

# ACO #38 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions

Measure Information Form (MIF)

## DATA SOURCE

- Medicare inpatient claims
- Medicare outpatient claims (Hospital outpatient and Part B Carrier claims)
- Medicare beneficiary enrollment data
- Accountable Care Organization (ACO) assignment file

## MEASURE SET ID

ACO #38

## EFFECTIVE DATE

01/01/2019

## NQF ID

#2888

## CARE SETTING

Hospital

## UNIT OF MEASUREMENT

ACO

## MEASUREMENT DURATION

Calendar Year

## MEASUREMENT PERIOD

Calendar Year

## MEASURE TYPE

Outcome

## **MEASURE SCORING**

Risk-standardized acute admission rate (RSAAR)

## **PAYER SOURCE**

Medicare fee-for-service (FFS)

## **IMPROVEMENT NOTATION**

Lower RSAAR scores indicate better quality.

## **MEASURE STEWARD**

Centers for Medicare & Medicaid Services (CMS)

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This quality measure was developed for CMS by Yale New Haven Hospital Health Services Corporation Center for Outcomes Research and Evaluation (CORE) in 2014.

## **MEASURE DESCRIPTION**

Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) beneficiaries 65 years and older with multiple chronic conditions (MCCs) who are assigned to the Accountable Care Organization (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 designed to help fill that gap as called for in NQF's "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 illness requiring admission in several ways:

1. Provide optimal and accessible chronic disease management to reduce catastrophic sequelae of chronic disease. For example:
  - a. Support healthy lifestyle behaviors and optimize medical management to minimize the risk for cardiovascular events such as stroke and heart attacks.
  - b. Carefully monitor and act early to address chronic problems that require major interventions if allowed to progress (for example, 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:
  - a. Closely monitor renal function in patients on diuretic therapy for heart failure and chronic kidney disease.
  - b. Minimize polypharmacy to reduce drug-drug and drug-disease interactions.
  - c. 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:
  - a. Promptly prescribe antibiotics for presumed bacterial pneumonia and diuretic treatment for fluid overload in heart failure.
  - b. Empower patients to recognize symptoms and to seek timely care.
  - c. Create accessible care options for patients (for example, weekend or evening hours; capacity to deliver intravenous medications).
5. Partner with the government, local businesses, and community organizations to improve support for patients with chronic illness. For example:
  - a. Collaborate with home nursing programs.
  - b. Partner with local businesses to increase opportunities to engage in healthy lifestyle behaviors.
  - c. 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). Demonstrated strategies include improving access to care; supporting self-care in the home; better coordinating care across providers; and integrating social work, nursing, and medical services.

### CLINICAL RECOMMENDATION STATEMENT

The rationale for measuring acute, unplanned admissions for ACO 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 voluntarily 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 fee-for-service providers through strengthening preventive care, delivering better coordinated and 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 (Chan et al., 2012; Dorr et al., 2008; Levine et al., 2012; Littleford & Kralik, 2010; Sommers et al., 2000; Zhang et al., 2008). Demonstrated strategies include improving access to care; supporting self-care in the home; better coordinating care across providers; and integrating social work, nursing, and medical services. It is our vision that this measure will 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.

### RELEASE NOTES / SUMMARY OF CHANGES

The planned admission algorithm was revised to align with the planned readmission algorithm (PRA) v4.0\_2019. Changes include:

- Revisions to the Agency for Healthcare Quality and Research (AHRQ) Clinical Classification Software (CCS) procedure groups and codes considered potentially planned (see worksheet MCC PAA PA3 in the value set document):
  - Added:

- 13 AHRQ CCS procedure groups to the set of potentially planned procedures (Procedure CCS 2, 42, 94, 123, 125, 147, 148, 160, 161, 164, 202, 211, 224)
- 49 individual ICD-10-PCS codes within procedure CCS 163 “Other non-OR therapeutic procedures on musculoskeletal system” that reflect potentially planned procedures
- 74 individual ICD-10-PCS codes within procedure CCS 174 “Other non-OR therapeutic procedures on skin subcutaneous tissue fascia and breast” that reflect potentially planned procedures
- Six individual ICD-10-PCS codes within procedure CCS 63 “Other non-OR therapeutic cardiovascular procedures” that reflect potentially planned procedures
- Six individual ICD-10-PCS codes within procedure CCS 95 “Other non-OR lower GI therapeutic procedures” that reflect potentially planned procedures
- 14 individual ICD-10-PCS codes within procedure CCS 96 “Other OR lower GI therapeutic procedures” that reflect potentially planned procedures
- 17 individual ICD-10-PCS codes within procedure CCS 98 “Other non-OR gastrointestinal therapeutic procedures” that reflect potentially planned procedures
- Removed:
  - One AHRQ CCS procedure group (CCS 49 “Other OR heart procedures”) but added a subset of 957 codes within this CCS to the individual codes section that are considered potentially planned
  - Nine individual ICD-10-PCS codes within procedure CCS 42 “Other OR Rx procedures on respiratory system and mediastinum” that are no longer considered potentially planned
- Revisions to the set of AHRQ diagnosis CCS groups and individual diagnosis codes considered acute (see Table ACO PAA PA4 Value Set):
  - Added:
    - One AHRQ CCS diagnosis group CCS 210 “Systemic lupus erythematosus and connective tissue disorders” that is considered acute
    - Three individual codes within CCS 100 “Acute myocardial infarction (without subsequent MI)” that are considered acute
    - Seven individual codes within CCS 108 “Congestive heart failure; nonhypertensive” that are considered acute
    - Eight individual codes within CCS 133 “Other lower respiratory disease” that are considered acute
    - 28 individual codes within CCS 50 “Diabetes mellitus with complications” that are considered acute
  - Removed:
    - 16 whole diagnosis (Dx) CCS groups (226, 227, 229, 233, 234, 235, 238, 239, 240, 241, 242, 243, 244, 253, 661, 662), but added subsets of codes within these CCS groups (typically representing ‘initial’ encounters, but not subsequent or sequela) to the individual code section

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- Three individual codes within CCS 108 “Congestive heart failure; nonhypertensive” that are not considered acute
- Revisions to the MCC cohort for v2019 to align with the most recently posted CCW code set from June 2018 (<https://www.ccwdata.org/web/guest/condition-categories>) (see the ‘MCC cohort’ tab in the code set document for specific codes):
  - Added:
    - Two codes to the AMI chronic condition
    - three codes to the chronic kidney disease (CKD) chronic condition, and removed four codes<sup>1</sup>
    - Two codes to the depression chronic condition
    - Nine codes to the heart failure chronic condition
    - Six codes to the stroke/TIA chronic condition
  - Removed:
    - Two codes from the Alzheimer's disease and related disorders or senile dementia chronic condition
    - Three asthma codes from the COPD and asthma chronic condition
    - Three codes from the stroke cohort<sup>2</sup> and removed 32 codes from stroke chronic condition exclusions list<sup>3</sup>
- Revisions to the MCC risk factors in v2019 as follows:
  - 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 the ‘MCC risk factor CCs’ tab in the code set file)
- Seven codes were added to the ‘pulmonary heart disease’ risk factor and one code non-billable code was removed from this risk factor (see the ‘MCC risk factors ICD10’ tab in the code set file)
- The ICD-10 diagnosis code to CMS-CC crosswalk can be found here: <https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors.html?DLSort=0&DLEntries=10&DLPage=1&DLSortDir=descending>

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<sup>1</sup> Note that three of the codes that were removed from the CKD cohort (for diabetes with hyperglycemia) remain in the CCW definition but were removed for the MCC measure because they do not on their own represent chronic kidney disease.

<sup>2</sup> Note that the three codes remain in the CCW definition but were removed for the MCC measure because they are not billable effective October 1, 2016.

<sup>3</sup> Note that these 32 codes remain in the CCW definition but were removed for the MCC measure because they are invalid.

## TECHNICAL SPECIFICATIONS

### TARGET POPULATION

ACO-assigned or aligned 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 eight chronic disease groups:

- Acute myocardial infarction (AMI)
- Alzheimer’s disease and related disorders or senile dementia
- Atrial fibrillation
- Chronic kidney disease (CKD)
- Chronic obstructive pulmonary disease (COPD) and asthma
- Depression
- Heart failure
- Stroke and transient ischemic attack (TIA)

This approach captures approximately 25% of Medicare FFS beneficiaries aged 65 years and older with at least one chronic condition (about five million patients in 2012).

The eight 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 tab in the Value Set identifies the claim algorithms and the specific International Classification of Diseases, Tenth Revision (ICD-10) codes for each of the eight chronic disease groups. The codes in the MCC Cohort tab reflect updates to the CCW code set to add new FY 2018 ICD10 codes effective October 1, 2017 (posted November 2017).

To be included in the cohort, beneficiaries must also be enrolled full-time in both Medicare Part A and B during the year prior to the measurement period. This requirement for full enrollment in Medicare Part A & 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 Part A and B during the year prior to the measurement year.  
*Rationale:* This data is needed to attribute chronic conditions to beneficiaries.
2. Beneficiaries that do not have 12 months continuous enrollment in Medicare Part A during the measurement year. Beneficiaries who become deceased during the measurement period are excluded if they do not have continuous enrollment in Medicare Part A until death (i.e. the 12-month requirement is relaxed for these beneficiaries). Beneficiaries with continuous enrollment until death are excluded after the time of death.  
*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 during the year are included only for the time they are alive.

## DENOMINATOR EXCEPTIONS AND EXCLUSIONS DETAILS

1. Beneficiaries without continuous enrollment in Medicare Part A and B during the year prior to the measurement year. Lack of continuous enrollment in Medicare Part A and B is determined by patient enrollment status in the Medicare Denominator File. The enrollment indicators must be appropriately marked during the year prior to the measurement year.
2. Beneficiaries without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death) are excluded. Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement year.

## NUMERATOR

### NUMERATOR STATEMENT

The outcome measured for each beneficiary is the number of acute unplanned admissions per 100 person-years at risk for admission. Persons are considered at risk for admission if they are alive, enrolled in FFS Medicare, and not currently admitted to an acute care hospital.

### NUMERATOR DETAILS

#### *Outcome Definition*

The outcome for this measure is the number of acute unplanned admissions per 100 person-years at risk for admission. The outcome includes inpatient admissions to an acute care hospital for any cause during the measurement year, unless an admission is identified as “planned.”

### *Identification of Planned Admissions*

The measure outcome includes only unplanned admissions. 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. 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 identifies a short list of always planned admissions (that is, those where the principal discharge diagnosis or procedure is major organ transplant or maintenance chemotherapy; See MCC PAA PA1 and MCC PAA PA2 Value Sets) as well as those admissions with a potentially planned procedure (for example, total hip replacement or cholecystectomy; See MCC PAA PA3) AND a non-acute principal discharge diagnosis code (See MCC PAA PA4 for acute diagnoses). Admissions that include potentially planned procedures that might represent complications of ambulatory care, such as cardiac catheterization, are not considered planned.

### *Outcome Attribution*

The outcome is attributed to the ACO to which the beneficiary is assigned in the Shared Savings Program or aligned in the Next Generation ACO Model.

## **STRATIFICATION OR RISK ADJUSTMENT**

### **STRATIFICATION**

Not applicable. This measure is not stratified.

### **RISK ADJUSTMENT**

We use a two-level, hierarchical, negative, binomial model 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 clinical 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-standardization model has 44 variables: age, each of the eight chronic disease groups, and 35 comorbidity variables. We define clinical variables primarily using CMS's Condition Categories version 22 (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 eight 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.

The risk-adjustment variables are:

*Demographic*

- Age (continuous variable)

*Eight chronic disease groups*

- AMI
- Alzheimer's disease and related disorders or senile dementia
- Atrial fibrillation
- CKD
- COPD and asthma
- Depression
- Heart failure
- Stroke and TIA

*Clinical comorbidities defined using Version 22 CCs or ICD-10 codes*

- Dialysis status (CC 134)
- Respiratory failure (CC 82, 83, 84)
- Advanced liver disease (CC 27 [remove ICD-10 K767], CC 28, 29, 30)
- Pneumonia (CC 114, 115, 116)
- Septicemia/shock (CC 2)
- Marked disability/frailty (CC 21, 70, 71, 73, 157, 158, 159, 160, 161, 189, 190)
- Pleural effusion/pneumothorax (CC 117)
- Hematological diseases (CC 46 [remove ICD-10 D593], CC 48)
- Advanced cancer (CC 8, 9, 10, 13)
- Infectious and immunologic diseases (CC 1, 3, 4, 5 [remove ICD-10 A1811], CC 6, 47, 90)
- Severe cognitive impairment (CC 50 [remove ICD-10 F05, F061, F068], CC 80, 64, 65)
- Major organ transplant status (CC 132, 186)
- Pulmonary heart disease (ICD-10 I2601, I2602, I2609, I270, I271, I2720, I2721, I2722, I2723, I2724, I2729, I2783, I2789, I2781, I279, I280, I281, I288, I289)
- Cardiomyopathy (ICD-10 I420, I421, I422, I425, I426, I427, I428, I429, I43, I514, I515)
- Gastrointestinal disease (CC 31, 32, 33, 35, 36)
- Bone/joint/muscle infections/necrosis (CC 39)

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- Iron deficiency anemia (CC 49)
- Diabetes with complications (CC 17, 18 [remove ICD-10 E0821, E0822, E0829, E0921, E0922, E0929, E1021, E1022, E1029, E1121, E1122, E1129, E1321, E1322, E1329], CC 19, 122, 123)
- Ischemic heart disease except AMI (CC 87, 88, 89, 98 add ICD-10 I511, I512)
- Other lung disorders (CC 112 [remove ICD-10 J470, J471, J479], CC 118)
- Vascular or circulatory disease (CC 106, 107, 108, 109 [remove ICD-10 I701, I722])
- Other significant endocrine disorders (CC 23 (remove ICD-10 E748, N251, N2581))
- Other disability and paralysis (CC 72, 74, 103, 104, 119)
- Substance abuse (CC 54, 55, 56)
- Pancreatic disease (CC 34)
- Other neurologic disorders (CC 75, 77, 78, 79, 81, 105)
- Arrhythmia (except atrial fibrillation) (CC 96 [remove ICD-10 I480, I481, I482, I4891] and CC 97)
- Hypertension (CC 95)
- Hip or vertebral fracture (CC 169, 170)
- Lower-risk cardiovascular disease (CC 91, 92, 93)
- Cerebrovascular disease (CC 102 [remove ICD-10 G463, G464, G465, G466, G467, G468, I6789])
- Other malignancy (CC 11 [Remove ICD-10 C641, C642, C649, C689], CC 12)
- Morbid obesity (ICD-10 Z6835, Z6836, Z6837, Z6838, Z6839, Z6841, Z6842, Z6843, Z6844, Z6845, E6601)
- Urinary disorders (CC 142 [remove ICD-10 N131, N132, N1330, N1339, Q620, Q6210, Q6211, Q6212, Q622, Q6231, Q6232, Q6239], CC 145 [remove ICD-10 N2589, N259, N261, N269, Q6102, Q612, Q613, Q614, Q615, Q618])
- Psychiatric disorders other than depression (CC 57, 59, 60, 62, 63 [remove ICD-10 F4321, F4323])

## 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 crude number of admissions per 100 person-years among all ACO beneficiaries with MCCs. 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 models, accounting for clustering of patients within ACOs and patient level characteristics, are 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 fee-for-service MCC patients 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.
2. The expected number of admissions is calculated from the model and based on the ACO’s case mix and national average intercept.
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. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering 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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