

# Risk-Standardized Acute Hospital Admission Rate for Patients with Multiple Chronic Conditions

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## Measure Information Form (MIF)

Measure Information Form (MIF)	
<b>Data Source</b>	<ul style="list-style-type: none"> <li>• Medicare inpatient claims</li> <li>• Medicare outpatient claims (Hospital outpatient and Part B Carrier claims)</li> <li>• Medicare Durable Medical Equipment (DME) claims</li> <li>• Medicare beneficiary enrollment data</li> <li>• Accountable Care Organization (ACO) assignment file</li> <li>• American Community Survey (ACS)</li> <li>• Area Health Resources File (AHRF)</li> </ul>
<b>Effective Date</b>	01/01/2021
<b>NQF ID</b>	#2888
<b>Care Setting</b>	Ambulatory care
<b>Unit of Measurement</b>	Accountable Care Organization (ACO)
<b>Measurement Duration</b>	Calendar Year
<b>Measurement Period</b>	Calendar Year
<b>Measure Type</b>	Outcome
<b>Measure Scoring</b>	Risk-standardized acute admission rate (RSAAR)
<b>Payer Source</b>	Medicare fee-for-service (FFS)
<b>Improvement Notation</b>	Lower RSAAR scores indicate better quality.
<b>Measure Steward</b>	Centers for Medicare & Medicaid Services (CMS)
<b>Copyright / Disclaimer</b>	This quality measure was developed for CMS by Yale New Haven Hospital Health Services Corporation Center for Outcomes Research and Evaluation (CORE) in 2014 and revised in 2020.

## Measure Description

Rate of risk-standardized acute, unplanned hospital admissions among Medicare FFS beneficiaries 65 years and older with multiple chronic conditions (MCCs) who are assigned to the ACO.

## Rationale

As of 2010, more than two-thirds of Medicare beneficiaries were diagnosed with or treated for two or more chronic conditions (CMS, 2012). People with MCCs are more likely to be admitted to the hospital than those without chronic conditions or with a single chronic condition. Additionally, they are more likely to visit the emergency department, use post-acute care (such as skilled nursing facilities), and require home health assistance (CMS, 2012). No quality measures specifically designed for this population exist to assess quality of care or to enable the evaluation of whether current efforts to improve care are successful; this measure is

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designed to help fill that gap as called for in National Quality Forum's (NQF) "Multiple Chronic Conditions Measurement Framework" (NQF, 2012).

The measure is focused on ACOs because providers in ACOs share responsibility for patients' ambulatory care, and better coordinated care should lower the risk of hospitalization for this vulnerable population. The measure is designed to illuminate variation in hospital admission rates and incentivize ACOs to develop efficient and coordinated chronic disease management strategies that anticipate and respond to patients' needs and preferences. The measure is also consistent with ACOs' commitment to deliver patient-centered care that fulfills the goals of the Department of Health and Human Services' National Quality Strategy—improving population health, providing better care, and lowering healthcare costs (U.S. Department of Health and Human Services, 2012).

The rationale for measuring all-cause acute admissions is to assess the quality of care as experienced by the patient and to drive overall improvements in care quality, coordination, and efficiency that are not specific to certain diseases. Ambulatory care providers can act together to lower patients' risk for a wide range of acute illnesses requiring admission in several ways:

1. Provide optimal and accessible chronic disease management to reduce catastrophic sequelae of chronic disease. For example:
  - Support healthy lifestyle behaviors and optimize medical management to minimize the risk for cardiovascular events such as stroke and heart attacks.
  - Carefully monitor and act early to address chronic problems that require major interventions if allowed to progress (e.g., assessment and treatment of peripheral artery disease in persistent infections in order to prevent amputation).
2. Anticipate and manage the interactions between chronic conditions. For example:
  - Closely monitor renal function in patients on diuretic therapy for heart failure and chronic kidney disease.
  - Minimize polypharmacy to reduce drug-drug and drug-disease interactions.
  - Assess and treat depression to improve self-efficacy and self-management of chronic disease.
3. Provide optimal primary prevention of acute illnesses, such as recommended immunizations and screening.
4. Facilitate rapid, effective ambulatory intervention when acute illness does occur, whether related or unrelated to the chronic conditions. For example:
  - Promptly prescribe antibiotics for presumed bacterial pneumonia and diuretic treatment for fluid overload in heart failure.
  - Empower patients to recognize symptoms and to seek timely care.
  - Create accessible care options for patients (e.g., weekend or evening hours; capacity to deliver intravenous medications).



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5. Partner with the government, local businesses, and community organizations to improve support for patients with chronic illness. For example:
  - Collaborate with home nursing programs.
  - Partner with local businesses to increase opportunities to engage in healthy lifestyle behaviors.
  - Provide outreach and services at senior centers.

Finally, a number of studies have shown that improvements in the delivery of healthcare services for ambulatory patients with MCCs can lower the risk of admission (Brown, Peikes, Peterson, Schore, & Razafindrakoto, 2012; Chan, You, Huang, & Ting, 2012; CMS, 2012; Dorr, Wilcox, Brunner, Burdon, & Donnelly, 2008; Levine, Steinman, Attaway, Jung, Enguidanos, 2012; Littleford & Kralik, 2010; Sommers, Marton, Barbaccia, & Randolph, 2000; Zhang, Wan, Rossiter, Murawski, & Patel, 2008; Kuo, Adhkari, Eke, Goodwin, & Raji, 2018; Matzke, Moczygemba, Williams, Czar, & Lee, 2018; Ruiz, Snyder, Rotondo, Cross-Barnet, Colligan, & Giuriceo, 2017; Edwards, Saha, Prentice, & Pizer, 2017; Krumme, Glynn, Schneeweiss, Gagne, Dougherty, Brill, & Choudhry, 2018; Gabriel, Powers, Encinosa, Bynum, & 2017). Demonstrated strategies include improving access to care; supporting self-care in the home; better coordinating care across providers; improved medication prescribing and dispensing strategies; and integrating social work, nursing, and medical services.

The goal of this measure is to illuminate variation among ACOs in hospital admission rates for people with MCCs and incentivize ACOs to expand efforts to develop and implement efficient and coordinated chronic disease management strategies that anticipate and respond to patients' needs and preferences. Recent data suggests that ACOs are indeed focused on strategies to reduce hospital admissions and use hospital admissions to evaluate the success of their interventions. A 2018 Annual ACO Survey showed that across all ACO types, top priorities included reducing avoidable emergency department (ED) visits and inpatient admissions, as well as reducing readmissions through better care transitions. In a series of case studies on ACOs, ACOs with palliative care and serious illness programs often judged the outcomes of their programs by evaluating their effect on ED visits and hospital admissions. These findings further support the use of hospital admissions as important outcomes in this setting as they are already widely recognized as signals of quality (Roiland, Bleser, Muhlenstein, & Saunders, 2020).

## Clinical Recommendation Statement

The rationale for measuring acute, unplanned admissions for an ACO's assigned beneficiaries with chronic disease is that ACOs are established precisely to improve patient-centered care and outcomes for these patients. Providers within an ACO share responsibility for delivering primary preventive services, chronic disease management, and acute care to patients with MCCs. Further, ACOs accept accountability for patient outcomes; providers form ACOs and commit to the goals of the ACO program, which include providing better coordinated care and chronic disease management while lowering costs (CMS, 2014). These program goals are fully aligned with the objective of lowering patients' risk of admission incentivized by the measure (CMS, 2014). ACOs should be able to lower the risk of acute, unplanned admissions more feasibly than less integrated Medicare FFS providers through strengthening preventive care, delivering better coordinated and



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more effective chronic disease management, and providing timely ambulatory care for acute exacerbations of chronic disease. ACOs may also need to engage with community organizations and health-related community services to facilitate effective chronic disease management.

Finally, a number of studies have shown that improvements in the delivery of healthcare services for ambulatory patients with MCCs can lower the risk of admission (Brown, Peikes, Peterson, Schore, & Razafindrakoto, 2012; Chan, You, Huang, & Ting, 2012; CMS, 2012; Dorr, Wilcox, Brunner, Burdon, & Donnelly, 2008; Levine, Steinman, Attaway, Jung, & Enguidanos, 2012; Littleford & Kralik, 2010; Sommers, Marton, Barbaccia, & Randolph, 2000; Zhang, Wan, Rossiter, Murawski, & Patel, 2008; Kuo, Adhkari, Eke, Goodwin, & Raji, 2018; Matzke, Moczygemba, Williams, Czar, & Lee, 2018; Ruiz, Snyder, Rotondo, Cross-Barnet, Colligan, & Giuriceo, 2017; Edwards, Saha, Prentice, & Pizer, 2017; Krumme, Glynn, Schneeweiss, Gagne, Dougherty, Brill, & Choudhry, 2018; Gabriel, Powers, Encinosa, Bynum, & 2017). Demonstrated strategies include improving access to care; supporting self-care in the home; better coordinating care across providers; improved medication prescribing and dispensing strategies; and integrating social work, nursing, and medical services.

## Release Notes / Summary of Changes

**Revisions to the measure specifications** were made to align this measure with an analogous measure developed for clinician groups participating in the Merit-Based Incentive Payment System (MIPS). These changes are summarized in this section and described more fully throughout this MIF.

- **Cohort:** expanded the cohort to include diabetes as a cohort-qualifying condition, updated the cohort to require Part B enrollment during the year prior to measurement, and revised cohort exclusions
- **Outcome:** narrowed the outcome with additional exclusion criteria to focus on admissions where risk can be reduced by providing high-quality ambulatory care
- **Risk adjustment:** revised clinical factors for adjustment due to the cohort changes, and added frailty and social risk factors to the risk-adjustment model
- **Data sources:** updated the list of data sources used for measure calculation
- **Statistical modeling:** modified the type of statistical model

Revisions to the Cohort	
Specification Updates	<ul style="list-style-type: none"><li>• Diabetes was added as a cohort-qualifying condition.<ul style="list-style-type: none"><li>○ The specific list of chronic conditions for the updated measure is the same as the original version of the measure, except for diabetes, and has been vetted nationally and published in the literature (Drye, 2018). In brief, it reflects the chronic conditions that, in combination, put patients at high risk of admission. The inclusion of diabetes</li></ul></li></ul>



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	<p>acknowledges the complexity that diabetes introduces to caring for patients with MCCs.</p> <ul style="list-style-type: none"> <li>• Require patients to be enrolled in Medicare Part B during the year prior to measurement</li> <li>• Exclude patients: <ul style="list-style-type: none"> <li>○ In hospice at the start of the measurement year or at any time in the year prior to measurement</li> <li>○ Without any visits to TINs associated with the attributed ACO during the measurement year and the year prior to measurement</li> <li>○ Not at risk for hospitalization at any time during the measurement year</li> </ul> </li> </ul>
Annual Coding System Updates	<ul style="list-style-type: none"> <li>• Added ICD-10 diagnosis codes to the following conditions: <ul style="list-style-type: none"> <li>○ Eleven diagnosis codes to Chronic Kidney Disease</li> <li>○ Two hundred forty-six diagnosis codes to Stroke/Transient Ischemic Attack (TIA)</li> </ul> </li> <li>• Removed: <ul style="list-style-type: none"> <li>○ One ICD-10 code from Chronic Kidney Disease</li> </ul> </li> </ul>

## Revisions to the Outcome

Specification Updates	<ul style="list-style-type: none"> <li>• Narrowed outcome to focus on admissions where risk can be reduced by providing high-quality ambulatory care. The following additional exclusions were made to the outcome: <ul style="list-style-type: none"> <li>○ Admissions that occur directly from a skilled nursing facility (SNF) or acute rehabilitation facility;</li> <li>○ Admissions that occur within a 10-day “buffer period” of time after discharge from a hospital, SNF, or acute rehabilitation facility;</li> <li>○ Admissions that occur after the patient has entered hospice;</li> <li>○ Admissions related to complications of procedures or surgeries;</li> <li>○ Admissions related to accidents or injuries; and</li> <li>○ Admissions that occur prior to the first visit with a clinician in a TIN associated with the assigned ACO</li> </ul> </li> </ul>
<p>Annual Coding System Updates</p> <p>The planned admission algorithm (PAA) was revised to align with the planned readmission algorithm (PRA) v4.0_2021; new 2020 ICD-10-CM and ICD-10-PCS codes were mapped to the available</p>	<ul style="list-style-type: none"> <li>• Revisions to AHRQ CCS procedure groups and codes considered potentially planned (see table ‘MCC PAA3’ in the Value Set): <ul style="list-style-type: none"> <li>○ Addition of 267 individual ICD-10-PCS codes within CCS categories 49, 61, 63, 101, 103, 146, and 222 added to the Potentially Planned Procedures list</li> </ul> </li> <li>• Revisions to the set of AHRQ CCS diagnosis groups and individual diagnosis codes considered acute (see table ‘MCC PAA4’ in the Value Set): <ul style="list-style-type: none"> <li>○ Added: <ul style="list-style-type: none"> <li>▪ Fifty-four individual ICD-10-CM codes within CCS diagnosis groups 97, 101, 105, 115, 149, 238, 244</li> </ul> </li> <li>○ Removed: <ul style="list-style-type: none"> <li>▪ One CCS diagnosis group (CCS 1 ‘Tuberculosis’) but retained subset of 57 codes within this CCS</li> </ul> </li> </ul> </li> </ul>



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Agency for Healthcare  
Research and Quality  
(AHRQ) Clinical  
Classification  
Software (CCS)  
v2019.1 beta maps.  
Changes include:

- Seven individual ICD-10-CM codes within CCS diagnosis groups 97, 106, 233

## Revisions to Risk-Adjustment Model

Specification Updates	<ul style="list-style-type: none"> <li>• Revised clinical variables used for adjustment.</li> <li>• Added frailty risk variables and two social risk factors to the risk-adjustment model: <ul style="list-style-type: none"> <li>○ Measures of frailty/disability defined based on 1) use of durable medical equipment (DME) using Policy Group Maps and 2) original reason for Medicare entitlement. <ul style="list-style-type: none"> <li>▪ Walking aids</li> <li>▪ Wheelchairs</li> <li>▪ Hospital bed</li> <li>▪ Lifts</li> <li>▪ Oxygen</li> <li>▪ Original reason for entitlement: disability insurance beneficiary</li> <li>▪ Original reason for entitlement: end-stage renal disease</li> </ul> </li> </ul> </li> <li>• AHRQ Socioeconomic Status (SES) Index (lowest quartile vs. upper three quartiles).</li> <li>• Area-level measure of specialist physician density (lowest quartile vs. upper three quartiles).</li> </ul>
Annual Coding System Updates	<ul style="list-style-type: none"> <li>• Updated condition categories (CCs) for clinical risk adjustment from Version 22 to Version 24</li> <li>• Substance abuse risk variable: added CC 202 and CC 203</li> <li>• Wheelchairs risk variable: added HCPCS code E2398 under Policy Group Map 606</li> <li>• Arrhythmia risk variable: removed four ICD-10 diagnosis codes</li> <li>• Pulmonary heart disease: added three ICD-10 diagnosis codes</li> <li>• Psychiatric disorders other than depression variable: changed CC 59 to CC 58 (hierarchy switched in HCC v24)</li> <li>• There were changes in the ICD-10 codes that are not counted in risk factor coding because they are in the cohort, due to cohort and condition category mapping updates (see table 'MCC All Risk Variables' in the Value Set).</li> </ul>
Annual Coding System Updates	<ul style="list-style-type: none"> <li>• Updated condition categories (CCs) for clinical risk adjustment from Version 22 to Version 24</li> <li>• Substance abuse risk variable: added CC 202 and CC 203</li> </ul>



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- Wheelchairs risk variable: added HCPCS code E2398 under Policy Group Map 606
- Arrhythmia risk variable: removed four ICD-10 diagnosis codes
- Pulmonary heart disease: added three ICD-10 diagnosis codes
- Psychiatric disorders other than depression variable: changed CC 59 to CC 58 (hierarchy switched in HCC v24)
- There were changes in the ICD-10 codes that are not counted in risk factor coding because they are in the cohort, due to cohort and condition category mapping updates (see table 'MCC All Risk Variables' in the Value Set).

## Revisions to Data Sources

Updated list of data sources used for measure to add:

- Medicare Durable Medical Equipment (DME) claims;
- American Community Survey (ACS); and
- Area Health Resources File (AHRF).

## Revisions to Statistical Model

The variance function of the negative binomial regression model was updated from a quadratic to linear variance function.

## Technical Specifications

### Target Population

- ACO-assigned Medicare beneficiaries with MCCs

### Denominator

#### Denominator Statement

Our target population is Medicare FFS beneficiaries aged 65 years and older assigned to the ACO whose combinations of chronic conditions put them at high risk of admission and whose admission rates could be lowered through better care. NQF's "Multiple Chronic Conditions Measurement Framework," which defines patients with MCCs as people "having two or more concurrent chronic conditions that... act together to significantly increase the complexity of management, and affect functional roles and health outcomes, compromise life expectancy, or hinder self-management" (NQF, 2012).

#### Denominator Details

The cohort is Medicare FFS beneficiaries aged 65 years and older assigned to the ACO during the measurement period with diagnoses that fall into two or more of nine chronic disease groups:





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1. Acute myocardial infarction (AMI)
2. Alzheimer's disease and related disorders or senile dementia
3. Atrial fibrillation
4. Chronic kidney disease (CKD)
5. Chronic obstructive pulmonary disease (COPD) and asthma
6. Depression
7. Diabetes
8. Heart failure
9. Stroke and transient ischemic attack (TIA)

The nine disease groups are defined using data from the Integrated Data Repository (IDR) in combination with algorithms for nine chronic condition categories. The nine categories are based on those used in CMS's Chronic Condition Data Warehouse (CCW) (Krumholz et al., 2006). We combined two CCW categories into a single chronic disease group—COPD and asthma. The 'MCC Cohort' table in the Value Set identifies the claim algorithms and the specific International Classification of Diseases, Tenth Revision (ICD-10) codes for each of the nine chronic disease groups. Due to the infrequent updates to the CCW, updates to the measure cohort for 2021 reporting are based on ICD-10 codes newly released in October 2020.

To be included in the cohort, beneficiaries must also be enrolled full-time in both Medicare Parts A and B during the year prior to the measurement period. This requirement for full enrollment in Medicare Parts A and B one year prior to measurement is to ensure adequate claims data to identify beneficiaries with these chronic conditions.

## Denominator Exceptions and Exclusions

1. Beneficiaries that do not have 12 months continuous enrollment in Medicare Parts A and B during the year prior to the measurement year.
  - Rationale: This data is needed to attribute chronic conditions to beneficiaries and for outcome assessment.
2. Beneficiaries that do not have 12 months continuous enrollment in Medicare Parts A and B during the measurement year. Beneficiaries who become deceased or entered hospice during the measurement period are excluded if they do not have continuous enrollment in Medicare Parts A and B until death or upon entering hospice (i.e., the 12-month requirement is relaxed for these beneficiaries).
  - Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). Beneficiaries with continuous enrollment who become deceased or enter hospice during the year are included only for the time they are alive and not



in hospice. We require Part B enrollment in order to ascertain office visits with clinicians in the ACO.

3. Beneficiaries enrolled in hospice during the year prior to the measurement year or at the start of the measurement year.
  - Rationale: The measure excludes these patients even though once a patient enters hospice care, a goal of care is to prevent the need for hospital care. However, it may be difficult to influence end-of-life care once a patient is enrolled in hospice and served by a hospice team.
4. Beneficiaries without any visits (Evaluation & Management [E&M] or other) with any of the TINs associated with the attributed ACO during the measurement year and the year prior to the measurement year.
  - Rationale: These patients are excluded because the start of their time-at-risk cannot be ascertained.
5. Beneficiaries not at risk for hospitalization at any time during the measurement year.
  - Rationale: The outcomes for these patients cannot be assessed as they are not at risk. For example, if the first visit to the attributed ACO occurred after the patient entered hospice, the patient would not have any time at risk and would thus be excluded.

## Denominator Exceptions and Exclusions Details

1. Beneficiaries without continuous enrollment in Medicare Parts A and B during the year prior to the measurement year. Lack of continuous enrollment in Medicare Parts A and B is determined by patient enrollment status in the Medicare Enrollment Database (EDB). The enrollment indicators must be appropriately marked during the year prior to the measurement year.
2. Beneficiaries without continuous enrollment in Medicare Parts A and B for the duration of the measurement period (or until death or hospice enrollment) are excluded. Lack of continuous enrollment in Medicare Parts A and B is determined by patient enrollment status in the Medicare EDB. The enrollment indicators must be appropriately marked during the measurement year.
3. Beneficiaries enrolled in hospice during the year prior to the measurement year or at the start of the measurement year are excluded. Enrollment in hospice is determined by a patients' hospice benefit information in the CMS's Medicare EDB.
4. Beneficiaries without any visits (E&M or other) with any of the TINs associated with the attributed ACO during the measurement year and the year prior to the measurement year are excluded. This is determined by using Medicare FFS non-institutional carrier claims.
5. Beneficiaries not at risk for hospitalization at any time during the measurement year are excluded. Persons are considered at risk for admission if they are alive, enrolled in FFS Medicare, and not admitted to an acute care hospital. In addition to time spent in the hospital, we also exclude from at-risk time: 1) time spent in a SNF or acute rehabilitation facility; 2) the time within 10 days following



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discharge from a hospital, SNF, or acute rehabilitation facility; and 3) time after entering hospice care. This is determined using Medicare FFS institutional inpatient claims and the Medicare EDB.

## Numerator

### Numerator Statement

The outcome measured for each beneficiary is the number of acute unplanned admissions per 100 person-years at risk for admission during the measurement period.

### Numerator Details

- **Outcome Definition**

The outcome for this measure is the number of acute unplanned admissions per 100 person-years at risk of admission during the measurement period.

This measure does not include the following types of admissions in the outcome because they do not reflect the quality of care provided by ambulatory care providers who are managing the care of patients with MCCs:

1. **Planned hospital admissions.**

- Rationale: Although clinical experts agree that proper care in the ambulatory setting should reduce hospital admissions, variation in planned admissions (such as for elective surgery) does not typically reflect quality differences. Consistent with the approach CMS has taken for other admission and readmission measures, the measure excludes planned hospital admissions because planned admissions are not a signal of poor-quality care. Planned admissions are those planned by providers and patients for anticipated medical treatment or procedures that must be provided in the inpatient setting. Most planned admissions are part of ongoing clinical care and do not represent acute events that could have been prevented by high-quality care. Moreover, for ambulatory patients with chronic diseases, admissions for certain planned procedures (e.g., placement of a cardiac device designed to prolong life) are consistent with the highest quality of care. For these reasons, planned admissions are not counted in the measure outcome.
- We based the planned admission algorithm on CMS's Planned Readmission Algorithm Version 4.0, which CMS originally created to identify planned readmissions for the hospital-wide readmission measure. In brief, the algorithm uses a flowchart and four tables of procedure and/or discharge diagnosis categories to identify planned admissions. Admissions are considered planned if any of the following occurs during the admission:



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- A procedure is performed that is in one of the procedure categories that are always planned regardless of diagnosis (Please see table 'MCC PAA1' in the Value Set).
- The principal diagnosis is in one of the diagnosis categories that are always planned (Please see table 'MCC PAA2' in the Value Set).
- A procedure is performed that is in one of the potentially planned procedure categories (or partial categories) (Please see table 'MCC PAA3' in the Value Set) and the principal diagnosis is not in the list of acute discharge diagnoses (Please see table 'MCC PAA4' in the Value Set).

## **2. Admissions that occur directly from a SNF or acute rehabilitation facility.**

- Rationale: The measure excludes from the outcome hospital admissions that occur when patients are in SNFs or acute rehabilitation facilities because, during that time, institutional providers have a more direct influence on patients' care and safety.

## **3. Admissions that occur within a 10-day "buffer period" of time after discharge from a hospital, SNF, or acute rehabilitation facility.**

- Rationale: Within this buffer period of transition back to community-based care, other factors in addition to ambulatory care, including care received in the hospital and post-discharge planning, contribute to the risk of admission; therefore, the measure does not hold ACOs accountable for admissions in this timeframe. This buffer period allows time for patients to be seen within 7 days of discharge as recommended in CMS's Transitional Care Management (TCM) service guidelines and for the ambulatory care provider's care plan to take effect. CMS's TCM service guidelines encourage providers to have a face-to-face visit within 7 days of discharge for Medicare patients with high medical decision complexity.

## **4. Admissions that occur after the patient has entered hospice.** The measure excludes from the outcome admissions that occur when patients are enrolled in Medicare's hospice benefit (hereinafter, hospice care).

- Rationale: Once a patient enters hospice care, a goal of care is to prevent the need for hospital care. However, ambulatory care providers may be attributed the patient and have relatively little influence on end-of-life care once a patient is enrolled in hospice and served by a hospice team.

## **5. Admissions related to complications from procedures or surgeries.**

- Rationale: These admissions are unrelated to primary care and the management of patients' chronic conditions.
- The measure outcome excludes the following AHRQ CCS diagnosis categories:
  - 145: Intestinal obstruction without hernia;
  - 237: Complication of device; implant or graft;
  - 238: Complications of surgical procedures or medical care; and
  - 257: Other aftercare.





## 6. Admissions related to accidents or injuries.

- Rationale: These admissions may represent random events that are not likely a reflection of care quality.
- The measure excludes the following AHRQ CCS diagnosis categories:
  - 2601 E Codes: Cut/pierce;
  - 2602 E Codes: Drowning/submersion;
  - 2604 E Codes: Fire/burn;
  - 2605 E Codes: Firearm;
  - 2606 E Codes: Machinery;
  - 2607 E Codes: Motor vehicle traffic (MVT);
  - 2608 E Codes: Pedal cyclist, not MVT;
  - 2609 E Codes: Pedestrian, not MVT;
  - 2610 E Codes: Transport, not MVT;
  - 2611 E Codes: Natural/environment;
  - 2612 E Codes: Overexertion;
  - 2613 E Codes: Poisoning;
  - 2614 E Codes: Struck by, against;
  - 2615 E Codes: Suffocation;
  - 2616 E Codes: Adverse effects of medical care;
  - 2618 E Codes: Other specified and classifiable;
  - 2619 E Codes: Other specified, not elsewhere classifiable (NEC);
  - 2620 E Codes: Unspecified; and
  - 2621 E Codes: Place of occurrence.

## 7. Admissions that occur prior to the first visit with the assigned ACO.

Rationale: During the measurement period, it is possible for a patient to have a hospital admission before the first visit with a clinician in the assigned ACO. In such cases, we do not want to unfairly count the admission against the ACO. This exclusion will not apply, however, if a clinician in the assigned ACO saw the patient in the previous year, suggesting an established relationship with the patient.

### • Outcome Attribution

The outcome is attributed to the ACO to which the beneficiary is assigned in the Shared Savings Program.

## Stratification or Risk Adjustment

### Stratification

Not applicable. This measure is not stratified.



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## Risk Adjustment

We use a two-level, hierarchical, negative binomial model with linear variance to estimate risk-standardized acute, unplanned admissions per 100 person-years at risk for admission. This approach accounts for the clustering of patients within ACOs and variation in sample size.

The model adjusts for demographic, clinical (including nine chronic disease groups and measures of frailty), and social risk factors present at the start of the measurement year, age, and the chronic disease categories that qualify the patient for the measure cohort.

Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association Scientific Statement, “Standards for Statistical Models Used for Public Reporting of Health Outcomes” (Krumholz et al., 2006; Normand & Shahian, 2007).

The risk-adjustment model includes 47 demographic and clinical (including nine chronic disease groups and measures of frailty) variables as well as two social risk factors. We define clinical variables primarily using CMS’s Condition Categories version 24 (CCs), which are clinically meaningful groupings of ICD-10 diagnosis codes. Where ICD-10 codes in CCs overlap with those used in the variables that define the nine chronic disease groups, we removed those ICD-10 codes from the CCs to eliminate the overlap. Some variables are also defined by subsets of ICD-10 codes within CCs. For details on how risk variables are defined, see the following tables in the Value Set: MCC All Risk Variables, MCC Risk Variables by ICD10s, MCC Risk Variables by Pol Grp, MCC CCtoICD Map.

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The risk-adjustment variables are:

Risk-Adjustment Variables	
<b>Demographic</b>	<ul style="list-style-type: none"> <li>• Age (categorical variable, &lt;70, 70-74, 75-79, 80-84, &gt;85)</li> </ul>
<b>Nine chronic disease groups</b>	<ul style="list-style-type: none"> <li>• AMI</li> <li>• Alzheimer's disease and related disorders or senile dementia</li> <li>• Atrial fibrillation</li> <li>• CKD</li> <li>• COPD and asthma</li> <li>• Depression</li> <li>• Diabetes</li> <li>• Heart failure</li> <li>• Stroke and TIA</li> </ul>
<b>Clinical comorbidities defined using Version 24 CCs or ICD-10 codes</b>	<ul style="list-style-type: none"> <li>• Dialysis status (CC 134)</li> <li>• Respiratory failure (CC 82, CC 83, CC 84)</li> <li>• Advanced liver disease (CC 27 [remove ICD-10-CM diagnosis code K767], CC 28, CC 29, CC 30)</li> <li>• Pneumonia (CC 114, CC 115, CC 116)</li> <li>• Septicemia/shock (CC 2)</li> <li>• Hematological diseases (CC 46 [remove ICD-10-CM diagnosis code D593], CC 48)</li> <li>• Advanced cancer (CC 8, CC 9, CC 10, CC 13)</li> <li>• Infectious and immune disorders (CC 1, CC 3, CC 4, CC 5 [remove ICD-10-CM diagnosis code A1811], CC 6, CC 47, CC 90)</li> <li>• Severe cognitive impairment (CC 50 [remove ICD-10-CM diagnosis codes F05, F061, F068], CC 64, CC 65, CC 80)</li> <li>• Major organ transplant status (CC 132, CC 186)</li> <li>• Pulmonary heart disease (ICD-10-CM diagnosis codes I2601, I2602, I2609, I2690, I2692, I2693, I2694, I2699, I270, I271, I2720, I2721, I2722, I2723, I2724, I2729, I2781, I2783, I2789, I279, I280, I281, I288, I289)</li> <li>• Cardiomyopathy (ICD-10-CM diagnosis codes I420, I421, I422, I425, I426, I427, I428, I429, I43, I514, I515)</li> <li>• Gastrointestinal disease (CC 31, CC 32, CC 33, CC 35, CC 36)</li> <li>• Iron deficiency anemia (CC 49)</li> <li>• Ischemic heart disease except AMI (CC 87, CC 88, CC 89, CC 98; ICD-10-CM diagnosis codes I511, I512)</li> <li>• Other lung disorders (CC 112 [remove ICD-10-CM diagnosis codes J470, J471, J479], CC 118 [remove ICD-10-CM J40])</li> </ul>



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	<ul style="list-style-type: none"> <li>• Vascular or circulatory disease (CC 106, CC 107, CC 108 [remove ICD-10-CM diagnosis codes I701, I722], CC 109)</li> <li>• Other significant endocrine disorders (CC 23 [remove E748, N251, N2581])</li> <li>• Other disability and paralysis (CC 72, CC 74, CC 119, sub-set of CC 103, sub-set of CC 104)</li> <li>• Substance abuse (CC 54, CC 55, CC 56, CC 202, CC 203)</li> <li>• Other neurologic disorders (CC 75, CC 77, CC 78, CC 79, CC 81, sub-set of CC 105)</li> <li>• Specified arrhythmias and other heart rhythm disorders (CC 96 [remove ICD-10 diagnosis codes I480, I481, I4811, I4819, I482, I4820, I4821, I4891], CC 97)</li> <li>• Hypertension (CC 95)</li> <li>• Hip or vertebral fracture (CC 169, CC 170)</li> <li>• Lower-risk cardiovascular disease (CC 91, CC 92, CC 93)</li> <li>• Cerebrovascular disease (CC 102 [remove ICD-10-CM diagnosis codes G463, G464, G465, G466, G467, G468, I6789])</li> <li>• Morbid obesity (ICD-10-CM diagnosis codes E6601, Z6835, Z6836, Z6837, Z6838, Z6839, Z6841, Z6842, Z6843, Z6844, Z6845)</li> <li>• Urinary disorders (CC 142 [remove ICD-10-CM diagnosis codes N131, N132, N1330, N1339, Q620, Q6210, Q6211, Q6212, Q622, Q6231, Q6232, Q6239] and CC 145 [remove ICD-10-CM diagnosis codes N2589, N259, N261, N269, Q6102, Q612, Q613, Q614, Q615, Q618])</li> <li>• Psychiatric disorders other than depression (CC 57, CC 58, CC 60, CC 62, CC 63 [remove ICD-10-CM diagnosis codes F4321, F4323])</li> <li>• Marked disability/frailty (CC 21, CC 70, CC 71, CC 73, CC 157, CC 158, CC 159, CC 160, CC 161, CC 189, CC 190)</li> </ul>
<b>Measures of frailty/disability</b> (Defined using Policy Group Maps for Durable Medical Equipment maintained by Palmetto GBA under contract to CMS (based on 2020 Quarter 1 version), or original reason for	<ul style="list-style-type: none"> <li>• Hospital bed (Policy Group Maps 250)</li> <li>• Lifts (Policy Group Maps 430 and 460)</li> <li>• Oxygen (Policy Group Map 400)</li> <li>• Walking aids (Policy Group Maps 140 and 590)</li> <li>• Wheelchairs (Policy Group Maps 602, 603, 604, 606)</li> <li>• Original reason for entitlement: disability insurance beneficiary</li> <li>• Original reason for entitlement: end stage renal disease</li> </ul>





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Medicare entitlement)	
<b>Social risk factors</b>	<ul style="list-style-type: none"> <li>• Low AHRQ SES Index (lowest quartile) <ul style="list-style-type: none"> <li>○ The AHRQ SES Index is a widely used variable that summarizes area-level measures of employment, income, education, and housing. Each of the Index components is available at the census-block level, which are then used to link to patient's residence using a 9-digit ZIP code. Census variables are found in the American Community Survey. The AHRQ SES Index score summarizes information from the following variables: <ul style="list-style-type: none"> <li>▪ percentage of people in the labor force who are unemployed;</li> <li>▪ percentage of people living below poverty level;</li> <li>▪ median household income;</li> <li>▪ median value of owner-occupied dwellings;</li> <li>▪ percentage of people ≥25 years of age with less than a 12th-grade education;</li> <li>▪ percentage of people ≥25 years of age completing ≥4 years of college; and</li> <li>▪ percentage of households that average ≥1 people per room.</li> </ul> </li> </ul> </li> <li>• Low area-level density of physician specialists (lowest quartile).</li> </ul>

## Sampling

This is not based on a sample or survey.

## Calculation Algorithm

The risk-standardized acute admission rate (RSAAR) for each ACO is calculated as the number of “predicted” to the number of “expected” admissions per 100 person-years, multiplied by the national rate of admissions among all Medicare FFS patients with MCCs attributed to an ACO. All eligible ACO beneficiaries with MCCs are used in the measure score calculation, and a score is generated for each ACO.

1. Two-level, hierarchical statistical model, accounting for clustering of patients within ACOs and patient level characteristics, is estimated. The measure uses a negative binomial model with a log offset since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors by accounting for the association between patient risk factors and the outcome of admission estimated using all FFS patients eligible for the measure in the ACO. The second level of the model estimates a random-intercept term that reflects the ACO's contribution to admission risk, based on its actual admission rate, the performance of other providers with similar case mix, and its sample size. The ACO-specific random intercept is used in the numerator calculation to derive an ACO-specific number of “predicted” admissions per person-year.



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2. The expected number of admissions is calculated from the model and based on the ACO's case mix and national average intercept among all ACOs.
3. The predicted number of admissions is calculated from the model and based on the ACO's case mix and the estimated ACO-specific intercept term.
4. The measure score is the ratio of predicted number of admissions over the expected number of admissions multiplied by the crude national admission rate among all ACO patients eligible for the measure. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering, provider-specific performance and sample-size variation.
5. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per 100 person-years at risk for hospitalization, for ease of interpretation (RSAAR).

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