Remove from planned procedure list	Diagnostic cardiac catheterization; coronary arteriography (AHRQ CCS 47)	These cardiac procedures are rarely the main reason for an elective inpatient hospitalization. Typically, these procedures are done during an observation stay. Removal of these procedure categories from the potentially planned procedures list reduces the rate of misclassification of unplanned readmissions as planned.
	Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator (AHRQ CCS 48)	
	Other diagnostic cardiovascular procedures (AHRQ CCS 62)	
	Amputation of lower extremity (AHRQ CCS 157)	Readmissions for these procedures typically represent worsening of wound unresponsive to previous management. Removal of these procedure categories from the potentially planned procedures list reduces the rate of misclassification of unplanned readmissions as planned (with the exception of AHRQ CCS 169, which was always considered unplanned in the stroke readmission measure).
	Debridement of wound; infection or burn (AHRQ CCS 169)	
Add to planned procedure list	Incision and excision of CNS (AHRQ CCS 1)	Patients admitted with newly diagnosed brain tumors may be electively readmitted for definitive management. The addition of this procedure category to the acute diagnoses list reduces the misclassification of planned readmissions as unplanned.