

Measure Information for the Clinician and Clinician Group Risk-standardized Hospital Admission Rates for Patients with Multiple Chronic Conditions

Version History

PY2022 MIPS MCC MIF v1 – Submitted 12/27/2021

PY2022 MIPS MCC MIF v2 – Submitted 02/11/2022

- Changes:
 - Exclusion of admissions with COVID-19 as a principal discharge diagnosis from the outcome ([page 6](#)).

A. Measure Name

Clinician and Clinician Group Risk-standardized Hospital Admission Rates for Patients with Multiple Chronic Conditions.

B. Measure Description


The measure is an annual risk-standardized rate of acute, unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients aged 65 years and older with multiple chronic conditions (MCCs; i.e., two or more of nine qualifying chronic conditions). The measure is adjusted for age, chronic condition categories, and other clinical and frailty risk factors present at the start of the 12-month measurement period as well as social risk factors. The measure attributes admissions to MIPS participating clinicians or clinician groups, as identified by their Medicare Taxpayer Identification Number (TIN). The measure is calculated for MIPS TINs with at least 16 clinicians per group and a case minimum of at least 18 patients with MCCs. Lower measure scores indicate better performance.

This clinician and clinician group measure has a National Quality Forum (NQF) ID: #3597.

C. Rationale

Hospital admission rates are an effective marker of ambulatory care quality. Hospital admissions from the outpatient setting reflect a deterioration in patients' clinical status





and as such reflect an outcome that is meaningful to both patients and providers. Patients receiving optimal, coordinated high-quality care should use fewer inpatient services than patients receiving fragmented, low-quality care. Thus, high population rates of hospitalization may signal poor quality of care or inefficiency in health system performance. Furthermore, these effects may be exacerbated in disadvantaged areas. [\[1\]](#)

Patients with MCCs are at high risk for hospital admission, often for potentially preventable causes, such as exacerbation of pulmonary disease. [\[2\]](#) Evidence from several Medicare demonstration projects suggests that care coordination results in decreased hospital admission rates among high-risk patients. [\[3\]](#) In addition, studies have shown that the types of ambulatory care clinicians this measure targets (for example, primary care providers and specialists caring for patients with MCCs) can influence admission rates through primary care clinician supply, continuity of care, medication prescribing and dispensing interventions, as well as patient-centered medical home interventions such as team-based care, home visits, and patient-oriented care. [\[4-11\]](#) Other studies speak directly to the positive effect that individual providers and group practices can have on lowering patients' hospital visit rates. In particular, they support that comprehensive and continuous care by individual providers can decrease care utilization. [\[12-13\]](#)


Ultimately, the goal of this measure is to illuminate variation among MIPS clinicians and clinician groups in hospital admission rates for patients with MCCs and incentivize them to expand efforts to develop and implement efficient and coordinated chronic disease management strategies that anticipate and respond to patients' needs and preferences.

D. Measure Outcome (Numerator)

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


The planned admission algorithm was based 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:

- A procedure is performed that is in one of the procedure categories that are always planned regardless of diagnosis (please see Table MIPS MCC PAA1 in the Data Dictionary).
 - The principal diagnosis is in one of the diagnosis categories that are always planned (please see Table MIPS MCC PAA2 in the Data Dictionary).
 - A procedure is performed that is in one of the potentially planned procedure categories (or partial categories; please see Table MIPS MCC PAA3 in the Data Dictionary) and the principal diagnosis is not in the list of acute discharge diagnoses (please see Table MIPS MCC PAA4 in the Data Dictionary).
2. Admissions that occur directly from a skilled nursing facility (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" 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 ambulatory care providers accountable for admissions in this time frame. 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 to 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 Agency for Healthcare and Research (AHRQ) Clinical Classifications Software (CCS) diagnosis categories:

- 145: Intestinal obstruction without hernia
- 237: Complication of device; implant or graft
- 238: Complications of surgical procedures or medical care
- 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
- 2620 E Codes: Unspecified
- 2621 E Codes: Place of occurrence

7. Admissions that occur prior to the first visit with the assigned clinician or clinician group.

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

8. Admissions with a principal discharge diagnosis of COVID-19.



Rationale: These admissions are unrelated to the quality of ambulatory care and the management of patients' chronic conditions.

This measure excludes the following International Classification of Diseases, Tenth Revision Clinical Modification (ICD-10-CM) code:


- U07.1: COVID-19

E. Population Measured (Denominator)

The cohort, or group of patients included in the measure, is comprised of Medicare FFS beneficiaries 65 years or older whose combinations of chronic conditions put them at high risk of admission and whose admission rates could be lowered through better care. This definition reflects 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." [\[14\]](#)

The specific inclusion criteria are as follows.

1. Patient is alive at the start of the measurement period and has two or more of nine chronic condition disease groups in the year prior to the measurement period:
 - 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
 - Diabetes
 - Heart failure
 - Stroke and transient ischemic attack (TIA)



The nine disease groups are defined using data from the Integrated Data Repository in combination with algorithms for nine chronic condition categories. Eight of the nine categories (all but diabetes (#7)), are based on those used in CMS's Chronic Conditions Data Warehouse (CCW). [15] One cohort combines two CCW categories into a single chronic disease group—COPD and asthma. The MCC Cohort tab in the Data Dictionary identifies the claim algorithms, lookback period, 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 MCC cohort for 2022 reporting are based on ICD-10 codes newly released in October 2021.

Rationale: As noted above, this definition of MCCs is consistent with NQF's "Multiple Chronic Conditions Measurement Framework." This measure has been vetted nationally and published in the literature. [16] In brief, it reflects the chronic conditions that most increased risk of admission.

2. Patient is aged ≥ 65 years at the start of the year prior to the measurement period.

Rationale: Younger Medicare patients represent a distinct population with dissimilar characteristics and outcomes. Additionally, these patients tend to cluster among certain providers. These factors make risk adjustment difficult.

3. Patient is a Medicare FFS beneficiary with continuous enrollment in Medicare Parts A and B during the year prior to the measurement period.


Rationale: Enrollment is necessary to provide clinical information for cohort identification and risk adjustment.

F. Exclusions

The measure excludes the following patients from the denominator:

- Patients without continuous enrollment in Medicare Part A or B during the measurement period.
- Patients who were in hospice at any time during the year prior to the measurement year or at the start of the measurement year.
- Patients who had no Evaluation & Management (E&M) visits to a MIPS-eligible clinician type.
- Patients assigned to clinician who achieve QP status and therefore do not participate in MIPS.
- Patients attributed to hematologists and oncologists.

G. Data Collection Approach and Measure Collection



This measure is calculated from Medicare inpatient claims, Medicare outpatient claims (hospital outpatient and Part B Carrier claims), Medicare beneficiary enrollment data, Durable Medical Equipment claims, the American Community Survey, and the Area Health Resource Files.

H. Methodological Information and Measure Construction

Attribution. The measure uses a visit-based approach to attribute patients to a primary care provider (PCP) or a specialist who typically coordinates or “quarterbacks” care for MCC patients included in the measure.


Provider types included for measurement:

- Primary care providers (PCPs): CMS designates PCPs as physicians who practice internal medicine, family medicine, general medicine, or geriatric medicine, and non-physician providers, including nurse practitioners, certified clinical nurse specialists, and physician assistants.
- Relevant specialists: Specialists covered by the measure are limited to those who provide overall coordination of care for patients with MCCs and who manage the chronic diseases that put the MCCs patients in the measure at risk of admission. These specialists were chosen with input from our Technical Expert Panel (TEP) and include cardiologists, pulmonologists, nephrologists, neurologists, endocrinologists, and hematologists/oncologists (see definitions in the Data Dictionary MIPMCC Attribution Providers). However, as noted above in Section F, the measure is not designed to assess the quality of care of cancer specialists who are actively managing cancer patients, and thus patients attributed to hematologists and oncologists are excluded from the measure.

Patient Attribution:

We begin by assigning each patient to the clinician most responsible for the patient’s care using the number and pattern of Evaluation & Management (E&M) visits (see Data Dictionary tab MIPSMCC Attribution E&M). The patient can be assigned to a PCP, a relevant specialist, or can be left unassigned.

- A patient who is eligible for attribution can be assigned to a relevant specialist only if the specialist has been identified as “dominant”. A specialist is considered “dominant” if they have two or more visits with the patient, as well as at least two more visits than any PCP or other relevant specialist. For example, if a patient saw a cardiologist four times in the measurement year, a PCP twice, and a nephrologist twice, the patient would be assigned to the cardiologist, having met the definition of “dominant” specialist. Note: Hematologists and oncologists are



considered relevant specialists as they could be expected to manage MCCs patients' care, especially during periods of acute cancer treatment. However, as indicated above in Section F, the measure is not designed to assess the quality of care of cancer specialists who are actively managing cancer patients, and thus patients attributed to hematologists and oncologists are excluded from the measure.

- There are two scenarios where a patient can be assigned to a PCP. First, the patient must have seen at least one PCP. The patient will then be assigned to the PCP with the highest number of visits as long as there is no relevant specialist who is considered “dominant.” Second, if the patient has had more than one visit with a relevant specialist but no “dominant” specialist has been identified, and has two or more visits with a PCP, they will be assigned to that PCP.
- Finally, the patient will be unassigned if they only saw non-relevant specialists, if the patient has not seen a PCP and no “dominant” specialist can be identified, or if the patient has not had more than one visit with any individual PCP.


Patients are then assigned at the Taxpayer Identification Number (TIN) level, which includes solo clinicians and groups of clinicians who have chosen to report their quality under a common TIN.

- At the TIN level, patients are first assigned to the clinician (unique National Provider Identifier (NPI)/TIN combination since a given provider can be affiliated with more than one TIN) most responsible for their care (using the algorithm for individual clinician-level attribution above) and then patients “follow” their clinician to the TIN designated by the clinician. Patients unassigned at the individual clinician level continue to be unassigned at the TIN level.

Person-time at risk:

Persons are considered at risk for hospital admission if they are alive, enrolled in FFS Medicare, and not in the hospital during the measurement period. 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 discharge from a hospital, SNF, or acute rehabilitation facility; and 3) time after entering hospice care.

Calculation Algorithm/Measure Logic. The cohort of MCCs patients is identified first by applying the inclusion/exclusion criteria. The attribution algorithm is then applied to assign patients to TINs. Patients are assigned to the individual clinician most responsible for their care, and then subsequently to the TIN designated by the clinician, using the visit-based attribution algorithm. Attribution is done in the measurement period and only patients assigned to a MIPS-eligible clinician will be included in the measure score calculation. The number of admissions and time at risk



in the measurement period are then calculated for each patient based on the measure specifications. The measure is risk adjusted for demographic, clinical, and social risk factors.

For the score calculation, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within MIPS providers and accommodates the varying patient sample sizes of different providers. The measure uses a negative binomial with linear variance (NB-1) model since the measure's outcome is a count of the number of admissions for MCCs patients during the measurement period.

The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admissions is determined based on all patients attributed to MIPS-eligible clinicians. Therefore, the “expected” number of admissions (described below) for each provider is based on the performance of all eligible MIPS providers nationwide.

The second level of the model estimates a random-intercept term that reflects the provider's contribution to admission risk, based on their actual admission rate, the performance of other providers, their case mix, and their sample size.

The measure score is a risk-standardized acute admission rate (RSAAR), calculated as the ratio of the number of predicted admissions to the number of expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed over expected ratio, but the numerator accounts for clustering, sample-size variation, and provider-specific performance. The expected number of admissions is calculated based on the provider's case mix and average intercept among all MIPS providers. The predicted number of admissions is calculated based on the provider's case mix and the estimated provider-specific random intercept term. The predicted to expected ratio is then multiplied for each provider by a constant – the crude rate of acute, unplanned admissions among all MIPS providers – for ease of interpretation.

Risk Adjustment. 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. Clinical variables are defined primarily using CMS's Condition Categories (CCs) version 24, 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, those ICD-10 codes were removed 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 tabs in the Data Dictionary: MIPS MCC All Risk Vars, MIPS MCC RVs defined by ICD10s, MIPS MCC RVs defined by Pol Grp, MIPS MCC CC to ICD Map.



The risk adjustment variables are as follows:

Demographic

- Age (categorical variable, <70, 70–75, 75–80, 80–85, >85)

Nine chronic disease groups

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

Clinical comorbidities defined using version 24 CCs or ICD-10 codes

- Dialysis status (CC 134)
- Respiratory failure (CC 82, CC 83, CC 84)
- Advanced liver disease (CC 27 [remove ICD-10-CM diagnosis code K767], CC 28, CC 29, CC 30)
- Pneumonia (CC 114, CC 115, CC 116)
- Septicemia/shock (CC 2)
- Hematological diseases (CC 46 [remove ICD-10-CM diagnosis code D593], CC 48)
- Advanced cancer (CC 8, CC 9, CC 10, CC 13)

- Infectious and immunologic diseases (CC 1, 3, 4, 5 [remove ICD-10-CM diagnosis code A1811], CC 6, CC 47, CC 90)
- Severe cognitive impairment (CC 50 [remove ICD-10-CM diagnosis codes F05, F061, F068], CC 80, CC 64, CC 65)
- Major organ transplant status (CC 132, CC 186)
- Pulmonary heart disease (ICD-10-CM diagnosis codes I26.01, I26.02, I26.09, I26.90, I26.92, I26.93, I26.94, I26.99, I27.0, I27.1, I27.20, I27.21, I27.22, I27.23, I27.24, I27.29, I27.83, I27.89, I27.81, I27.9, I28.0, I28.1, I28.8, I28.9)
- Cardiomyopathy (ICD-10-CM diagnosis codes I420, I421, I422, I425, I426, I427, I428, I429, I43, I514, I515)
- Gastrointestinal disease (CC 31, CC 32, CC 33, CC 35, CC 36)
- Iron deficiency anemia (CC 49)
- Ischemic heart disease except AMI (CC 87, CC 88, CC 89, CC 98, ICD-10-CM diagnosis codes I51.1, I51.2)
- Liver disease (CC 27 [remove ICD-10-CM diagnosis code K76.7], 28, 29, 30)
- Other lung disorders (CC 112 [remove ICD-10-CM diagnosis codes J47.0, J47.1, J47.9], CC 118 [remove ICD-10-CM diagnosis code J40])
- Vascular or circulatory disease (CC 106 [remove ICD-10-CM diagnosis codes E10.52, E11.52], CC 107, CC 108 [remove ICD-10-CM diagnosis codes I70.1, I72.2, E10.51, E11.51, E13.51], CC 109)
- Other significant endocrine disorders (CC 23 [remove ICD-10-CM diagnosis codes E74.8, N25.1, N258.1])
- Other disability and paralysis (CC 72, 74, 119; sub-set of CC 103 (ICD-10-CM diagnosis codes G81.00, G81.01, G81.02, G81.03, G81.04, G81.10, G81.11, G81.12, G81.13, G81.14, G81.90, G81.91, G81.92, G81.93, G81.94); sub-set of CC 104 (ICD-10-CM diagnosis codes G83.0, G83.10, G83.11, G83.12, G83.13, G83.14, G83.20, G83.21, G83.22, G83.23, G83.24, G83.30, G83.31, G83.32, G83.33, G83.34, G83.5, G83.81, G83.82, G83.83, G83.84, G83.89, G83.9))
- Substance abuse (CC 54, CC 55, CC 56, CC 202, CC 203)

- Other neurologic disorders (CC 75, CC 77, CC 78, CC 79, CC 81, sub-set of CC 105 (ICD-10-CM diagnosis codes H53.461, H53.462, H53.469, H53.47, R41.4, R47.01))
- Arrhythmia (except atrial fibrillation) (CC 96 [remove ICD-10 diagnosis codes I48.0, I48.1, I48.2, I48.91, I48.11, I48.19, I48.20, I48.21], CC 97))
- Hypertension (CC 95)
- Hip or vertebral fracture (CC 169, CC 170)
- Lower-risk cardiovascular disease (CC 91, CC 92, CC 93)
- Cerebrovascular disease (CC 102 [remove ICD-10-CM diagnosis codes G46.3, G46.4, G46.5, G46.6, G46.7, G46.8, I678.9])
- Morbid obesity (ICD-10-CM diagnosis codes Z68.35, Z68.36, Z68.37, Z68.38, Z68.39, Z68.41, Z68.42, Z68.43, Z68.44, Z68.45, E66.01)
- Urinary disorders (CC 142 [remove ICD-10-CM diagnosis codes N13.1, N13.2, N13.30, N13.39, Q62.0, Q62.10, Q62.11, Q62.12, Q62.2, Q62.31, Q62.32, Q62.39] and 145 [remove ICD-10-CM diagnosis codes N25.89, N25.9, N26.1, N26.9, Q61.02, Q61.2, Q61.3, Q61.4, Q61.5, Q61.8])
- Psychiatric disorders other than depression (CCs 57, 58, 60, 62, 63 [remove ICD-10-CM diagnosis codes F43.21, F43.23])
- 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)

Measures of disability/frailty (defined using Policy Group Maps for Durable Medical Equipment maintained by Palmetto GBA under contract to CMS, or original reason for Medicare entitlement)

- Hospital bed (Policy Group Maps 250)
- Lifts (Policy Group Maps 430 and 460)
- Original reason for entitlement: disability insurance beneficiary
- Original reason for entitlement: end-stage renal disease
- Oxygen (Policy Group Map 400)

- Walking aids (Policy Group Maps 140 and 590)
- Wheelchairs (Policy Group Maps 602, 603, 604, 606)

Social risk factors

- Low AHRQ Socioeconomic Status (SES) Index (lowest quartile)


The AHRQ SES Index is a widely used variable that summarizes area-level measures of employment, income, education, and housing. [\[17\]](#) Each of the Index components is available at the census-block level, which are then used to link to patient's residence using a nine-digit ZIP code. Census variables are found in the American Community Survey. The AHRQ SES Index score summarizes information from the following variables:

- Percentage of people in the labor force who are unemployed
- Percentage of people living below poverty level
- Median household income
- Median value of owner-occupied dwellings
- Percentage of people ≥ 25 years of age with less than a 12th-grade education
- Percentage of people ≥ 25 years of age completing ≥ 4 years of college
- Percentage of households that average ≥ 1 people per room
- Low area-level density of physician specialists (lowest quartile)

Case thresholds for measure reporting. As noted in the 2022 Quality Payment Program Final Rule, MIPS eligible groups, subgroups*, virtual groups, and APM Entities with at least 16 clinicians per group and with 18 attributed patients with MCCs as the case minimum will be scored on this administrative claims-based measure.

*Subgroups are only available through MVP reporting. All measure-specific criteria must be met by the subgroup.

I. Further Information



To access additional measure specifications, please visit
<https://qpp.cms.gov/about/resource-library>.

J. References

1. Jencks, S. F., et al. (2019). "Safety-Net Hospitals, Neighborhood Disadvantage, and Readmissions Under Maryland's All-Payer Program: An Observational Study." *Ann Intern Med*. doi: 10.7326/M16-2671
2. Abernathy K, Zhang J, Mauldin P, et al. Acute Care Utilization in Patients With Concurrent Mental Health and Complex Chronic Medical Conditions. *J Prim Care Community Health*. 2016;7(4):226-233.
3. Brown RS, Peikes D, Peterson G, Schore J, Razafindrakoto CM. Six features of Medicare coordinated care demonstration programs that cut hospital admissions of high-risk patients. *Health Aff (Millwood)*. 2012;31(6):1156-1166.
4. van Loenen T, van den Berg MJ, Westert GP, Faber MJ. Organizational aspects of primary care related to avoidable hospitalization: a systematic review. *Fam Pract*. 2014;31(5):502-516.
5. Dale SB, Ghosh A, Peikes DN, et al. Two-Year Costs and Quality in the Comprehensive Primary Care Initiative. *N Engl J Med*. 2016;374(24):2345-2356.
6. Casalino LP, Pesko MF, Ryan AM, et al. Small primary care physician practices have low rates of preventable hospital admissions. *Health Aff (Millwood)*. 2014;33(9):1680-1688
7. Matzke GR, Moczygemba LR, Williams KJ, Czar MJ, Lee WT. Impact of a pharmacist–physician collaborative care model on patient outcomes and health services utilization. *American Journal of Health-System Pharmacy*. 2018;75(14):1039-1047

8. Ruiz S, Snyder LP, Rotondo C, Cross-Barnet C, Colligan EM, Giuriceo K. Innovative Home Visit Models Associated With Reductions In Costs, Hospitalizations, And Emergency Department Use. *Health Affairs*. 2017;36(3):425-432
9. Edwards ST, Saha S, Prentice JC, Pizer SD. Preventing Hospitalization with Veterans Affairs Home-Based Primary Care: Which Individuals Benefit Most? *Journal of the American Geriatrics Society*. 2017;65(8):1676-1683
10. Krumme AA, Glynn RJ, Schneeweiss S, et al. Medication Synchronization Programs Improve Adherence To Cardiovascular Medications And Health Care Use. *Health Aff (Millwood)*. 2018;37(1):125-133. doi:10.1377/hlthaff.2017
11. Gabriel M, Powers C, Encinosa W, Bynum J. E-Prescribing and Adverse Drug Events: An Observational Study of the Medicare Part D Population With Diabetes. *Medical care*. 2017;55
12. Bazemore, A., et al. (2018). "Higher Primary Care Physician Continuity is Associated With Lower Costs and Hospitalizations." *Ann Fam Med*. 16(6): 492-497.
13. O'Malley, A. S., et al. (2019). "New approaches to measuring the comprehensiveness of primary care physicians." *Health Serv Res*. 54(2): 356-366.
14. National Quality Forum. Multiple Chronic Conditions Measurement Framework. <http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=71227>. Accessed February 20, 2019.
15. Krumholz, H. M., Brindis, R. G., Brush, J. E., Cohen, D. J., Epstein, A. J., Furie, K., Howard, G., Peterson, E. D., Rathore, S. S., Smith, Jr., S. C., Spertus, J. A., Wang, Y., & Normand, S. L. (2006). Standards for statistical models used for public reporting of health outcomes: An American Heart Association scientific statement from the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council. *Circulation*, 113(3), 456–462. <https://dx.doi.org/10.1161/CIRCULATIONAHA.105.170769>
16. Drye EE, Altaf FK, Lipska KJ, Spatz ES, Montague JA, Bao H, Parzynski CS, Ross JS, Bernheim SM, Krumholz HM, Lin Z. Defining Multiple Chronic Conditions for Quality Measurement. *Med Care*. 2018 Feb;56(2):193-201.
17. Bonito, A; Bann, C; Eicheldinger, C; Carpenter, L. Creation of New Race-Ethnicity Codes and Socioeconomic Status (SES) Indicators for Medicare Beneficiaries. Report prepared for Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services. January 2008. Available at: <https://archive.ahrq.gov/research/findings/final-reports/medicareindicators/medicareindicators.pdf>