NATIONAL QUALITY FORUM

Memo

August 1, 2016

TO: NQF Members and Public

FR: NQF Staff

RE: Commenting Draft Report: *All-Cause Admissions and Readmissions 2015-2017*

Background

This report reflects the review of measures in the Readmissions Project. Reducing avoidable admissions and readmissions to acute care facilities continues to be an important focus of quality improvement across the healthcare system. While there is no clear evidence on how many of these readmissions may be avoidable, estimates have ranged that anywhere from five percent to 79 percent may be preventable. While admission and readmission rates continue to decrease, it is imperative to ensure they do so safely and without adverse consequences for patients.

The Readmissions Standing Committee reviewed 17 measures; 16 were recommended for endorsement and 1 was not recommended for endorsement.

Recommended:

- 0171 Acute Care Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services)
- 0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services)
- 0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE))
- 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE))
- 1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE))
- 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)
- 2827 PointRight® Pro Long Stay(TM) Hospitalization Measure (PointRight)
- 2858 Discharge to Community (American Health Care Association)
- 2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF) (Health Services Advisory Group, Inc.)

- 2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE))
- 2880 Excess days in acute care (EDAC) after hospitalization for heart failure (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
- 2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI) (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
- 2882 Excess days in acute care (EDAC) after hospitalization for pneumonia (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
- 2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
- 2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
- 2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))

Not Recommended:

- 2884 30-Day Unplanned Readmissions for Cancer Patients (Alliance of Dedicated Cancer Centers (ADCC))

The Committee requests comments on all measures.

NQF Member and Public Commenting

NQF Members and the public are encouraged to provide comments via the online commenting tool on the draft report as a whole, or on the specific measures evaluated by the All-Cause Admissions and Readmissions Standing Committee.

Please note that commenting concludes on August 30, 2016 at 6:00 pm ET – no exceptions.

All-Cause Admissions and Readmissions 2015-2017

DRAFT REPORT FOR COMMENT

August 1, 2016

NATIONAL QUALITY FORUM

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All-Cause Admissions and Readmissions

DRAFT REPORT

Executive Summary

Reducing avoidable admissions and readmissions to acute care facilities continues to be an important focus of quality improvement across the healthcare system. Unnecessary hospitalizations can prolong a patient's illness, increase their time away from home and family, expose them to potential harms, and add to their costs. Avoidable admissions and readmissions also contribute significantly to the United States' high rate of healthcare spending. One estimate puts the cost of all-cause adult hospital readmissions at over 40 billion dollars annually. While there is no clear evidence on how many of these readmissions may be avoidable, estimates have ranged that any where from five percent to 79 percent may be preventable.[1] A 2013 MedPAC report suggests that reducing avoidable readmissions by 10 percent could achieve a savings of $1 billion or more.[2]

Currently, there are more than 46 NQF-endorsed admissions and readmissions. These measures have been adopted into a number of federal quality programs with the aim of reducing unnecessary admissions and readmissions by fostering improved care coordination across the healthcare system.

The impact of sociodemographic (SDS) factors on readmission measures continues to be an on-going question. As payment penalties attached to the use of readmission measures increase, questions have arisen about how to improve performance without disproportionately affecting safety net facilities serving the most vulnerable populations. To better understand these issues, NQF launched a two year trial period in April 2015 where measures can be evaluated for the potential need for SDS adjustment based on both conceptual and empirical evidence.

While admission and readmission rates continue to decrease, it is imperative to ensure they do so safely and without adverse consequences for patients. In particular, reducing admission and readmission rates should be balanced with monitoring of unintended consequences to ensure that patients are getting the care that they need.

For this project, the Standing Committee evaluated 11 newly-submitted measures and 6 measures undergoing maintenance review against NQF's standard evaluation criteria. Sixteen measures were recommended for endorsement.

The 16 measures that were recommended by the Standing Committee are:

- 0171 Acute Care Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services)
- 0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services)

- 0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE))
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- 2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))
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- 2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE))

The Standing Committee did not recommend the following measure:

- 2884 30-Day Unplanned Readmissions for Cancer Patients (Alliance of Dedicated Cancer Centers (ADCC))

Brief summaries of the measures currently under review are included in the body of the report; detailed summaries of the Standing Committee's discussion and ratings of the criteria for each measure are in Appendix A.

Introduction

Reducing unnecessary admissions and readmissions to acute care facilities has been a focus of healthcare quality improvement efforts. The Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) estimated that in 2011, there were approximately 3.3 million adult 30-day all-cause hospital readmissions in the United States.[3] It has been estimated that one in five Medicare beneficiaries are readmitted within 30 days of discharge.

These excess hospitalizations can negatively impact a patient's quality of life, forcing them to spend more time away from home and their families. Avoidable admissions and readmissions cause patients prolonged illness and pain, potential unnecessary exposure to harm, loss of productivity, inconvenience and added cost. Avoidable admissions and readmissions also burden the healthcare system with unnecessary costs. HCUP estimated that in 2011, 30-day adult all-cause hospital readmissions were associated with about $41.3 billion in hospital costs.

The causes of avoidable admissions and readmissions are complex and multi-factoral. Avoidable admissions and readmissions can be related to a lack of care coordination and poor discharge planning. However, the risk of readmission can also be impacted by environmental, community, and patient-level factors, including sociodemographic factors. The complex causes of avoidable admissions and readmissions means that providers across the healthcare system including hospitals, skilled nursing facilities, and clinicians in the community must work together to ensure high quality care transitions by improving care coordination across providers and engaging patients and their families.

The National Quality Forum has been active in its work to endorse and recommend the use of performance measures to help reduce avoidable admissions and readmissions. In 2012, NQF endorsed two all-cause readmission measures. In 2015, NQF endorsed 17 measures examining community-level readmissions, pediatric readmissions, and readmission measures in the Post-Acute Care and Long-Term Care settings, in addition to hospital and health plan readmission measures. Past measure endorsement projects endorsed six condition-specific readmission measures, as well as measures of acute care hospitalization from home health and community settings. The NQF-convened Measure Applications Partnership (MAP) has stressed the importance of measures addressing avoidable admissions and readmissions in its work to recommend measures for use in federal quality initiative programs. MAP has stressed that measures of readmissions should be part of a suite of measures promoting shared accountability across the healthcare system.

Avoidable admissions and readmissions continue to put an unnecessary burden on patients and on the resources of the healthcare system. Reducing the rates of these events will require all stakeholders to work together and look beyond their walls to improve coordination of care. Performance measurement can provide the necessary information to focus improvement efforts and drive change across the healthcare system.

Trends and Performance

Hospital admission rates have been declining steadily. The American Hospital Association found an inpatient admission rate of 103.7 per 1,000 in 2014, down from a high of 119.7 per 1,000 in 2002.[4]

Similarly the Healthcare Cost and Utilization Project (HCUP) found that the rate of hospitalization decreased an average of 1.9 percent per year between 2008 and 2012.[5]

Likewise, recent trends show improvement in 30-day hospital readmission rates among Medicare fee-for-service beneficiaries. From 2007-2011 between 19-19.5 percent of Medicare patients were readmitted to the hospital within 30 days of discharge.[6] However, the rate fell to 18.5 percent in 2012 and decreased further to 17.5 percent in 2013, resulting in 150,000 fewer hospital readmissions between January 2012 and December 2013.[7]

However, there are concerns that the increased focus on reducing avoidable admissions and readmissions could lead to increased use of observation status and the Emergency Department (ED). Potentially preventable ED visits rose by 11 percent from 2008-2012.[8] Similarly the use of observation status may be rising. Researchers found a 34% increase in the use of observation stays from 2007 to 2009.[9] One analysis found that the top 10 percent of hospitals with the largest decrease in readmission rates between 2011 and 2012 increased their use of observation status by an average 25 percent for the same time period[10]. However, other analyses have challenged the belief that reductions in readmissions are related to changes in the use of observation status[11] and the evidence on the association remains mixed.

NQF Portfolio of Performance Measures for All-Cause Admissions and Readmissions Conditions

The All-Cause Admissions and Readmissions Standing Committee (see Appendix D) oversees NQF's portfolio of Admissions and Readmissions measures that includes all-cause and condition-specific measures. (See Appendix B) This portfolio contains over 40 admission and readmission measures addressing numerous healthcare settings:

Table 1. NQF Admissions and Readmissions Portfolio of Measures

	All-Cause	Condition Specific
Hospital	4	13
Home Health	4	0
Skilled Nursing Facility	4	0
Long-term Care Facility	1	0
Inpatient Rehab Facility	1	0
Inpatient Psychiatric Facility	1	0
Dialysis Facility	2	0
Health Plan	1	0
Population-Based	4	11
Hospital Outpatient/Ambulatory Surgery Center	0	1
Total	22	25

Additional measures related to admissions and readmissions may be reviewed by other Standing Committees based on appropriate expertise. These measures address issues such as population level

admission rates and readmissions to specific subpopulations such as the Neonatal Intensive Care Unit (NICU).

National Quality Strategy

NQF-endorsed measures for Admission and Readmissions support the National Quality Strategy (NQS). The NQS serves as the overarching framework for guiding and aligning public and private efforts across all levels (local, state, and national) to improve the quality of healthcare in the U.S. The NQS establishes the "triple aim" of better care, affordable care, and healthy people/communities, focusing on six priorities to achieve those aims: *Safety, Person and Family Centered Care, Communication and Care Coordination, Effective Prevention and Treatment of Illness, Best Practices for Healthy Living, and Affordable Care.*

Improvement efforts for admissions, readmissions, and length of stay are consistent with the NQS triple aim and align with several of the NQS priorities, including:

- **Making Care Safer by Reducing Harm Caused in the Delivery of Care**. The Centers for Medicare & Medicaid Services reported in February 2013 that the 30-day, all-cause readmission rate dropped to 17.8 percent, or 70,000 fewer readmissions in the last quarter of 2012, after averaging 19 percent for the past five years.[11] The MedPAC June 2013 Report to Congress indicated that, at a national level, all-cause readmissions for the three reported conditions (Heart Failure, AMI, and Pneumonia) had a larger decrease in readmissions over the three-year measurement period than for all conditions, since implementation of the Hospital Readmissions Reduction Program.[12]
- **Promoting Effective Communication and Coordination of Care**. Readmissions are events that are associated with gaps in follow-up care. Researchers have estimated that inadequate care coordination, including inadequate management of care transitions, was responsible for $25 to $45 billion in wasteful spending in 2011 as a result of avoidable complications and unnecessary hospital readmissions.[13]

Each measure in the admissions and readmissions portfolio is listed in the Measurement Framework below.

Use of Measures in the Portfolio

Endorsement of measures by NQF is valued not only because the evaluation process itself is both rigorous and transparent, but also because evaluations are conducted by multi-stakeholder committees comprised of clinicians and other experts from the full range of healthcare providers, employers, health plans, public agencies, community coalitions, and patients—many of whom use measures on a daily basis to ensure better care. Moreover, NQF-endorsed measures undergo routine "maintenance" (i.e., re-evaluation) to ensure that they are still the best-available measures and reflect the current science. Importantly, federal law requires that preference be given to NQF-endorsed measures for use in federal public reporting and performance-based payment programs. NQF measures also are used by a variety of stakeholders in the private sector, including hospitals, health plans, and communities.

The admissions and readmissions portfolio of measures continues to grow rapidly. While some of the oldest measures in the portfolio have been endorsed since 2008, new measures have been developed and endorsed in recent years to expand accountability for avoidable admissions and readmissions to new settings and conditions. As reducing avoidable admissions and readmissions continues to be a key quality goal, the use of these measures continues to expand. In particular, the Improving Medicare Post-Acute Care Transformation Act of 2014 (IMPACT Act) required CMS to implement quality measures for potentially preventable readmission rates to long-term care hospital, inpatient rehabilitation facilities, skilled nursing facilities, and home health agencies. Currently measures in the portfolio are used in a number of federal programs, including the Home Health Quality Reporting Program, Ambulatory Surgical Center Quality Reporting Program, the Hospital Inpatient Quality Reporting Program, Hospital Readmission Reduction Program, Medicare Shared Savings Program, Inpatient Rehabilitation Facility Quality Reporting Program, Long Term Care Hospital Quality Reporting Program, and the Skilled Nursing Facility Value Based Purchasing Program.

See Appendix C for details of federal program use for the measures in the portfolio.

NQF's All-Cause Admissions and Readmissions Portfolio

All Cause/All Condition Specific Population Based Measures

Measure Number	Measure Title
1768	Plan All-Cause Readmissions [NCQA]
2504	30-day Rehospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries [CMS]
2503	Hospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries [Colorado Foundation for Medical Care]
2888*	Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions [Yale/CORE]

*Denotes measures reviewed in this current project

Condition Specific Population Based Measures

Measure Number	Measure Title
0272	Diabetes Short-Term Complications Admission Rate (PQI 1) [AHRQ]
0273	Perforated Appendix Admission Rate (PQI 2) [AHRQ]
0274	Diabetes Long-Term Complications Admission Rate (PQI 3) [AHRQ]
0277	Heart Failure Admission Rate (PQI 8) [AHRQ]
0279	Bacterial Pneumonia Admission Rate (PQI 11) [AHRQ]
0280	Dehydration Admission Rate (PQI 10) [AHRQ]
0281	Urinary Tract Infection Admission Rate (PQI 12) [AHRQ]
0283	Asthma in Younger Adults Admission Rate (PQI 15) [AHRQ]
0638	Uncontrolled Diabetes Admission Rate (PQI 14) [AHRQ]

Admissions Measures for Pediatric Quality Indicators

Measure Number	Measure Title
0727	Gastroenteritis Admission Rate (pediatric) [AHRQ]
0728	Asthma Admission Rate (Pediatric) [AHRQ]
2886*	Risk-Standardized Acute Admission Rates for Patients with Heart Failure [Yale/CORE]
2887*	Risk-Standardized Acute Admission Rates for Patients with Diabetes [Yale-CORE]

Hospital All-Cause/All-Condition Readmission Measures

Measure Number	Measure Title
0335	PICU Unplanned Readmission Rate [Virtual PICU Systems, LLC]
1789*	Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) [CMS]
2393	Pediatric All-Condition Readmission Measure [Center of Excellence for Pediatric Quality Measurement]
2879*	Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data [Yale/CORE]

*Denotes measures reviewed in this current project

Cardiovascular Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
0330*	Hospital 30-day, all-cause, risk-standardized readmission rate following heart failure hospitalization for patients 18 and older [CMS]
0505	Thirty-day all-cause risk standardized readmission rate following acute myocardial infarction (AMI) hospitalization [CMS]
0695	Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) [American College of Cardiology]
2514	Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate [STS]
2515	Hospital 30-day, all-cause, unplanned, risk-standardized readmission rate (RSRR) following coronary artery bypass graft (CABG) surgery [CMS]
2880*	Excess days in acute care (EDAC) after hospitalization for heart failure [Yale/CORE]
2881*	Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI) [Yale/CORE]

*Denotes measures reviewed in this current project

Pulmonary Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
0506*	Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalization. [CMS]
1891*	Hospital 30-Day, All-Cause, Risk-Standardized Readmission Rate (RSRR) following Chronic Obstructive Pulmonary Disease (COPD) Hospitalization [CMS]

Measure Number	Measure Title
2414	Pediatric Lower Respiratory Infection Readmission Measure [Center of Excellence for Pediatric Quality Measurement]
2882*	Excess days in acute care (EDAC) after hospitalization for pneumonia

*Denotes measures reviewed in this current project

Surgical Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
2513	Hospital 30-Day All-Cause Risk-Standardized Readmission Rate (RSRR) following Vascular Procedures [CMS]
1551	Hospital-level 30-day, all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) [CMS]

Setting-Specific Readmission Measures

Measure Number	Measure Title
0171*	Acute Care Hospitalization (Risk-Adjusted) [CMS]
0173*	Emergent Care (Risk Adjusted)
1463	Standardized Hospitalization Ratio for Admissions [CMS]
2375	PointRight OnPoint-30 SNF Rehospitalizations [AHCA]
2510	Skilled Nursing Facility 30-Day All-Cause Readmission Measure (SNFRM) [RTI]
2380	Rehospitalization During the First 30 Days of Home Health [CMS]
2505	Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health [CMS]
2512	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Long-Term Care Hospitals (LTCHs) [CMS]
2502	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facilities [CMS]
2496	Standardized Readmission Ratio (SRR) for dialysis facilities [CMS]
2539	Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy [CMS]
2827*	PointRight® Pro Long Stay(TM) Hospitalization Measure (PointRight)
2858*	Discharge to Community [ACHA]
2860*	Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)

All-Cause Admissions and Readmissions Measure Evaluation

On June 8-9, 2016 the Admissions and Readmissions Standing Committee evaluated 11 new measures and 6 measures undergoing maintenance review against NQF's standard evaluation criteria.

Comments Received Prior to Standing Committee Evaluation

NQF solicits comments on endorsed measures on an ongoing basis through the Quality Positioning System (QPS). In addition, NQF solicits comments prior to the evaluation of the measures via an online tool located on the project webpage. For this evaluation cycle, the pre-evaluation comment period was open from April 5- May 5, 2016 for the 17 measures under review. A total of 14 pre-evaluation comments were received (Appendix G).

All submitted comments were provided to the Standing Committee prior to its initial deliberations during the in-person meeting.

Refining the NQF Measure Evaluation Process

To streamline and improve the periodic evaluation of currently-endorsed measures, NQF has updated the way it re-evaluates measures for maintenance of endorsement. This change took effect beginning October 1, 2015. NQF's endorsement criteria have not changed, and all measures continue to be evaluated using the same criteria. However, under the new approach, there is a shift in emphasis for evaluation of currently-endorsed measures:

- **Evidence:** If the developer attests that the evidence for a measure has not changed since its previous endorsement evaluation, there is a decreased emphasis on evidence, meaning that the Standing Committee may accept the prior evaluation of this criterion without further discussion or need for a vote. For health outcome measures, NQF requires that measure developers articulate a rationale (which often includes evidence) for how the outcome is influenced by healthcare processes or structures rather than a systematic review of the empirical evidence.
- **Opportunity for Improvement (Gap):** For re-evaluation of endorsed measures, there is increased emphasis on current performance and opportunity for improvement. Endorsed measures that are "topped out" with little opportunity for further improvement are eligible for Inactive Endorsement with Reserve Status.
- **Reliability**
    - Specifications: There is no change in the evaluation of the current specifications.
    - Testing: If the developer has not presented additional testing information, the Standing Committee may accept the prior evaluation of the testing results without further discussion or need for a vote.
- **Validity:** There is less emphasis on this criterion if the developer has not presented additional testing information, and the Standing Committee may accept the prior evaluation of this subcriterion without further discussion and vote. However, the Standing Committee still considers whether the specifications are consistent with the evidence. Also, for outcome measures, the Standing Committee discusses questions required for the SDS Trial even if no change in testing is presented.
- **Feasibility:** The emphasis on this criterion is the same for both new and previously-endorsed measures, as feasibility issues might have arisen for endorsed measures that have been implemented.
- **Usability and Use:** For re-evaluation of endorsed measures, there is increased emphasis on the use of the measure, especially use for accountability purposes. There also is an increased emphasis on improvement in results over time and on unexpected findings, both positive and negative.

Standing Committee Evaluation

Of the eleven new measures and six measures undergoing maintenance of endorsement considered by the Standing Committee at its June 8-9, 2016 meeting, sixteen were recommended for endorsement, and one measure was not recommended. Table 2 summarizes the results of the Standing Committee's evaluation.

Table 2. Admissions and Readmissions Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	6	11	17
Measures recommended for endorsement	6	10	16
Measures not recommended for endorsement	0	1	1
Reasons for not recommending	Importance – 0 Scientific Acceptability – 0 Overall – 0 Competing Measure – 0	Importance – 0 Scientific Acceptability – 1 Overall – 0 Competing Measure – 0	

Overarching Issues

During the Standing Committee's discussion of the measures, several overarching issues emerged that were factored into the Standing Committee's ratings and recommendations for multiple measures and are not repeated in detail with each individual measure.

Adjustment for Sociodemographic Factors

During the previous project to endorse admissions and readmissions measures, the Standing Committee had substantial discussions about the need to consider sociodemographic factors in the measures' risk adjustment models. At the time, NQF policy prohibited the inclusion of such factors in risk adjustment models. However, in a concurrent project, NQF convened an expert panel that was charged with reviewing this guidance and developing a set of recommendations on the inclusion of SDS factors in risk adjustment models. The expert panel recommended that SDS factors be evaluated in the risk adjustment model for measures when there is a conceptual and empirical rationale to do so.

Risk adjustment for sociodemographic factors remains a controversial issue based on concerns that adjustment could mask healthcare disparities. Those in favor of risk adjustment for these factors argue that it is necessary to ensure fair, unbiased, and accurate measurement. Those opposed to adjusting for these factors are concerned that doing so will create different performance standards for different patients. Based on these concerns, the NQF Board of Directors implemented a two-year trial period when performance measures may be adjusted using sociodemographic factors where appropriate. During this project the Standing Committee was asked to assess each measure to determine if SDS adjustment is appropriate.

A growing body of literature demonstrates a relationship between a patient's socioeconomic status and their risk of hospital readmission.[12] At the same time, the Patient Protection and Affordable Care Act (ACA) created the Hospital Readmissions Reduction Program (HRRP), a pay for performance program that reduces payments to hospitals that are determined to have excess readmissions. Because of the potential relationship between factors such as income, education, and social support and a patient's likelihood of being readmitted, there are concerns that the HRRP unfairly penalizes safety-net institutions that treat higher numbers of vulnerable patients[13] and that doing so takes away resources that these facilities need to serve patients with complex medical and social needs. However, other stakeholders feel that adjusting the measures may mask disparities in care and prefer other solutions such as additional payments to support the safety net.

Because of the potential impact of SDS factors on the results of these measures, the Standing Committee focused on the need to ensure they are appropriately risk-adjusted. Under the validity criterion, the Standing Committee had careful deliberations about whether SDS adjustment is appropriate. The SDS Expert Panel stressed the need to assess each measure individually to determine if SDS adjustment is appropriate and that there must be a conceptual basis and empirical evidence to support the inclusion of SDS factors. The Panel also noted the potential need to explore the use of community variables to characterize the environment in which the patient lives as well as community characteristics that are relevant as characteristics of the healthcare unit such as funding for safety net provides and the pool of available healthcare workers.

To meet the requirements of the trial period, measure developers have done extensive and innovative work to consider the impact of SDS factors on their measures. The trial period has helped to illuminate the challenges to adjusting for SDS factors including the limited availability of patient-level data. The Standing Committee discussed the need for better data that would allow additional SDS factors to be considered. The Standing Committee recognized the current limitations of claims data and the need to improve the underlying data elements. The Standing Committee noted the potential of electronic health data and expressed hope that measure developers will continue to find ways to leverage electronic health data to capture additional SDS factors so that their impact on admissions and readmissions can be examined.

Review of the CMS/Yale SDS Adjustment Methodology

Eight of the 17 measures reviewed in this project were developed by CMS/Yale CORE and use similar risk adjustment methodology. This section highlights the Standing Committee's review of Yale CORE's methodology related to SDS factors to avoid repeating similar discussions under individual measures.

CMS/Yale CORE presented their approach to SDS adjustment to the Standing Committee. CMS/Yale CORE noted that there is a modest relationship between patient-level socioeconomic status and readmission in the CMS/Yale CORE readmission measures. For these analyses, CMS/Yale CORE was able to use SDS data based on the American Community Survey linked to 9-digit zip codes to obtain data at the census block group level. Specifically, the developers used the AHRQ SES index which includes variables such as the percent of persons with less than a high school degree, the percent of persons living below the poverty level, the percent of persons unemployed, and median household income.

CMS/Yale CORE reported that the addition of SDS factors did not improve the risk adjustment models or meaningfully change hospital scores or rankings based on those scores. For example, the developer noted that the c-statistic for the risk adjustment model for the heart failure readmission measure changed from 0.608 to 0.609 when SDS factors were added to the model. Yale CORE also noted that the five percent of hospitals who would experience the greatest improvement in their readmission rates if SDS factors were added to the models would see their readmission rates decline by about 0.3 percent.

Additionally CMS/Yale CORE presented analyses showing the relative contribution of patient-level and hospital-level SDS factors. The developer found that when compared to clinical factors a greater proportion of the risk of readmission could be attributed to the hospital-level effects compared to patient-level effects. Based on these findings, the developer recommended against adding these variables to the measures.

The Standing Committee recognized that sociodemographic status is a complex issue and the interactions between a person's socioeconomic status and their medical risk is challenging to measure. Ultimately, the Standing Committee recommended endorsing these measures without SDS adjustment. However, the Standing Committee noted the challenges in disentangling clinical from social risk factors, particularly for issues such as functional status and behavioral health. The Standing Committee also expressed concerns with potential issues for minority or lower SES patients such as bias, discrimination, and access.

The Standing Committee reiterated the need for more precise data about socioeconomic and other factors and to continue developing innovative ways to assess the impact of these factors. In particular, the Standing Committee recommended exploring ways to assess factors such as homelessness, community resources, available home supports, and other social risk factors. The Standing Committee noted that the analyses presented by Yale CORE focused only on patient-level variables and recommended additional analyses to better understand how hospital characteristics such as disproportionate share could impact the results of the measures. The Standing Committee also stressed the need to customize care and the challenges that can present when payment policy limits the available resources.

Review of Conditionally Endorsed Measures

In April 2015, NQF began a two year trial period during which sociodemographic status (SDS) factors should be considered as potential factors in the risk-adjustment approach of measures submitted to NQF if there is a conceptual reason for doing so. Prior to this, NQF criteria and policy prohibited the inclusion of such factors in the risk adjustment approach and only allowed for inclusion of a patient's clinical factors present at the start of care.

Because the previous All-Cause Admissions and Readmissions project began and ended prior to the start of the trial period, the Standing Committee did not consider SDS factors as part of the risk-adjustment approach during their initial evaluation. When the NQF Board of Directors (BoD) Executive Committee ratified the CSAC's approval to endorse these 17 measures, it did so with the condition that these

measures enter the SDS trial period because of the potential impact of SDS on readmissions and the impending start of the SDS trial period.

The Standing Committee met through a series of webinars to review the conceptual and empirical basis for adjusting these measures for SDS factors. Ultimately, the Standing Committee recommended continuing the endorsement of these measures without SDS factors in their risk adjustment models. Details on the process of this review and the Standing Committee's findings can be found in Appendix H.

Mitigating Unintended Consequences of the Use of Admissions and Readmissions Measures

The Standing Committee emphasized the need to ensure that admissions and readmissions measures are used appropriately and that consideration be given to potential unintended consequences of their use. The Standing Committee noted that reducing admission and readmission rates should be balanced with careful monitoring of unintended consequences to ensure that patients are getting the care that they need.

The Standing Committee raised concerns about the relationship between mortality rates and readmission rates. MedPAC noted that for heart failure patients, readmission rates are negatively correlated with mortality rates, giving two possible reasons for this correlation: (1) hospitals with lower mortality rates but higher readmission rates may be saving sicker patients or (2) some hospitals are more likely to admit a patient rather than monitor a patient in the community.[14] The Standing Committee noted that there is a need to balance admissions and readmissions with measures that assess concepts like mortality to ensure that the use of admissions and readmissions measures is not limiting patients' access to needed care.

There is concern that decreasing readmission rates may be related to increased use of observation status and use of the emergency department[15]. While new research challenges this claim,[16] there may be observation stays and ED visits that may have a negative impact on patients. The Standing Committee previously recognized that there is a need to gain a full picture of what happens to a patient after discharge from acute care, including ED visits and observation stays. The Standing Committee was encouraged by the development of new measures that incorporate these outcomes to ensure quality is measured in a way that is most meaningful to patients.

Questions also arose about the relationship between admissions and readmissions. Stakeholders noted that reducing admission rates may lead to the appearance of higher readmission rates since the measure denominator (i.e. hospital discharges) may decrease quicker than the numerator (i.e. readmissions). This could penalize providers who are working to improve care coordination and keep patients out of the hospital in the first place. The use of readmission rates aims to encourage all healthcare providers to take a leadership role in supporting community interventions aimed at reducing both avoidable admissions and avoidable readmissions.

Shared Accountability across Settings

Preventing avoidable admissions and readmissions requires stakeholders across the healthcare system to work together. In its 2014-2015 Admissions and Readmissions project, NQF expanded its portfolio to address additional post-acute and long-term care sites. In this project, the Standing Committee

reviewed new measures for psychiatric hospitals, cancer hospitals, skilled nursing facilities, and accountable care organizations (ACOs). Expanding measurement of avoidable admissions and readmissions to these additional settings helps to ensure shared accountability for these events. The Standing Committee recognized a particular need to ensure that ACOs do not achieve savings by withholding necessary care. The Standing Committee noted that the ACO measures reviewed in this project represent an important start to balancing this risk.

Impact of Current or Intended Use on Measure Evaluation

Throughout its review of measures for this project, the Standing Committee grappled with balancing information about how a measure is being used with the scientific neutrality of the CDP process. The Standing Committee raised questions about the different scoring algorithms used for different quality incentive programs that use the same measures. In particular, the Standing Committee struggled with the different ways the CMS/Yale 30-day hospital readmission measures are used in the Hospital Inpatient Quality Reporting Program (IQR) and the Hospital Readmissions Reduction Program (HRRP). The Standing Committee questioned why public reporting on Hospital Compare requires a 95% confidence interval, while payment penalties are determined through a cut-point at 50% despite the same underlying measures being used for both purposes.

As a starting place for addressing these issues, NQF empaneled an Intended Use Advisory Panel to develop foundational recommendations for how the intended use of a measure should be incorporated into the endorsement process. While that group ultimately decided that the review of measures should be equally rigorous for any accountability purpose, the Panel urged further work to better understand the interaction between performance measures and how they are used in quality incentive programs. The Advisory Panel noted the need to better understand how performance categories are defined and whether or not statistical tests should be used to distinguish between these categories.

Summary of Measure Evaluation

The following brief summaries of the measure evaluation highlight the major issues that were considered by the Standing Committee. Details of the Standing Committee's discussion and ratings of the criteria for each measure are in included in Appendix A.

Recommended

0171 Acute Care Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services): Recommended

Description: Percentage of home health stays in which patients were admitted to an acute care hospital during the 60 days following the start of the home health stay.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Home Health; **Data Source**: Administrative claims

NQF #0171 is a maintenance measure that was previously endorsed in 2012; it is publicly reported on Home Health Compare. Since it's last review, the measure's title has been updated to improve clarity and the risk adjustment model was recalibrated. The Standing Committee agreed that a performance gap still exists since analyses of Medicare claims show that 14 percent of home health patients are rehospitalized within 30 days of the start of home health care. The Standing Committee raised concerns

about the availability of home health services and questioned whether patients accepted into home health could impact the validity of this measure. The Standing Committee noted that home health agencies have more flexibility about whether or not to accept a patient than other providers may have. However, the Standing Committee noted that in some markets, hospitals are working with home health agencies to improve care coordination and to assist them in handling more complex patients. The Standing Committee agreed that the measure continues to meet the NQF criteria and recommended NQF #0171 for endorsement.

0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health (Centers for Medicare & Medicaid Services): Recommended

Description: Percentage of home health stays in which patients used the emergency department but were not admitted to the hospital during the 60 days following the start of the home health stay.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Home Health; **Data Source**: Administrative claims

NQF #0173 is a maintenance measure that was last endorsed in 2012; it is publicly reported on Home Health Compare. The Standing Committee agreed that this is an important measure that can provide information about patients' ability to provide the necessary self-care to remain stable in the community setting. The Standing Committee noted that tracking ED use will become increasingly important as the healthcare system moves to alternative payment models. However, the Standing Committee also noted that not all referrals to the ED should be seen as a negative outcome as some ED visits may be necessary and represent the home health agency recognizing an acute problem and getting the patient to the appropriate level of care. The Standing Committee raised concerns that results of this measure are not improving over time and encouraged the developer to track data for multiple chronic conditions and co-morbidities, and to look at alternative data sources to enhance their risk models. The Standing Committee agreed that the measure continued to meet the NQF criteria and recommended NQF #0173 for endorsement.

0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)): Recommended

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals or Veterans Health Administration (VA) hospitals.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #0330 is a maintenance measure that was last endorsed in 2012 and is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. The Standing Committee discussed the two updates to the measure. First, the updated measure excludes

patients who have either an LVAD or a heart transplant during their indexed stay or during the year prior. The Standing Committee generally agreed that this change was an appropriate reflection of a change in clinical practice. Second, the measure had modest changes to the planned readmissions algorithim which excludes scheduled or planned readmissions from the measure. The Standing Committee noted that there is still a performance gap, with the average heart failure readmission rate over 22 percent and rates ranging from 16 percent to over 32 percent. The Standing Committee was concerned that the published literature suggested a nomimal but significant inverse correlation between readmissions and mortality and recommended continued monitering. Ultimately, the Standing Committee agreed that the measure continues to meet the NQF criteria and recommended NQF #0330 for endorsement.

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)): Recommended

Description: The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Readmission is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. CMS annually reports the measure for patients who are 65 years or older and are enrolled in fee-for-service (FFS) Medicare hospitalized in non-federal hospitals. Please note this measure has been substantially updated since the last submission; as described in S.3., the cohort has been expanded. Throughout this application we refer to this measure as version 8.2.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #0506 is a maintenance measure that was last endorsed in 2013 and is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. The Standing Committee reviewed the two measure updates. First, the measure has an expanded cohort including patients who have a principal diagnosis of sepsis and a secondary diagnosis of pneumonia that is present on admission, and patients who have a principal diagnosis of aspiration pneumonia. Second, the measure includes the updated planned readmissions algorithm noted above. The Standing Committee agreed that the measure still has a performance gap, with rates of pneumonia readmission ranging from 13.1 percent to 24.7 percent and an average rate of 17.5 percent, and it continues to meet the NQF criteria and recommended NQF #0506 for endorsement.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)): Recommended

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory;

cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #1789 is a maintenance measure and is currently used in the Hospital Inpatient Quality Report (IQR) Program. The Standing Committee agreed that there continues to be a performance gap, with all-cause readmission rates ranging from 11.4 percent to 20.1 percent and an average rate of 15.4 percent. The Standing Committee raised concerns that merging multiple cohorts into one group may mask the individual variance properties of the individual cohorts. However, the Standing Committee generally agreed that the measure had sufficient reliability and validity testing to continue endorsement.

1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)): Recommended

Description: The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #1891 is a maintenance measure. This facility/hospital-level measure was last endorsed in 2013 and is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. The Standing Committee agreed that the measure continues to have a performance gap with readmission rates for COPD ranging from 15.5 percent to 26.6 percent and an average rate of 20.2 percent. While there was discussion about the modest results of the reliability testing and the use of hierachical logistical modeling, the Standing Committee agreed that the measure met the criteria for NQF endorsement.

2827 PointRight® Pro Long Stay(TM) Hospitalization Measure (PointRight): Recommended

Description: The PointRight Pro Long Stay Hospitalization Measure is an MDS-based, risk-adjusted measure of the rate of hospitalization of long-stay patients (aka “residents”) of skilled nursing facilities (SNFs) averaged across the year, weighted by the number of stays in each quarter.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility; **Data Source**: Electronic Clinical Data

NQF #2827 is a newly-submitted measure for this project and the American Healthcare Association (AHCA) plans to pubically report this measure on their website for free public use as well as use the measure in its its member data profiling and tracking tool, LTC Trend Tracker®.The Standing Committee noted the importance of this measure, as a 2013 report from the Department of Health and Human Services (HHS) Office of the Inspector Generalfound that 25% of Medicare nursing home residents had hospitalizations (i.e., direct discharges to acute care hospitals of Medicare residents, whether post-acute or long stay), and that these hospitalizations cost $14.3 billion. The Standing Committee expressed concern with the inclusion of race as a varaible in the risk adjustment model. Based on the discussion, the developer agreed to remove the race variable and update their measure specifications and testing results. The Standing Committee agreed that with this change, the measure was suitable for endorsement.

2858 Discharge to Community (American Health Care Association): Recommended

Description: The Discharge to Community measure determines the percentage of all new admissions from a hospital who are discharged back to the community alive and remain out of any skilled nursing center for the next 30 days. The measure, referring to a rolling year of MDS entries, is calculated each quarter. The measure includes all new admissions to a SNF regardless of payor source.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility; **Data Source**: Electronic Clinical Data

NQF #2858 is a newly submitted measure for this project and is currently publicly reported on the ACHA/NCAL Research and Data Website. The Standing Committee agreed that improving national discharge to community rates directly aligns with the three aims of the National Quality Strategy, namely better care, healthy people/healthy communities, and affordable care. The Standing Committee noted that there is a performance gap, with 10-20% of nursing home residents who are capable of going back to the community remaining institutionalized. This increases the exposure of these residents to healthcare associated inflections, exacerbations of psychosocial challenges, among other health and quality issues. The Standing Committee noted that this measure includes risk adjustment for maritial status, age, and gender. The Standing Committee discussed other potential SDS variables in the Minimum Data Set (MDS) such as payer and English language but agreed with the developer's assessment that they are unreliable. Based on this discussion, the Standing Committee agreed to recommend the measure for endorsement.

2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF) (Health Services Advisory Group, Inc.): Recommended

Description: This facility-level measure estimates an all-cause, unplanned, 30-day, risk-standardized readmission rate for adult Medicare fee-for-service (FFS) patients with a principal discharge diagnosis of a psychiatric disorder or dementia/Alzheimer's disease. The performance period for the measure is 24 months.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Behavioral Health/Psychiatric : Inpatient; **Data Source**: Administrative claims

NQF #2860 is a newly-submitted measure for this project. The Standing Committee agreed that there is an important performance gap, with analyses of Medicare claims data indicating that over 20% of patients who receive pyschiatric care in an inpatient setting are readmitted within 30 days of discharge. The Standing Committee discussed the need to improve care coordination and discharge planning for patients with behavioral health issues but recognized the challenges to patient engagement in the behavioral health population. The Standing Committee raised concerns about potential unintended consequences that may come from using this measure and recommended monitoring additional outcomes such as mortality in this population and to ensure that this measure does not worsen access to care issues for this population.

2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data (Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)): Recommended

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized readmission ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is Medicare Fee-for-Service beneficiaries who are 65 years or older.This Hybrid Hospital-Wide Readmission (HWR) measure is a re-engineered version of measure 1789, the Hospital-Wide All-Cause Unplanned Readmission Measure which was developed for patients 65 years and older using Medicare claims and is currently publically reported in the Hospital Inpatient Quality Reporting Program. This reengineered measure uses clinical data elements from patients' electronic health records in addition to claims data for risk adjustment.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

This newly-submitted measure is conceptually based on NQF #1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR). However, #2879 is a hybrid measure that includes data from both claims and clinical data elements from the electronic health record. The Standing Committee noted that linking claims and EHR data is an important advancement in quality measurement and is an opportunity for innovation for future measures. Specifically, the Standing Committee noted that including data from clinical data elements may enhance and improve the face validity and overall performance of the risk adjustment model.

The Standing Committee noted that the developer used Health Quality Measure Format (HQMF) specifications and used the Value Set Authority Center (VSAC) for their code sets. Additionally, the measure was created using the Measure Authoring Tool (MAT). While the Standing Committee recognized the current EHR data collection and reporting challenges, they also acknowledged that the

use of the VSAC and MAT should help to ensure the measure's reliability. Ultimately, the Standing Committee recommended both this measure and NQF #1789 for endorsement.

2880 Excess days in acute care (EDAC) after hospitalization for heart failure (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for heart failure to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with heart failure by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #2880 is a newly-submitted measure that aims to provide a more complete understanding of the quality of care transitions for patients with heart failure by measuresing a return to acute care after hospital discharge through a number of outcomes: emergency department (ED) visits, observation stays, and unplanned readmissions. This measure is not currently publicly reported but it has been finalized for use in CMS' Hospital Inpatient Quality Report (IQR) program starting in FY 2018. The Standing Committee noted that the measure identifies a significant gap in performance with the 10th percentile at -29 days and the 90th percentile at 44.4 days. Unlike readmission rates, this measure captures a normalized number of days after hospitalization and may not be easily be compared across conditions. This format for reporting measure results may require additional education since it is not as consistent with readmission measure methods used in the past. The Standing Committee agreed that this measure is an important contribution to performance measurement as it captures the potiental unintended negative conseqneces of increased ED use and observation stays associated with readmissions.

2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI) (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for acute myocardial infarction (AMI) to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with AMI by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #2881 is a newly-submitted measure that aims to provide a more complete understanding of the quality of care transitions for patients with AMI by measuresing a return to acute care after hospital discharge through a number of outcomes: emergency department (ED) visits, observation stays, and unplanned readmissions. This measure is not currently publicly reported, but was finalized for use in CMS' Hospital Inpatient Quality Report (IQR) program starting in FY 2018. Similar to NQF #2880, the Standing Committee agreed that the measure has a performance gap and is important to measure and report. The Standing Committee recommended the measure for endorsement, with moderate certainty that the measure scores are reliable and valid, with an intraclass correlation coefficient of 0.54, and a correlation with readmissions of 0.61.

2882 Excess days in acute care (EDAC) after hospitalization for pneumonia (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for pneumonia to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with pneumonia by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, the Center for Medicare and Medicaid Services (CMS) will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #2882 is a newly-submitted measure in this project that aims to provide a more complete understanding of the quality of care transitions for patients with pneumonia by measuresing a return to acute care after hospital discharge through a number of outcomes: emergency department (ED) visits, observation stays, and unplanned readmissions. This measure is not currently publicly reported, but may be used in one or more CMS programs, such as the IQR program. The Standing Committee agreed that the measure had a fairly large performance gap that ranged from 67 to 230 days. The Standing Committee had moderate certainty that the measure scores are reliable and valid, with an intraclass correlation coefficient of 0.8, and a correlation with readmissions of 0.7. The Standing Committee encouraged the developer to continue to test innovative approaches to improve the prediction accuracy of this measure and others like it.

2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with heart failure; **Measure Type**: Outcome ; **Level of Analysis**: Integrated Delivery System; **Setting of Care**: Ambulatory Care : Clinician Office/Clinic, Other; **Data Source**: Administrative claims

NQF #2886 is a newly-submitted measure for this project. This measure in not currently publicly reported but was recently added to the Medicare Shared Savings Program (MSSP) quality measure set and is planned for pay-for-reporting in the MSSP. The Standing Committee noted that this measure will

be helpful to accoutable care organizations (ACOs) as they work to improve quality and better understand their total costs. The Standing Committee did express concerns that the measure could be challenging to use in a quality initiative program when the interventions to improve take time to establish and ACOs enter the program at different times. The Standing Committee expressed caution about the reliability of the measure to assess performance in smaller ACOs, but ultimately agreed it met the standards for scientific acceptablity. The Standing Committee did note that this measure should be monitored carefully for unintended consequenes as too few admissions may increase mortality. The Standing Committee encouraged the developer to explore whether ED visits, observation stays, and skilled nursing faciliites admissions could be included in the measure. The Commtitee also encouraged the developer to explore expanding the population to include patients under 65.

2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with diabetes; **Measure Type**: Outcome ; **Level of Analysis**: Integrated Delivery System; **Setting of Care**: Ambulatory Care : Clinician Office/Clinic, Other; **Data Source**: Administrative claims

NQF #2887 is a newly-submitted measure. This measure is not currently publicly reported but was recently added to the Medicare Shared Savings Program (MSSP) quality measure set and is planned for pay-for-reporting in the MSSP. The Standing Committee noted methodolically similarilarities with #2886 and reiterated their comments regarding reliablity and validity. Given the importance of managing diabetes in the ambulatory setting, the Standing Committee recommended that the developer explore ways to expand the admissions included in the measure because often a planned admission could be indicative of poor care; events such as amputations or wound debridement can be devastating for the patient. Additionally, the Standing Committee cautioned against providing a disincentive for necessary acute care. The Standing Committee noted that this measure could be an important balance to the cost incentives provided by the ACO model.

2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions (Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)): Recommended

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with multiple chronic conditions (MCCs); **Measure Type**: Outcome ; **Level of Analysis**: Integrated Delivery System; **Setting of Care**: Ambulatory Care : Clinician Office/Clinic; **Data Source**: Administrative claims

NQF #2888 is a newly submitted measure and is not currently publicly reported; it was recently added to the Medicare Shared Savings Program (MSSP) measure set and is planned for pay-for-reporting in the MSSP. The Standing Committee agreed that there is a performance gap, noting that as of 2010, more than two-thirds of Medicare beneficiaries had been diagnosed with or treated for two or more chronic conditions. People with multiple chronic conditions (MCCs) are more likely to be admitted to the hospital than those without chronic conditions or with a single chronic condition. Additionally, people with MCCs are more likely to visit the emergency department, use post-acute care (such as SNFs), and

require home health assistance. The Standing Committee agreed that this is an important quality measure since it is specifically designed for the MCC population and few measures exist to assess their quality of care or improvement intiatives for that population.

Not Recommended

2884 30-Day Unplanned Readmissions for Cancer Patients (Alliance of Dedicated Cancer Centers (ADCC)): Not Recommended

Description:30-Day Unplanned Readmissions for Cancer Patients is a cancer-specific measure. It provides the rate at which all adult cancer patients (= 18 years old), regardless of payer type, have an unplanned re-hospitalization within 30 days of an index admission. The readmission is defined as a subsequent inpatient admission to the reporting facility, which occurs within 30 days of the discharge date of an eligible index admission.; **Measure Type**: Outcome ; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #2884 is a newly- submitted measure. This measure calculates the 30-day unplanned rehospitalization rate for adult cancer patients and includes all eligible patients with a readmission to a PPS-Exempt Cancer Hospital within 30 days of the discharge date from an index admission with an admission status of urgent or emergency. In alpha testing, the developer found that readmission rates ranged from 14.5 percent to 15.8 percent. Currently, there are no readmission measures for cancer. The Standing Committee noted the importance of this measure and was very supportive of the concept. However, concerns arose around the reliability of this measure and the ability to implement it broadly. Ultimately, this measure did not pass the Scientific Acceptability criterion.

References

[1] "Health Policy Brief: Medicare Hospital Readmissions Reduction Program," Health Affairs, November 12, 2013.
[2] Medicare Payment Advisory Committee (MEDPAC). Report to the Congress: Medicare and the Health Care Delivery System, DC: MedPAC; 2013. Available at http://medpac.gov/documents/Jun13_EntireReport.pdf
[3] http://www.hcup-us.ahrq.gov/reports/statbriefs/sb172-Conditions-Readmissions-Payer.pdf
[4] American Hospital Association. Inpatient Admissions in Community Hospitals, 1994-2014. http://www.aha.org/research/reports/tw/chartbook/ch3.shtml
[5] http://www.hcup-us.ahrq.gov/reports/statbriefs/sb180-Hospitalizations-United-States-2012.pdf
[6] Department of Health and Human Services. New HHS Date Shows Major Strides Made in Patient Safety, leading to Improved Care and Savings. https://innovation.cms.gov/Files/reports/patient-safety-results.pdf. Accessed July 5, 2016.
[7] Ibid
[8] http://www.hcup-us.ahrq.gov/reports/statbriefs/sb195-Potentially-Preventable-Hospitalizations.pdf
[9] http://content.healthaffairs.org/content/31/6/1251.full
[10] http://healthaffairs.org/blog/2015/10/28/is-observation-status-substituting-for-hospital-readmission/
[11] Zuckerman et al. Readmissions, Observation, and the Hospital Readmissions Reduction Program. The New England Journal of Medicine. 2016.
[12] Joynt KE, Orav EJ, Jha AK. Thirty-day readmission rates for Medicare beneficiaries by race and site of care. JAMA 2011 Feb 16;305(7):675-81
[13] Steven H. Sheingold, Rachel Zuckerman, and Adele Shartzer. Understanding Medicare Hospital Readmission rates and Differing Mentalities Between Safety-Net and Other Hospitals. Health Affairs 35, no 1 (2016): 124-131.
[14] MedPAC. Refining the Hospital Readmissions Reduction Program. June 2013.
[15] Vashi AA, Fox JP, Carr BG, et al. Use of hospital-based acute care among patients recently discharged from the hospital. JAMA. Jan 23 2013;309(4):364-371.
[16] Zuckerman et al. Readmissions, Observation, and the Hospital Readmissions Reduction Program. The New England Journal of Medicine. 2016.

Appendix A: Details of Measure Evaluation

Rating Scale: H=High; **M**=Moderate; **L**=Low; **I**=Insufficient; **NA**=Not Applicable; **Y**=Yes; **N**=No

Measures Recommended

0171 Acute Care Hospitalization During the First 60 Days of Home Health

Submission | Specifications

Description: Percentage of home health stays in which patients were admitted to an acute care hospital during the 60 days following the start of the home health stay.

Numerator Statement: Number of home health stays for patients who have a Medicare claim for an unplanned admission to an acute care hospital in the 60 days following the start of the home health stay.

Denominator Statement: Number of home health stays that begin during the 12-month observation period.

Exclusions: The following are excluded:

1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death.

2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim.

3) Home health stays in which the patient receives service from multiple agencies during the first 60 days.

4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Home Health

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-3**; **M-15**; **L-0**; **I-0**

Rationale:

- The developer provided data on the distribution of performance of this measure for four years (2011, 2012, 2013, and 2014). These data note that the average risk-adjusted acute care hospitalizations for 2014 were 14.8%; and the 25th percentile was 12.7% and 75th percentile was 16.8%. This distribution of agency performance has a standard deviation of 3.3%. Based on these results the Standing Committee concurred a gap in care exists and that there is an opportunity for improvement.
- The Standing Committee noted that there is evidence that home health agencies can implement interventions to reduce admissions and that a performance gap exists. The Standing Committee also noted that performance on the measure varies across facilities.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-2**; **M-16**; **L-0**; **I-0** 2b. Validity: **H-1**; **M-17**; **L-1**; **I-0**

Rationale:

- A beta-binomial distribution was fitted for all agencies. The beta-binomial method was developed for

provider level measures reported as rates, and it allows one to calculate an agency level "reliability score," interpreted as the percent of variance due to the difference in measure score among providers.
    - The developer notes that the distribution of national reliability scores shows that the majority of agencies have a reliability score greater than 0.871 and that this implies their performance can likely be distinguished from other agencies. This can be interpreted as 87% of the variance is due to differences among providers, and 13% of the variance is due to measurement error or sampling uncertainty.
- The validity of this measure was calculated at the measure score level using empirical testing. The developer did not conduct additional validity testing of the measure elements noting that CMS audits a sample of claims for acute inpatient hospitalizations as a part of the annual payment error calculations.
    - The developers tested the validity of the measure through the use of payment error audits. The developers justified this during the prior review by stating that there is no reason to believe hospital would be more likely to have erroneous claims for home health patients than for others.
- This measure employs a multinomial logit model for risk adjustment. Variables included in the model include prior care setting (e.g., outpatient emergency room, inpatient acute, psychiatric facility, etc.), health status (measured using HCCs and all remaining CCs), demographic information (measured using age-gender interactions), enrollment status (ESRD and disability), and interactions between these factors. The c-statistic is 0.693.
- The developer submitted a conceptual rationale for SDS adjustment but ultimately chose not to include SDS factors in the risk adjustment model based on limited impact on performance rates.
- The Standing Committee raised concerns that the availability of home health services and the question of which patients are accepted into home health could impact the validity of this measure. The Standing Committee noted that home health agencies have more flexibility about whether or not to accept a patient than other providers may have. However, the Standing Committee noted that in some markets hospitals are working with home health agencies to improve care coordination and to assist them in handling more complex patients.
- The Standing Committee agreed this measure met the reliability and validity criteria.

3. Feasibility: H-16; M-3; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- This measure is collected through administrative claims data. The Standing Committee agreed the measure is feasible to collect and implement.

4. Usability and Use: H-3; M-16; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- This measure is currently publicly reported and is used in an accountability program. The measure is currently used for quality improvement and benchmarking.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-19**; **N-0**

Rationale

- The Standing Committee recognized the importance of reducing the number of home health stays for patients who have a Medicare claim for an unplanned admission to an acute care hospital in the 60 days following the start of the home health stay and recommended the measure for endorsement.

6. Public and Member Comment

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0171 Acute Care Hospitalization During the First 60 Days of Home Health
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
Submission | Specifications
Description: Percentage of home health stays in which patients used the emergency department but were not admitted to the hospital during the 60 days following the start of the home health stay. **Numerator Statement**: Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 60 days following the start of the home health stay. **Denominator Statement**: Number of home health stays that begin during the 12-month observation period. **Exclusions**: The following are excluded: 1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death. 2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. 3) Home health stays in which the patient receives service from multiple agencies during the first 60 days. 4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay. **Adjustment/Stratification**: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification» **Level of Analysis:** Facility **Setting of Care:** Home Health **Type of Measure**: Outcome **Data Source**: Administrative claims **Measure Steward**: Centers for Medicare & Medicaid Services
STANDING COMMITTEE MEETING [06/08/2016-06/09/2016] **1. Importance to Measure and Report: The measure meets the Importance criteria** (1a. Evidence, 1b. Performance Gap) 1a. Evidence: **Y-17; N-1**; 1b. Performance Gap: **H-4**; **M-13**; **L-0**; **I-0** Rationale: • The developer provided data on the distribution of risk-adjusted performance on this measure for 2011-2014. The average risk-adjusted performance is 11.9%, with the 25th percentile performance at 11.1% and the 75th performance at 12.5%. Based on these results the Standing Committee concurred a gap in care exists and that there is an opportunity for improvement. • Standing Committee members expressed concerns that there was a limited evidence base for this measure. Standing Committee members noted challenges patients encounter connecting with primary care providers and the limited demonstrated impact of interventions such as medication reconciliation, education, and falls prevention. However, the Standing Committee felt this is an important tracking measure that can provide important information about patients' ability to provide self-care to remain stable in the community setting. • The Standing Committee noted that tracking ED use could become an important issue as the healthcare system moves to alternative payment models. The Standing Committee also noted that not all referrals to the ED should be seen as a bad thing as this can represent the home health agency recognizing an acute problem early and getting the patient to the appropriate level of care.

0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
• The Standing Committee noted that results on this measure are not improving but that this could be due to the patient population getting sicker over time. The Standing Committee suggested the developer better track data for multiple chronic conditions and co-morbidities.
2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u> (2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity) 2a. Reliability: **H-0**; **M-17**; **L-0**; **I-0** 2b. Validity: **H-1**; **M-16**; **L-0**; **I-0** <u>Rationale</u>: • A beta-binomial distribution was fitted for all agencies. The beta-binomial method was developed for provider level measures reported as rates, and it allows one to calculate an agency level "reliability score," interpreted as the percent of variance due to the difference in measure score among providers. • The developer noted that the distribution of national reliability scores shows that the majority of agencies have a reliability score greater than 0.818 and that this implies their performance can likely be distinguished from other agencies.   ○ This can be interpreted as approximately 82% of the variance is due to differences among providers, and 12% of the variance is due to measurement error or sampling uncertainty. • The developer performed an audit of claims data to test the validity of the measure score. Of a 2010 audit of 31,766 Part B claims, there was 0.2% (801) claims that can patient record could not be found. • This measure employs a multinomial logit model for risk adjustment. Variables included in the model include prior care setting (e.g., outpatient emergency room, inpatient acute, psychiatric facility, etc.), health status (measured using HCCs and all remaining CCs), demographic information (measured using age-gender interactions), enrollment status (ESRD and disability), and interactions between these factors. The c-statistic is 0.632. • The developer submitted a conceptual rationale for SDS adjustment but ultimately chose not to include SDS factors in the risk adjustment model based on limited impact on performance rates. • The Standing Committee suggested the developer look to other sources of data such as the Continuity of Care Document to improve the risk models for this measure. • The Standing Committee agreed this measure met the reliability and validity criteria.
3. Feasibility: H-14; M-2; L-0; **I-0** *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* <u>Rationale</u>: • This measure is collected through administrative claims data. The Standing Committee agreed the measure is feasible to collect and implement.
4. Usability and Use: H-7; M-9; L-0; **I-0** *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* <u>Rationale</u>: • This measure is currently publicly reported and is used in an accountability program. The measure is currently used for quality improvement and benchmarking.
5. Related and Competing Measures • The Standing Committee raised concerns that this measure may compete with NQF #2505.The developer stated that this measure is "harmonized with the Rehospitalization measures (NQF numbers 2505 and 2380) and with CMS' Hospital-Wide All-Cause Unplanned Readmission (HWR) measure (NQF 1789) in the definition of unplanned hospitalizations." The developer added that this measure differs from other post-acute hospital readmission measures due to the unique nature of home health care as a post-acute setting.
Standing Committee Recommendation for Endorsement: **Y-16**; **N-0** <u>Rationale</u>

0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
• The Standing Committee recognized the importance of reducing the number of avoidable emergency department visits for the elderly without readmission among the elderly community and recommended this measure for continued endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

Submission | Specifications

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals or Veterans Health Administration (VA) hospitals.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index HF admission. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups.

The cohort includes admissions for patients aged 18 years and older discharged from the hospital with either a principal discharge diagnosis of HF (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals or Veterans Health Administration (VA) hospitals.

Additional details are provided in S.9 Denominator Details.

Exclusions: The readmission measures excludes admissions:

1. Ending in discharges against medical advice

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

2. Without at least 30 days of post-discharge enrollment in FFS Medicare

Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted.

3. Occurring within 30 days of discharge from an index admission

Rationale: This exclusion ensures that no hospitalization will be considered as both a readmission and an index admission within the same measure.

4. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission

Rationale: Patients with these procedures are a highly-selected group of patients with a different risk of the readmission outcome.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-19; N-1** 1b. Performance Gap: **H-9**; **M-9**; **L-1**; **I-1**

<u>Rationale</u>:

- Data provided by the developer cover a total of 1,210,454 and show that heart failure readmission rates ranges from a minimum of 16% to a maximum of 32.1%.
- Hospitals serving low proportion of Dual Eligible, African-American, and patients below AHRQ SES index score of 42.7 had lower readmission rates than those with high proportions of these patients.
- The Standing Committee discussed the two updates to the measure. First, the updated measure excludes patients who have either an LVAD or a heart transplant during their indexed stay or during the year prior. The Standing Committee generally agreed that this change was an appropriate reflection of a change in clinical practice. Second, the measure had modest changes to the planned readmissions algorithm which excludes scheduled or planned readmissions from the measure.
- The noted that there is still a performance gap, with the average heart failure readmission rate over 22 percent and rates ranging from 16 percent to over 32 percent.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-7**; **M-12**; **L-0**; **I-1** 2b. Validity: **H-1**; **M-17**; **L-1**; **I-1**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS.
- In addition, the developer compared frequencies and odds ratios of variables from their risk model across three years of data in order to assess the consistency of those variables over time.
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered an appropriate method of testing reliability.
- A total of 1,210,454 admissions over a 3-year period were examined, with 604,022 in one sample and 606,432 in the other randomly-selected sample. Two risk-standardized readmission rates (RSRR) were calculated for each hospital: one from each of the two separate samples. The agreement between the two RSRRs for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.58.
- The developer demonstrated measure validity through medical record validation.
    - The HF readmission administrative model (original model specification prior to completion of the planned readmission algorithm) was validated against a medical record model with the same cohort of patients for whom hospital-level HF readmission medical record data are available.
    - A measure cohort was developed with medical record data using the inclusion/exclusion criteria and risk-adjustment strategy.
    - A sample of 64,329 patients was matched for comparison.
- This measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital level 30-day risk-standardized readmission rate (RSRR). Variables considered for inclusion in the model were patient-level risk-adjustors that are expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including demographic factors (age, sex) and indicators of comorbidity and disease severity. The C-statistic is 0.63.
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- SDS variables were ultimately not included in model as the developer found that the effect size of each of these variables is small, the c-statistic (i.e., predictive value) is unchanged with the addition of any of

0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
these variables into the model, and the addition of any of these variables into the model has little to no effect on hospital performance. • The Standing Committee expressed concerns about published literature suggesting there was a small, but significant inverse correlation between readmissions and mortality and recommended continued monitoring. • Overall, the Standing Committee agreed this measure met the reliability and validity criteria.
3. Feasibility: H-16; M-4; L-;0 I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-3; M-15; L-2; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • It is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. • The Standing Committee noted that this measure is associated with reduction in hospital RSRR by 1.6% between 2011-2012 and 2013-2014. • The Standing Committee agreed the measure is highly usable.
5. Related and Competing Measures • This measure is related to #2880: Excess days in acute care (EDAC) after hospitalization for heart failure.
Standing Committee Recommendation for Endorsement: **Y-19**; **N-1** Rationale • The Standing Committee recognized the importance of reducing readmissions due to heart failure and the need for improved care coordination and recommended the measure for continued endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

Submission | Specifications

Description: The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Readmission is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. CMS annually reports the measure for patients who are 65 years or older and are enrolled in fee-for-service (FFS) Medicare hospitalized in non-federal hospitals.

Please note this measure has been substantially updated since the last submission; as described in S.3., the cohort has been expanded. Throughout this application we refer to this measure as version 8.2.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients 18 and older discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or over or (2) patients aged 18 years or older. We have specifically tested the measure in both age groups.

The cohort includes admissions for patients aged 18 years and older discharged from the hospital with principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis; and with a complete claims history for the 12 months prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

Additional details are provided in S.9 Denominator Details.

Exclusions: The readmission measures exclude index admissions for patients:

1. Discharged against medical advice (AMA);
2. Without at least 30 days post-discharge enrollment in FFS Medicare;
3. Admitted within 30 days of a prior index admission.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-20; N-0**; 1b. Performance Gap: **H-12**; **M-7**; **L-1**; **I-0**

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

Rationale:

- New evidence is provided since the last endorsement maintenance review. Since its last review, this measure has been updated to include an expanded cohort to include patients with aspiration pneumonia and sepsis.
- Data provided by the developer cover a total of 1,469,277 and show that pneumonia readmission rates ranges from a minimum of 13.1% to a maximum of 24.7%.
- Hospitals serving low proportion of Dual Eligible, African-American, and patients below AHRQ SES index score of 42.7 had lower readmission rates than those with high proportions of these patients.
- The Standing Committee reviewed the two measure updates. First, the measure has an expanded cohort including patients who have a principal diagnosis of sepsis and a secondary diagnosis of pneumonia that is present on admission, and patients who have a principal diagnosis of aspiration pneumoia. Second, the measure includes the updated planned readmissions algorithm noted for Measure #0330.
- The Standing Committee agreed that the measure still has a performance gap, with rates of pneumonia readmission ranging from 13.1 percent to 24.7 percent with an average rate of 17.5 percent.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-12**; **M-8**; **L-0**; **I-0** 2b. Validity: **H-1**; **M-17**; **L-1**; **I-0**

Rationale:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS.
- In addition, the developer compared frequencies and odds ratios of variables from their risk model across three years of data in order to assess the consistency of those variables over time.
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered an appropriate method of testing reliability.
- A total of 1,469,277 admissions over a 3-year period were examined, with 733,434 in one sample and 735,843 in the other randomly-selected sample. Two risk-standardized mortality rates (RSMR) were calculated for each hospital: one from each of the two separate samples. The agreement between the two RSMRs for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.73.
- The developer tested the original version of the measure by comparing the administrative model with a medical-record based model. The results of this testing are included in the citation Krumholz, 2008. The developer notes that the claims-based measure produced results which were highly correlated with those produced through manual chart audit. (Krumholz et al., 2008; Lindenauer et al., 2011)
- This measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital level 30-day risk-standardized readmission rate (RSRR). Variables considered for inclusion in the model were patient-level risk-adjustors that are expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including demographic factors (age, sex) and indicators of comorbidity and disease severity. The C-statistic is 0.63.
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- SDS variables were ultimately not included in model as the developer found that the effect size of each of these variables is small, the c-statistic (i.e., predictive value) is unchanged with the addition of any of these variables into the model, and the addition of any of these variables into the model has little to no effect on hospital performance.
- The Standing Committee questioned whether hospitals with a larger proportion of aspiration pneumonia patients did similar to other hospitals, to which the developers noted yes. Additionally, Standing

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
Committee members expressed concerns on the lack of data published on sensitivity and specificity for patients with sepsis and pneumonia as a secondary diagnosis in hospitals. Overall, the Standing Committee agreed this measure had sufficient reliability and validity testing to meet the criteria.
3. Feasibility: H-15; M-4; L-0; I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-4; M-15; L-0; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • It is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. • The Standing Committee agreed the measure is highly usable.
5. Related and Competing Measures • This measure is related to NQF #0279: Bacterial Pneumonia Admission Rate (PQI 11) and NQF #2882: Excess days in acute care (EDAC) after hospitalization for pneumonia. The developer notes that the measures are not completely harmonized. The developer justifies the difference by noting that for outcome measures clinical coherence of the cohort takes precedence over alignment with related non-outcome measures.
Standing Committee Recommendation for Endorsement: **Y-18**; **N-1** Rationale • The Standing Committee recognized the importance of reducing readmissions due to pneumonia and the need for improved care coordination and discharge management and recommended the measure for continued endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Submission | Specifications

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: The measure includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission.

Additional details are provided in S.9 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals;
2. Without at least 30 days post-discharge enrollment in FFS Medicare;
3. Discharged against medical advice (AMA);
4. Admitted for primary psychiatric diagnoses;
5. Admitted for rehabilitation; or
6. Admitted for medical treatment of cancer.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Unchanged – no vote** 1b. Performance Gap: **H-3**; **M-15**; **L-1**; **I-0**

Rationale:

- The developer stated that there are no updates to the evidence since the last submission, so the Standing Committee agreed that there was no need for a repeat discussion or vote on evidence.
- Data provided by the developer cover a total of 22,000,000 admissions and show that readmission rates ranges from a minimum of 11.4% to a maximum of 20.1%.

- Hospitals serving low proportion of Dual Eligible, African-American, and patients below AHRQ SES index score of 45 had lower readmission rates than those with high proportions of these patients.
- The Standing Committee agreed that there continues to be a performance gap, with all cause readmission rates ranging from 11.4 percent to 20.1 percent with an average of 15.4 percent.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-8**; **M-11**; **L-0**; **I-0** 2b. Validity: **H-8**; **M-11**; **L-0**; **I-0**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS.
- In addition, the developer compared frequencies and odds ratios of variables from their risk model across three years of data in order to assess the consistency of those variables over time.
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered an appropriate method of testing reliability.
- A total of 6,843,808 admissions in the 2015 publicly reported measure, with 3,420,728 in one sample and 3,423,080 in the other randomly-selected sample. Two risk-standardized readmission rates (RSRR) were calculated for each hospital: one from each of the two separate samples. The agreement between the two RSRRs for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.80.
- The developer demonstrated measure validity through prior validity testing done on their other claims-based measures, through the use of established measure development guidelines, and examination of content validity by comparing hospital performance with that on other quality measures.
- This measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital level 30-day risk-standardized readmission rate (RSRR). Variables considered for inclusion in the model were patient-level risk-adjustors that are expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including demographic factors (age, sex) and indicators of comorbidity and disease severity.
- C-statistic for each cohort:
    - Medicine cohort: 0.643
    - Surgical cohort: 0.675
    - Cardiorespiratory cohort: 0.636
    - Cardiovascular cohort: 0.658
    - Neurology cohort: 0.622
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- SDS variables were ultimately not included in model as the developer found that the effect size of each of these variables is small, the c-statistic (i.e., predictive value) is unchanged with the addition of any of these variables into the model, and the addition of any of these variables into the model has little to no effect on hospital performance.
- The Standing Committee raised concerns that merging multiple cohorts into one group may mask the individual variance properties of the individual cohorts.
- The Standing Committee expressed that the modeling was laid out very explicitly and well-specified and generally agreed that the measure had sufficient reliability and validity testing to meet the reliability and validity criteria.

3. Feasibility: H-17; M-2; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
Rationale: • This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-7; M-12; L-0; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • It is currently used in the Hospital Inpatient Quality Report (IQR) Program. • The Standing Committee agreed the measure is highly usable.
5. Related and Competing Measures • This measure is related to NQF # 1768: Plan All-Cause Readmissions (PCR). This measure and the NCQA Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. Each of these measures has different specifications. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Standing Committee in 2011.
Standing Committee Recommendation for Endorsement: **Y-18**; **N-1** Rationale • The Standing Committee recognized the importance of reducing readmissions and the need for improved care coordination and discharge management and recommended the measure for continued endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

Submission | Specifications

Description: The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients discharged from the hospital with a principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have explicitly tested the measure in both age groups.

The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD (see codes below) OR a principal discharge diagnosis of respiratory failure (see codes below) with a secondary discharge diagnosis of acute exacerbation of COPD (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

Additional details are provided in S.9 Denominator Details.

Exclusions: The readmission measures exclude index admissions for patients:

1. Without at least 30 days post-discharge enrollment in FFS Medicare.

2. Discharged against medical advice (AMA);

3. Admitted within 30 days of a prior index admission.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **unchanged – no vote**; 1b. Performance Gap: **H-7**; **M-13**; **L-0**; **I-0**

Rationale:

- The developer states that there are no updates to the evidence since the last submission, so the Standing Committee agreed that there was no need for a repeat discussion on evidence.
- Data provided by the developer cover a total of 925,315 admissions and show that COP readmission rates

1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

ranges from a minimum of 15.5% to a maximum of 26.6%.

- Hospitals serving low proportion of Dual Eligible, African-American, and patients below AHRQ SES index score of 45 had lower readmission rates than those with high proportions of these patients.
- The Standing Committee agreed that the measure continues to have a performance gap with readmission rates for COPD ranging from 15.5 percent to 26.6 percent and an average of 20.2 percent.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-5**; **M-14**; **L-0**; **I-0** 2b. Validity: **H-8**; **M-12**; **L-0**; **I-0**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS.
- In addition, the developer compared frequencies and odds ratios of variables from their risk model across three years of data in order to assess the consistency of those variables over time.
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered to be an appropriate method of testing reliability.
- A total of 925,315 admissions over a 3-year period were examined, with 461,505 in one sample and 463,810 in the other randomly-selected sample. Two risk-standardized readmission rates (RSRR) were calculated for each hospital: one from each of the two separate samples. The agreement between the two RSRRs for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.48.
- The developer demonstrated measure validity through prior validity testing done on their claims-based measures, through use of established measure development guidelines, and by systematic assessment of measure face validity by a Technical Expert Panel (TEP).
- This measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital level 30-day risk-standardized readmission rate (RSRR). Variables considered for inclusion in the model were patient-level risk-adjustors that are expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including demographic factors (age, sex) and indicators of comorbidity and disease severity. The C-statistic is 0.64.
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- SDS variables were ultimately not included in model as the developer found that the effect size of each of these variables is small, the c-statistic (i.e., predictive value) is unchanged with the addition of any of these variables into the model, and the addition of any of these variables into the model has little to no effect on hospital performance.
- While there was discussion about the modest results of the reliability testing and the use of hierachical logistical modeling, the Standing Committee agreed that the measure met the reliability and validity criteria for NQF endorsement.

3. Feasibility: H-15 M-5 L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

<u>Rationale</u>:

- This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.

4. Usability and Use: H-9; M-11; L-0; I-0

1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences) Rationale: • It is currently used in the Hospital Inpatient Quality Report (IQR) and Hospital Readmissions Reduction (HRRP) Programs. • The Standing Committee noted that there are no unintended consequences for the measure, but had a few concerns regarding the advantages and disadvantages of the hierarchical approach how closely the predictive rate reflects hospital performance. • Overall, the Standing Committee felt the measure met the NQF criteria for usability and use.
5. Related and Competing Measures • This measure is related to NQF #0275: Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 5).
Standing Committee Recommendation for Endorsement: **Y-18**; **N-2** Rationale • The Standing Committee recognized the importance of reducing readmissions due to COPD and the need for improved care coordination and discharge management and recommended the measure for continued endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2827 PointRight® Pro Long Stay(TM) Hospitalization Measure

Submission | Specifications

Description: The PointRight Pro Long Stay Hospitalization Measure is an MDS-based, risk-adjusted measure of the rate of hospitalization of long-stay patients (aka "residents") of skilled nursing facilities (SNFs) averaged across the year, weighted by the number of stays in each quarter.

Numerator Statement: The numerator for the measure is the sum over four quarters of the counts of hospitalizations of the quarterly denominator populations, where hospitalizations comprise discharges directly from the SNF to an acute care hospital.

The count of hospitalizations excludes discharges from the SNF to LTACHs, IRFs, and psychiatric hospitals, and excludes admissions to acute care hospitals that directly follow a discharge from the SNF to a setting other than an acute care hospital.

However, if a patient is discharged from a SNF directly to an acute care hospital during a quarter at risk, the hospitalization will be counted in the numerator even if the patient was discharged to a setting other than an acute care hospital earlier in that quarter.

Hospitalizations are counted over at-risk intervals of 3 months at a time because this period is long enough to yield nonzero numerators even for SNFs with low rates of hospitalization, yet short enough so that almost all of the denominator population will be present in the facility for all, or almost all, of the period. The latter feature makes the calculation simpler than if the risk exposure was calculated by days or weeks.Four quarters of denominators and four quarters of numerators are summed to yield the values for the full measure period.

Denominator Statement: The quarterly denominator population consists exactly of those patients present in the SNF on the first day of the quarter (the "snapshot date") who meet the criterion for long stay on that date. The denominator for a quarter is the number of patients in the quarterly denominator population. The denominator for the measure is the sum of the quarterly denominators for the four quarters in the 12 month measure period.

The criterion for a patient's having a long stay is a cumulative length of stay in the facility of more than 100 days as of the snapshot date. The cumulative length of stay of a patient is the length of the current stay as of the snapshot date and plus the full lengths of stay of any previous stays that are linked to it. According to the criteria for linkage of stays used in the present measure, a stay in a SNF is linked to a subsequent stay in the SNF if the patient was discharged from the SNF to the community and was readmitted to the SNF within 10 days or fewer. All stays in a sequence of linked stays are included in the sum of days used to determine a patient's cumulative length of stay. In these criteria the term "community" comprises private residences and all organized settings that are primarily residential in character, including senior housing, independent living facilities, board and care homes, and assisted living facilities.

A patient can contribute multiple times to the denominator for a 12 month measure period. For example, a resident continuously present in the facility for a full year would contribute four to the denominator.

Exclusions: There are no exclusions from the denominator; all patients in the facility on the snapshot date who meet the long stay criterion on that date are included. However, the measure will not be reported for a SNF if the annual unknown outcome rate is greater than 10%.The definition of the annual unknown outcome rate is provided in S.11.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data

Measure Steward: American Health Care Association

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-7**; **M-11**; **L-0**; **I-0**

2827 PointRight® Pro Long Stay(TM) Hospitalization Measure

Rationale:

- As a rationale for measuring this health outcome, the developer suggests that skilled nursing facilities are able to influence rates of hospitalizations for long term care residents in an number of ways including structural interventions such as high staffing levels and nurse practitioner availability as well as process interventions such as early detection of signs and symptoms of impending infections (pneumonia, urinary tract infection, etc.) and chronic disease exacerbation (e.g. congestive heart failure, diabetes mellitus, etc.)
- The developer cited a 2010 study showing that 33% of SNFs hospitalization can be avoidable, and in 2005 (according to the same 2010 study), avoidable hospitalizations cost Medicare $3 billion and Medicaid $463 million. Additionally, the developer presented data obtained from the national MDS data from CMS, citing 437,356 long nursing home stays discharged to an acute hospital from the first quarter of 2015.
- The Standing Committee discussed the need for this measure, noting the lack of measures for this population, as well as the need to identify and study hospitalizations among long stay residents. The Standing Committee noted the current focus on short-term stay patients, rather than long-stay. The fact that many hospitalizations of this population can often be avoided (between 25% to 33% as stated by the Standing Committee), further emphasized the importance of this measure.
- The Standing Committee agreed the measure met the evidence criteria.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-4**; **M-14**; **L-0**; **I-0** 2b. Validity: **H-1**; **M-18**; **L-0**; **I-0**

Rationale:

- The developers performed three types of reliability testing including alignment of model independent values, reliability of rates over time, and the stability of facility level adjusted rate bootstrapping.
    - The developers compared the prevalence of the risk adjustment covariates between a testing sample of 2,096 SNFs and the national population and analyzed change from quarter to quarter in the observed and adjusted long-stay hospitalization rates.
- The developer explained that their reasoning was that the underlying probability of a SNF's long-stay patients hospitalizing and the characteristics of its long-stay patient population were unlikely to change greatly in a three month period so that most of the change from quarter to quarter would be due to limitations on measure reliability.
- The developer recalculated adjusted rates for the measure for CY 2014 using a random sample of stays. The developer then reviewed the distribution of differences between facilities' original adjusted rates and the rates calculated with the new sample. The developer interpreted a distribution of differences with a small variance and a mean of zero as acceptable measure stability or reliability.
    - The developer interpreted their results as representative of the SNF population and 48% of the comparable risk adjustment model covariates were found to have prevalence within 5% of the prevalence found in the national sample. 66% were found to have prevalence within 10% of the prevalence found in the national sample.
- The developer performed two methods of validity testing including agreement of model dependent variables, and the performance measure score in correlation with the SNF industry measures of quality.
    - The comparison showed that that 86% of hospitalizations of Medicare FFS patients identified by the MDS are confirmed by Medicare FFS claims; in the other direction, 98% (208,891 of 213,772) of acute inpatient claims found near an MDS discharge have an MDS discharge code of acute hospital.
    - The developer interprets this finding that MDS discharge assessments appear to be overstating the rate of acute hospitalizations to a moderate degree but that the overall high level of agreement between MDS discharge coding and claims supports the validity of the measure
- The differences between age and race categories were noted by the Standing Committee during the validity discussion. Although the developers noted discharge to community rates as well as other negative outcomes that differ by race and age, the Standing Committee noted that the measure itself is separate

from these issues. The Standing Committee agreed the developer had provided a conceptual reason not to include the small effects identified.
    - The developer stated that race was included because of the Standing Committee discussion from the year prior. However, upon further inspection and discussion with the developer, the Standing Committee requested that race be removed from the measure. Under instruction from NQF staff, the Standing Committee continued voting on the measure under the assumption that the developer would remove race at later date.
    - The developers have since updated the measure to remove race from the risk adjustment model.
- The risk adjustment model employed in the PointRight Pro Long Stay Hospitalization Rate utilizes four logistic regression models applied to four discrete subgroups of the denominator population to estimate risk of any hospitalization during a quarter at risk.
    - Logistic Regression Model Long Stay Group 1 c-statistic = .63
    - Logistic Regression Model Long Stay Group 2, c-statistic = .63
    - Logistic Regression Model Long Stay Group 3, c-statistic = .62
    - Logistic Regression Model Long Stay Group 4, c-statistic = .63
    - Linear Regression Model Rate of all Hospitalizations, R-squared = .99
- The Standing Committee also had questions about the dataset, but the developer confirmed that the measure is based on the Minimum Data Set (MDS) and therefore it is not based on claims data.
- The Standing Committee agreed this measure met the reliability and validity criteria.

3. Feasibility: H-12; M-7; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- The required data elements are routinely generated and used during care delivery. They are collected and used by healthcare personnel during the provision of care.
- Although some Standing Committee Members noted the burden that this measures can cause for a nursing home staff because of the changes that would likely results from the use of this measure, such as changing staffing patterns, the Standing Committee agreed the measure would be feasible and worth the effort.

4. Usability and Use: H-4; M-14; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- This measure is not currently reported but is planned for use in CMS' evaluation of SNF's clinical performance. Also, AHCA plans to publish this measure on its website for free use by AHCA members and other selected stakeholders. The Standing Committee raised the issue discussed under feasibility and the fact that effort would be required by nursing homes under this measure, but the Standing Committee agreed the measure was usable.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-18**; **N-1**

Rationale

- The Standing Committee recognized the importance of reducing the number of home health stays for patients who have a Medicare claim for an unplanned admission to an acute care hospital in the 60 days following the start of the home health stay and recommended the measure for endorsement.

6. Public and Member Comment

-

7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X

2827 PointRight® Pro Long Stay(TM) Hospitalization Measure
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2858 Discharge to Community

Submission | Specifications

Description: The Discharge to Community measure determines the percentage of all new admissions from a hospital who are discharged back to the community alive and remain out of any skilled nursing center for the next 30 days. The measure, referring to a rolling year of MDS entries, is calculated each quarter. The measure includes all new admissions to a SNF regardless of payor source.

Numerator Statement: The outcome measured is the number of new admissions from an acute care hospital discharge to community from a skilled nursing center. More specifically, the numerator is the number of stays discharged back to the community (i.e. private home, apartment, board/care, assisted living, or group home as indicated on the MDS discharge assessment form) from a skilled nursing center within 100 days of admission and remain out of any skilled nursing center for at least 30 days.

Denominator Statement: The denominator is the total number of all admissions from an acute hospital (MDS item A1800 "entered from"=03 (indicating an "acute care hospital") to a center over the previous 12 months, who did not have a prior stay in a nursing center for the prior 100 days (calculated by subtracting 100 from the admission date (MDS item A1900 "admission date").

Please note, the denominator only includes admissions from acute hospitals (MDS item A1800 "entered from"=03 (indicating an "acute care hospital") regardless of payor status.

Exclusions: The denominator has three exclusions (see below).

First, stays for patients less than 55 years of age are excluded from the measure.

Second, stays for which we do not where the patient entered from, or for which we do not observe the patient's discharge, are excluded from being counted in the denominator.

Third, stays with no available risk adjustment data (clinical and demographic characteristics listed in Section S.14) on any MDS assessment within 18 days of SNF admission are excluded from the measure.

Note, while not denominator exclusions, we also suppress the data for facilities that have fewer than 30 stays in the denominator, or for whom the percent of stays with a known outcome is less than 90%. The suppression of risk adjusted to community rates for facilities with fewer than 30 stays in the denominator is to improve the reliability of the measure, as detailed in the testing section (2b3). The suppression of rates for facilities for whom fewer than 90% of stays had a known outcome is done to improve the reliability of the measure and avoid perverse incentives about submitting MDS assessments for patients not discharged to the community.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data

Measure Steward: American Health Care Association

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-19; N-0**; 1b. Performance Gap: **H-7**; **M-12**; **L-0**; **I-0**

Rationale:

- The developer stated the rationale for the measure that improving national discharge to community rates directly aligns with NQS 3 aims of Better Care, Healthy People/Health Communities, and Affordable Care. The developer listed several studies from peer-reviewed journals that provide examples of clinical actions (identifying warning symptoms, medication reconciliation, follow-ups on labs and appointments, etc.) especially continuous communication between the patient/his family, staff at acute care hospitals and SNF staff lead to a patient- and family-centered improvement of quality of care.
- Studies show the majority of nursing home residents prefer community discharge over remaining in post-acute and long-term care but an estimated 10%-20% of nursing home residents capable of successfully

residing in the community with appropriate rehabilitative services and support in place do not get discharged and remain unnecessarily in institutionalized care.

- Extended SNF stays increase a patient's risk and exposure to health care-related infections and serious illnesses, such as Methicillin-resistant Staphylococcus aureus (MRSA) and clostridium difficile (C. difficile). Approximately 2 million infections occur in nursing homes each year (Strausbaugh & Joseph, 2000). Nearly 10-30% of nursing home residents are colonized with C. difficile at any given time (Makris & Gelone, 2007).
- The utilization of SNFs and discharge to community rates is not uniform across the nation or between communities. Non-uniform rates are reflective of inconsistent community practices and engagement in the SNF discharge to community process.
- The Standing Committee specifically noted the importance of this measure since it is the most direct signals of the policy objective to address discharge coordination planning. The Standing Committee noted the relationship this measure has to the ACHA Quality Initiative goal and the importance of measuring the discharge to community rates for skilled nursing facility patients.
- The Standing Committee noted that ten to 20 percent of nursing home residents that are capable of going back to the community remain institutionalized and reference exposure to health care associated infections, as well as psychosocial and financial challenges these residents may experience. The Standing Committee agreed this measure met the evidence criteria.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-3**; **M-16**; **L-0**; **I-X** 2b. Validity: **H-0**; **M-19**; **L-0**; **I-0**

<u>Rationale</u>:

- The developers used a replacement bootstrapping method and performance comparison between quarters to test for reliability.
- The developer conducted a random resampling of the population with replacement to simulate a facility or two facilities of similar size independently drawing patients from the same underlying patient population and compared outcomes before and after resampling.
    - It was found that if a SNF's patients were completely redrawn from the same underlying population (e.g. the same SNF a year in the future) or if two SNFs who each drew patients from the same underlying population were compared, 68% of the time they will remain ranked within ten percentiles of where they were before redrawing patients. In 96% of cases, they would shift less than thirty percentiles after random resampling.
- The developer tested the validity of the measure two ways. First, the coding of discharges was validated against matched Part A claims data. Secondly, the developer performed construct validity testing by correlating risk adjusted discharge to community rates with certain other measures hypothesized to be driven by the same factors driving discharge to community rates.
    - The developers found a negative and statistically significant relationship between the discharge to community rate and the short stay rehospitalization rate (Pearson's correlation =-0.092, p<.0001).
    - The developer noted this negative correlation was expected because higher scores of discharge to community measure are indicative of higher quality, whereas lower scores of the short stay rehospitalization rate are indicative higher quality.
        - The developer also found statistically significant correlations between the discharge to community rate and the CMS Nursing Home Compare Short Stay quality measures. These findings were interpreted as supporting the construct validity of the discharge to community measure.
- The risk adjustment model includes 60 risk adjustment variables, which were encoded in 116 variables in the final risk model (including interaction terms, multilevel factor variables, etc.).
- SDS variables were analyzed in the same way as all other variables. The developer did not do any separate analyses on these variables.
- Ultimately the developers included age, sex, and marital status.

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• The C-statistic was 0.820. • The Standing Committee noted the two separate reliability methods used, include replacement bootstrapping and performance comparison. The Standing Committee agreed the measure met the reliability criterion. • The Standing Committee noted that the measure was adjusted for age, gender, and marital status. The developers noted the correlation between discharges to the community and higher quality care, which was generally agreed upon by the Standing Committee. The Standing Committee agreed the measure met the scientific acceptability criteria.
3. Feasibility: H-16; M-3; L-0; I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • All measure data elements are in defined fields in electronic claims (e.g., clinical registry, nursing home MDS, home health OASIS) and routinely collected by and used by healthcare personnel during the provision of care. It was determined that this measure did not present collection burden because it relies solely on data items from the MDS 3.0 that all facilities are already required to submit. • The Standing Committee noted that there would likely be fluctuation between quarter to quarter due to missing rates, but overall agreed the measure was feasible.
4. Usability and Use: H-4; M-15; L-0; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • This measure is currently publicly reported and is used in an accountability program. The measure is currently used for quality improvement and benchmarking. • The measure has been in use since 2014 and the Standing Committee noted a 3.6% increase. The Standing Committee made a suggestion to provide more clarification in the title, but overall agreed the measure would be highly usable.
5. Related and Competing Measures • No related or competing measures noted.
Standing Committee Recommendation for Endorsement: **Y-19**; **N-0** Rationale • The Standing Committee recognized the importance of improving national discharge to community rates and recommended the measure for endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)

Submission | Specifications

Description: This facility-level measure estimates an all-cause, unplanned, 30-day, risk-standardized readmission rate for adult Medicare fee-for-service (FFS) patients with a principal discharge diagnosis of a psychiatric disorder or dementia/Alzheimer's disease.

The performance period for the measure is 24 months.

Numerator Statement: The measure estimates the incidence of unplanned, all-cause readmissions to IPFs or short-stay acute care hospitals following discharge from an eligible IPF index admission. We defined readmission as any admission that occurs on or between Days 3 and 30 post-discharge, except those considered planned.

Denominator Statement: The target population for this measure is Medicare FFS beneficiaries aged 18 years and older discharged from an inpatient psychiatric facility with a principal diagnosis of a psychiatric disorder. Eligible index admissions require enrollment in Medicare Parts A and B for 12 months prior to the index admission, the month of admission, and at least 30 days post discharge. Patients must be discharged alive to a non-acute setting (not transferred). A readmission within 30 days is eligible as an index admission, if it meets all other eligibility criteria.

Exclusions: The measure excludes admissions for patients:

- Discharged against medical advice (AMA)
- With unreliable data (e.g. has a death date but also admissions afterwards)
- With a subsequent admission on day of discharge and following 2 days (transfers/interrupted stay period)

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Behavioral Health/Psychiatric : Inpatient

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-1**; 1b. Performance Gap: **H-8**; **M-10**; **L-1**; **I-0**

Rationale:

- An analysis of Medicare claims data found that over 20% of patients who receive psychiatric care in an inpatient setting are readmitted within 30 days of discharge.
- The Standing Committee stressed the evidence that readmission rates can be lowered though care coordination interventions and discharge planning practices, such as improving care management and connecting patients to services in their communities. The Standing Committee noted that a lack of care coordination is an on-going issue in behavioral health and that rates of connection with aftercare following discharge from an inpatient facility are low.
- The measure developer provided the distribution of 11.0% to 35.4% with an average rate of 21.0%
- The Standing Committee noted there is a need for an increased focus on admissions, readmissions, and care coordination issues in behavioral health. In particular, the Standing Committee noted that the limited data available suggests readmissions for behavioral health may be higher than general medical/surgical readmissions and that there are currently very low rates of connections to aftercare.
- The Standing Committee agreed that there were interventions such as intensive care management and connections to services in the community that could improve the results of this measure.
- The Standing Committee noted unique challenges in the behavioral health setting and raised concerns about the impact of access to care on this measure. The Standing Committee raised concerns that this measure should be implemented carefully to avoid worsening access issues.

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- Based on these results the Standing Committee concurred a gap in care exists and that there is an opportunity for improvement.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-3**; **M-16**; **L-0**; **I-0** 2b. Validity: **H-0**; **M-16**; **L-4**; **I-0**

<u>Rationale</u>:

- To test the reliability of the measure, the developer calculated the intra-class correlation coefficient (ICC) using a test-retest approach that examines the agreement between repeated measures of the same IPF for the same time period.
- The developer used two test-retest approaches to generate independent samples of patients within the same IPF: a split-half sampling design and bootstrapping.
    - For split-half sampling, the developer randomly sampled half of all eligible index admissions in each facility over the two-year period, resulting in two samples that cover the same two-year period but with case volume the size of a measure that would be calculated with one year of data. The ICC in the split-half sampling design was estimated using the RSRRs of the two split-half samples.
    - A total of 716,174 admissions over a 2-year period were examined, with 358,087 in each randomly-selected sample. The RSRR was estimated for each sample using a hierarchical logistic regression model. The average RSRR in the two-split-half samples had means of 21.03% and 20.93 percent. The agreement between the two RSRRs for (as measure by an intra-class correlation coefficient (ICC)) was 0.60.
    - For bootstrapping, the developer sampled 1,000 pairs of samples from the original measure cohort with replacement (stratified sampling by IPF), resulting in 1,000 pairs of new samples within each IPF with the identical sample size as in the original measure cohort, thus maintaining the sample size of a two-year measure. The ICC in the bootstrap sampling was estimated for each pair of the bootstrap samples. With the 1,000 ICC estimates from the 1,000 pairs of bootstrap samples, the developer determined the distribution of estimated ICC coefficients and thus could calculate the mean and 95% CI of the ICC.
    - The ICC obtained from the bootstrapping approach, comparing 1,000 pairs of samples of the original measurement cohort, which were sampled with replacement yielding an identical sample size as the original measurement cohort, is 0.78 (95% CI 0.77-0.80).
- The developer performed a systematic assessment of face validity of the measure score. Face validity of the measure score was obtained by a TEP vote at the conclusion of measure development.
- This measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital level 30-day risk-standardized readmission rate (RSRR). To validate the risk adjustment model, the developer used bootstrapping in which 1,000 bootstrap samples were randomly drawn from the original dataset with replacement. The bootstrap samples were used as the development dataset, and the original cohort was used as the comparison dataset. The C-statistic was 0.660.
- To select clinical risk factors, the developers employed a stepwise logistic regression process with backward elimination of variables, using 100 bootstrap samples derived from the entire measure population via random selection with replacement. The developer retained all variables in the stepwise backward elimination that showed an association with readmission at p<.15 in 70% of the bootstrap samples.
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources. Given the complexity of accurately measuring SDS in current datasets, the developers do not think the empirical evidence is strong enough to warrant inclusion of any of the current SDS variables in the risk model for this measure.

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• The Standing Committee raised concerns about the number of patients being excluded because of transfers and interrupted stays. In particular, the Standing Committee raised concerns that this excludes the sizeable number of patients who are discharges from an IPF but readmitted a day or two later. However, the Standing Committee recognized that at this time it is not possible to capture this data from Medicare claims. The Standing Committee expressed a desire to see this issue explored further in the future. • The Standing Committee raised concerns about the 24 month timeframe for this measure but accepted the developer's rationale that this would allow more facilities to achieve the minimum threshold of 25 cases. • The Standing Committee urged the developer to consider ways to expand the measure beyond Medicare patients. • The Standing Committee agreed this measure met the reliability and validity criteria.
3. Feasibility: H-12; M-8; L-0; I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • This measure is collected through administrative claims data. • The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-6; M-13; L-1; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • The measure is not currently publicly reported, but it is intended for use in the Inpatient Psychiatric Facility Quality Reporting Program. • The Standing Committee noted the need to be able to measure readmissions in behavioral health, however the Standing Committee recognized the challenges of patient engagement in this population • The Standing Committee did express concerns about the unintended consequences of this measure, in particular they noted the need to protect access to care and to balance this measure with measures addressing outcomes like mortality.
5. Related and Competing Measures • No related or competing measures noted.
Standing Committee Recommendation for Endorsement: **Y-19**; **N-1** Rationale • The Standing Committee recognized the importance of reducing readmissions to inpatient psychiatric facilities and the need for improved care coordination and discharge management. The Standing Committee noted the unique challenges of connecting with follow-up care in behavioral health and also noted the need to monitor other outcomes in this population such as mortality.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data

Submission | Specifications

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized readmission ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is Medicare Fee-for-Service beneficiaries who are 65 years or older.

This Hybrid Hospital-Wide Readmission (HWR) measure is a re-engineered version of measure 1789, the Hospital-Wide All-Cause Unplanned Readmission Measure which was developed for patients 65 years and older using Medicare claims and is currently publically reported in the Hospital Inpatient Quality Reporting Program. This reengineered measure uses clinical data elements from patients' electronic health records in addition to claims data for risk adjustment.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: The measure includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories)with a complete claims history for the 12 months prior to admission.

Additional details are provided in S.9 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals;
2. Without at least 30 days post-discharge enrollment in FFS Medicare;
3. Discharged against medical advice (AMA);
4. Admitted for primary psychiatric diagnoses;
5. Admitted for rehabilitation; or
6. Admitted for medical treatment of cancer.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data

1a. Evidence: **Y-19; N-0**; 1b. Performance Gap: **H-2**; **M-17**; **L-0**; **I-0**

Rationale:

- This hybrid measure estimates a hospital-level risk-standardized readmission rate (RSRR) for unplanned readmission for any eligible condition within 30 days of hospital discharge, using both claims and electronic health record data (EHR). Electronic clinical information is added into the risk adjustment model to enhance the face validity and performance of the measure.
- The Standing Committee noted that the while the opportunity for improvement on this measure may be the same as #1789, the inclusion of clinical data through hybrid measures is an opportunity for innovation for future measures and could improve and enhance quality measurement.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-0**; **M-17**; **L-1**; **I-0** 2b. Validity: **M-16**; **L-2**; **I-0**

Rationale:

- Reliability testing was performed at both the measure score and data element levels. The measure was developed to avoid the use of claims data elements through to be coded inconsistently across hospitals, instead using filed that are consequential for payment and which are audited by CMS. In addition, the developer compared frequencies and odds ratios of variables from their risk model across three years of data in order to assess the consistency of those variables over time. The performance score was assessed through test-retest reliability. The agreement between the two RSRRs for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.688.
- The Standing Committee noted that the developers used Health Quality Measure Format (HQMF) specifications and used the Value Set Authority Center (VSAC) for their code sets. Additionally, the measure was created using the measure authoring tool (MAT). The use of these tools should help to ensure this measure can be implemented reliability.
- However, the Standing Committee expressed concerns about the reliability of EHR data and that the measurement error associated with EHRs is going to be different from measurement error associated with claims data.
- The validity of the measure was assessed through face validity. The measure was tested at both the measure score and data element levels.
- The measure employs a hierarchical logistic regression model (a form of hierarchical generalized linear model [HGLM]) to create a hospital-level 30-day risk-standardized readmission rate (RSRR).
- Several critical clinical data elements used in the measure's risk models were derived from patients' electronic medical records. When this measure is implemented, CMS intends to obtain these critical data elements from hospital EHRs and merge the data with claims data to calculate and report measure results.
- The developer tested the validity of electronic extraction of these critical data elements as part of a more comprehensive evaluation of a larger set of core clinical data elements (CCDEs). The CCDE are a set of 21 EHR data elements that are captured on most adults (plus Troponin, which is a condition-specific CCDE for patients with acute myocardial infarction) admitted to acute care hospitals, are easily extracted from EHRs, and can be used to risk adjust hospital outcome measures for a variety of conditions and procedures. All of the critical data elements used in the Hybrid HWR measure are included in the CCDE.
- The addition of electronic clinical data results in a small improvement in risk model discrimination.
- The developer tested the impact of SDS variables on the risk model. The developer ultimately chose not to include these variables in the model because the effect size of each of these variables is small, the c-statistic (i.e., predictive value) is unchanged with the addition of any of these variables into the model, and the addition of any of these variables into the model has little to no effect on hospital performance.
- C-statistic for each co-hort:
    - Medicine cohort: 0.651
    - Surgery/Gynecology cohort: 0.802
    - Cardiorespiratory cohort: 0.668

- Cardiovascular cohort: 0.731
- Neurology cohort: 0.708

3. Feasibility: H-2; M-16; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- This measure is based on administrative claims data and electronic clinical data, which will be collected from hospitals using MAT output and value sets to inform data queries and electronic reporting requirements.

4. Usability and Use: H-6; M-11; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- This measure is intended for implementation in the Hospital Inpatient Quality Reporting (IQR) program. The Standing Committee noted that if the data needed to calculate this measure can be feasibly reported it is useful for that purpose.

5. Related and Competing Measures

- This measure directly competes with NQF #1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR). The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary risk-standardized readmission rate (RSRR), derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. Admissions for planned procedures that are not accompanied by an acute diagnosis do not count as readmissions in the measure outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older and are enrolled in fee-for-service (FFS) Medicare and hospitalized in non-federal hospitals.
- The Standing Committee justified including both measures in the portfolio because #2879 includes additional clinical variables in the risk adjustment model and these additional variables are obtained through EHR data. Due to the current challenges of collecting and reporting EHR data the Standing Committee felt that #2879 may not be ready for wide scale implementation and that both measures should be endorsed.

Standing Committee Recommendation for Endorsement: **Y-16**; **N-2**

Rationale

- The Standing Committee noted that this measure represented an important improvement to quality measurement. Linking claims and electronic clinical data could allow for the inclusion of important new variables in risk adjustment models. However, the Standing Committee recognized the challenges to using and reporting EHR data and to using a measure across EHR systems. The Standing Committee felt that this hybrid measure offered increased risk model discrimination over the claims-based version (NQF #1789) making it suitable for endorsement.

6. Public and Member Comment

-

7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X

2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2880 Excess days in acute care (EDAC) after hospitalization for heart failure

Submission | Specifications

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for heart failure to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with heart failure by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.

Numerator Statement: The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index heart failure hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full-day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.

Denominator Statement: The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-Federal acute care hospitals for heart failure.

The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of heart failure (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

Additional details are provided in S.9 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. Without at least 30 days post-discharge enrollment in FFS Medicare.

2. Discharged against medical advice (AMA);

3. Admitted within 30 days of a prior index discharge.

For 2016 public reporting, the measure will also exclude:

4. Admissions with a procedure code for left ventricular assist device (LVAD) implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission. Patients with these procedures are a highly selected group of patients with different risk of the outcome. This exclusion will be added to the heart failure EDAC measure so that it remains fully harmonized with the CMS 30-day heart failure readmission measure. We did not exclude patients with LVAD or heart transplantation from the cohort of admissions used in the analyses for measure development and testing presented here.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-16; N-2**; 1b. Performance Gap: **H-7**; **M-11**; **L-0**; **I-0**

Rationale:

- The developer cites that "the increasing use of ED visits and observation stays has raised concerns that

current readmission measures do not capture the full range of unplanned acute care in the post-discharge period" (Vashi et al., 2013; Rising et al., 2012; Feng et al., 2012).
- Additionally, the developer notes that "observation stays can occur in many different parts of the hospital, including dedicated treatment rooms, the ED, or inpatient units. In particular, there is concern that high use of observation stays could in some cases replace readmissions, and that hospitals with high rates of observation stays in the post-discharge period may therefore have low readmission rates that do not accurately reflect the quality of care (Vashi et al., 2013)."
- Data provided by the developer cover a total of 575,672 discharges and show that heart failure readmission rates ranges from a minimum of -67 to a maximum of 196.
- The Standing Committee noted that the measure identifies a significant gap in performance with the 10th percentile at -29 days and the 90th percentile at 44.4 days. The Commmittee agreed that the measure met the NQF importance to measure and report criteria.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-0**; **M-17**; **L-1**; **I-0** 2b. Validity: **H-1**; **M-16**; **L-1**; **I-0**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS. Additionally, the developer used the final risk-adjustment variables in the existing, NQF-endorsed measure of hospital-level risk-standardized readmission rates following AMI (NQF #0505).
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method.
- For test-retest reliability, the developer calculated the EDAC for each hospital using first the development sample, then the validation sample. Thus, each hospital twice was measured twice, each time using an entirely distinct set of patients. The developer states that the extent to which the calculated measures of these two subsets agree is evidence that the measure is assessing an attribute of the hospital, not of the patients. As a metric of agreement, the developer calculated the intra-class correlation coefficient (ICC) as defined by ICC[2,1] by Shrout and Fleiss (1979) and assessed the values according to conventional standards (Landis and Koch, 1977).
- A total of 1,180,895 admissions were examined, with 590,448 in one sample and 590,447 in the other. The agreement between the two EDAC values for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.73.
- The developer demonstrated measure validity through prior validity testing done on their claims-based measures, through use of established measure development guidelines, and by systematic assessment of measure face validity by a Technical Expert Panel (TEP).
- The measure employs a hierarchical generalized linear model [HGLM]) that consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days).
- The developers also considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- The developers state that both the patient-level and hospital-level dual eligible and race effects were significant in the logistic part of the HF EDAC model, but only the hospital-level effect was significant in the Poisson part of the model. This indicates that a) both the patient- and hospital-level dual eligible and

race effects are associated with an increased risk of acute care but b) only the hospital-level effect is associated with the expected duration of that care. The developers note that if the dual eligible or race are used in the model to adjust for patient-level differences, then some of the differences between hospitals would also be adjusted for, potentially obscuring a signal of hospital quality.

- The developers state that given these findings and complex pathways that could explain any relationship between SDS and readmission, they did not incorporate SDS variables into the measure.
- For the logit model of zero versus non-zero days, which includes all patients in the cohort, the developers calculated the c-statistic.
    - C-statistic for logit part of model: 0.587
- For the Poisson model of non-zero days, which includes only patients with some acute care, the developers calculated the deviance R2. The deviance R2 is computed from the difference in the log-likelihoods between the final model and an empty model (no covariates) attributed to each observation, averaged over all observations.
    - Deviance R2 for truncated Poisson part of model: 0.026 (2.6%)
- Several Standing Committee members had concerns that this new methodology may cause confusion, since it is not the usual observed to expected ratio. Standing Committee members noted that this format for measure reporting may require education since it is not as consistent with the methods used in the past for other readmissions measures.
- The Standing Committee noted that unlike readmission rates, this measure captures a normalized number of days after hospitalization and may not be easily be compared across conditions.
- Standing Committee members noted that the empirical testing showed a Poisson correlation of 0.714 and the TEP agreement was around 92 percent, with 83 percent of the TEP in moderate or strong agreement. However, the Standing Committee had concerns about the c-statistic of 0.59, which is not very good.
- The Standing Committee agreed this measure met the reliability and validity criteria.

3. Feasibility: H-13; M-3; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.

4. Usability and Use: H-1; M-15; L-2; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- This measure in not currently publicly reported, but was finalized for use in CMS' Hospital Inpatient Quality Report (IQR) program starting in FY 2018.

5. Related and Competing Measures

- This measure is related to NQF #0330: Hospital 30-day All-Cause RSRR Following Heart Failure Hospitalization. The developers note that both measures are harmonized.

Standing Committee Recommendation for Endorsement: **Y-16**; **N-1**

Rationale

- The Standing Committee agreed that this measure is an important contribution to performance measurement as it captures the potiental unintended negative consequences of increased ED use and observation stays when measuring readmissions. Standing Committee members emphasized that the developers should communicate the differences between these measures and the readmissions measures so there is no confusion, since the reporting format is not as consistent with methods used in the past.

6. Public and Member Comment

-

2880 Excess days in acute care (EDAC) after hospitalization for heart failure
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)

Submission | Specifications

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for acute myocardial infarction (AMI) to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with AMI by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.

Numerator Statement: The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index AMI hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.

Denominator Statement: The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-federal acute care hospitals for AMI.

The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of AMI (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

Additional details are provided n S.9 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. Without at least 30 days post-discharge enrollment in FFS Medicare;

2. Discharged against medical advice (AMA);

3. Admitted within 30 days of a prior index discharge;

4. Admitted and then discharged on the same day (because it is unlikely these are clinically significant AMIs).

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-12**; **M-6**; **L-0**; **I-0**

<u>Rationale</u>:

- The developer cites that "the increasing use of ED visits and observation stays has raised concerns that current readmission measures do not capture the full range of unplanned acute care in the post-discharge period" (Vashi et al., 2013; Rising et al., 2012; Feng et al., 2012).
- Additionally, the developer notes that "observation stays can occur in many different parts of the hospital, including dedicated treatment rooms, the ED, or inpatient units. In particular, there is concern that high use of observation stays could in some cases replace readmissions, and that hospitals with high rates of observation stays in the post-discharge period may therefore have low readmission rates that do

not accurately reflect the quality of care (Vashi et al., 2013)."

- Data provided by the developer cover a total of 232,954 discharges and show that AMI readmission rates range from a minimum of -54 to a maximum of 170.
- Similar to NQF #2880, the Standing Committee agreed that the measure has a significant performance gap with the 10th percentile -23 days to the 90th percentile at 46 days among hospitals. The Standing Committee agreed that the measure is important to measure and report.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-0**; **M-18**; **L-0**; **I-0** 2b. Validity: **H-1**; **M-17**; **L-0**; **I-0**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS. Additionally, the developer used the final risk-adjustment variables in the existing, NQF-endorsed measure of hospital-level risk-standardized readmission rates following AMI (NQF #0505).
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method.
- For test-retest reliability, the developer calculated the EDAC for each hospital using first the development sample, then the validation sample. Thus, each hospital twice was measured twice, each time using an entirely distinct set of patients. The developer states that the extent to which the calculated measures of these two subsets agree is evidence that the measure is assessing an attribute of the hospital, not of the patients. As a metric of agreement, the developer calculated the intra-class correlation coefficient (ICC) as defined by ICC[2,1] by Shrout and Fleiss (1979) and assessed the values according to conventional standards (Landis and Koch, 1977).
- A total of 496,716 admissions were examined, with 248,358 in each sample. The agreement between the two EDAC values for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.54.
- The developer demonstrated measure validity through prior validity testing done on their claims-based measures, through use of established measure development guidelines, and by systematic assessment of measure face validity by a Technical Expert Panel (TEP).
- The measure employs a hierarchical generalized linear model [HGLM]) that consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days).
- The developers considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- The developers state that both the patient-level and hospital-level dual eligible and race effects were significant in the logistic part of the AMI EDAC model, but only the hospital-level effect was significant in the Poisson part of the model. This indicates that a) both the patient- and hospital-level dual eligible and race effects are associated with an increased risk of acute care but b) only the hospital-level effect is associated with the expected duration of that care. The developers note that if the dual eligible or race are used in the model to adjust for patient-level differences, then some of the differences between hospitals would also be adjusted for, potentially obscuring a signal of hospital quality.
- The developers state that given these findings and complex pathways that could explain any relationship between SDS and readmission, they did not incorporate SDS variables into the measure
- The Standing Committee had moderate certainty that the measure scores are reliable and valid with an

2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)

intraclass correlation coefficient of 0.54, and a correlation with readmissions of 0.61.
• For the logit model of zero versus non-zero days, which includes all patients in the cohort, the developers calculated the c-statistic.
  ○ C-statistic for logit part of model: 0.60
• For the Poisson model of non-zero days, which includes only patients with some acute care, the developers calculated the deviance R2. The deviance R2 is computed from the difference in the log-likelihoods between the final model and an empty model (no covariates) attributed to each observation, averaged over all observations.
  ○ Deviance R2 for truncated Poisson part of model: 0.040 (4.0%)
• Standing Committee members expressed that the observed to predicted graph on this measure was better than the heart failure measure #2880.
• The Standing Committee agreed this measure met the reliability and validity criteria.

3. Feasibility: H-15; M-3; L-0; I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-4; M-14; L-0; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • This measure in not currently publicly reported, but was finalized for use in CMS' Hospital Inpatient Quality Report (IQR) program starting in FY 2018.
5. Related and Competing Measures • This measure is related to NQF #0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. The developers note that both measures are harmonized.
Standing Committee Recommendation for Endorsement: **Y-18**; **N-0** Rationale • The Standing Committee recognized the importance of reducing excess days in acute care due to acute myocardial infarction. The Standing Committee agreed that this measure is an important contribution to performance measurement as it captures the potential unintended negative consequences of increased ED use and observation stays when measuring readmissions. Standing Committee members emphasized that the developers should communicate the differences between these measures and the readmissions measures so there is no confusion, since the reporting format is not as consistent with the methods used in the past for readmissions measures.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2882 Excess days in acute care (EDAC) after hospitalization for pneumonia

Submission | Specifications

Description: This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for pneumonia to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with pneumonia by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, the Center for Medicare and Medicaid Services (CMS) will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.

Numerator Statement: The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index pneumonia hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.

Denominator Statement: The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-Federal acute care hospitals for pneumonia.

The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of pneumonia (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

Additional details are provided n S.9 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. Without at least 30 days post-discharge enrollment in FFS Medicare.

2. Discharged against medical advice (AMA);

3. Admitted within 30 days of a prior index discharge;

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-13**; **M-4**; **L-0**; **I-0**

<u>Rationale</u>:

- The developer cites that "the increasing use of ED visits and observation stays has raised concerns that current readmission measures do not capture the full range of unplanned acute care in the post-discharge period" (Vashi et al., 2013; Rising et al., 2012; Feng et al., 2012).
- Additionally, the developer notes that "observation stays can occur in many different parts of the hospital, including dedicated treatment rooms, the ED, or inpatient units. In particular, there is concern that high use of observation stays could in some cases replace readmissions, and that hospitals with high rates of observation stays in the post-discharge period may therefore have low readmission rates that do not accurately reflect the quality of care (Vashi et al., 2013)."
- Data provided by the developer cover a total of 495,130 discharges and show that pneumonia

readmission rates ranged from a minimum of -67 to a maximum of 229.

- The Standing Committee agreed that the measure had fairly large performance gap that ranged from 67 days to 230 days and thus important to measure and report.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-5**; **M-12**; **L-0**; **I-0** 2b. Validity: **H-0**; **M-17**; **L-1**; **I-0**

<u>Rationale</u>:

- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS. Additionally, the developer used the final risk-adjustment variables in the current CMS 30-day pneumonia readmission measure.
- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method.
- For test-retest reliability, the developer calculated the EDAC for each hospital using first the development sample, then the validation sample. Thus, each hospital twice was measured twice, each time using an entirely distinct set of patients. The developer states that the extent to which the calculated measures of these two subsets agree is evidence that the measure is assessing an attribute of the hospital, not of the patients. As a metric of agreement, the developer calculated the intra-class correlation coefficient (ICC) as defined by ICC[2,1] by Shrout and Fleiss (1979) and assessed the values according to conventional standards (Landis and Koch, 1977).
- A total of 990,260 admissions were examined, with 495,130 in each sample. The agreement between the two EDAC values for each hospital (as measured by an intra-class correlation coefficient (ICC)) was 0.80.
- The developer demonstrated measure validity through prior validity testing done on their claims-based measures, through use of established measure development guidelines, and by systematic assessment of measure face validity by a Technical Expert Panel (TEP).
- The measure employs a hierarchical generalized linear model [HGLM]) that consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days).
- The developers considered a number of variables related to sociodemographic status (SDS) for potential inclusion in the risk-adjustment model. Candidate SDS variables were selected for examination based on a review of literature and national data sources.
- The developers state that both the patient-level and hospital-level dual eligible and race effects were significant in the logistic part of the pneumonia EDAC model, but only the hospital-level effect was significant in the Poisson part of the model. This indicates that a) both the patient- and hospital-level dual eligible and race effects are associated with an increased risk of acute care but b) only the hospital-level effect is associated with the expected duration of that care. The developers note that if the dual eligible or race are used in the model to adjust for patient-level differences, then some of the differences between hospitals would also be adjusted for, potentially obscuring a signal of hospital quality.
- The developers state that given these findings and complex pathways that could explain any relationship between SDS and readmission, they did not incorporate SDS variables into the measure.
- For the logit model of zero versus non-zero days, which includes all patients in the cohort, the developers calculated the c-statistic.
    - C-statistic for logit part of model: 0.616
- For the Poisson model of non-zero days, which includes only patients with some acute care, the

2882 Excess days in acute care (EDAC) after hospitalization for pneumonia
developers calculated the deviance R2. The deviance R2 is computed from the difference in the log-likelihoods between the final model and an empty model (no covariates) attributed to each observation, averaged over all observations. o Deviance R2 for truncated Poisson part of model: 0.034 (3.4%) • The Standing Committee had moderate certainty that the measure scores are reliable and valid, with an intraclass correlation coefficient of 0.8, and a correlation with readmissions of 0.7. The face validity of the measure had a 91 percent agreement, of which 83 perfect were moderate or strong agreement. • The Standing Committee agreed that this measure met the reliability and validity criteria and encouraged the developer to continue to test innovative approaches to improve the the prediction accuracy of this measure and others like it.
3. Feasibility: H-14; M-4; L-0; I-0 *(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)* Rationale: • This measure is collected through administrative claims data. The Standing Committee agreed the measure would be feasible to collect and implement.
4. Usability and Use: H-2; M-14; L-2; I-0 *(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)* Rationale: • This measure in not currently publicly reported, but may be used in one or more CMS programs, such as the IQR program. • The Standing Committee agreed that this measure met the NQF usability and use criteria.
5. Related and Competing Measures • This measure is related to NQF #0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization. The developers note that both measures are harmonized.
Standing Committee Recommendation for Endorsement: **Y-18**; **N-0** Rationale • The Standing Committee recognized the importance of reducing excess days in acute care due to pneumonia. The Standing Committee agreed that this measure is an important contribution to performance measurement as it captures the potential unintended negative consequences of increased ED use and observation stays when measuring readmissions. Standing Committee members emphasized that the developers should communicate the differences between these measures and the readmissions measures so there is no confusion, since the reporting format is not as consistent with the methods used in the past for readmissions measures.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-; N-
9. Appeals

2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure

Submission | Specifications

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with heart failure

Numerator Statement: The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)

Denominator Statement: The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of heart failure.

Exclusions: The measure excludes:

1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death).

Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).

2. Patients with left ventricular assist devices (LVADs).

Rationale: We exclude these patients because while they have a high risk of admission, they are low in prevalence and are clustered among a few ACOs.

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Integrated Delivery System

Setting of Care: Ambulatory Care : Clinician Office/Clinic, Other

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-11**; **M-8**; **L-0**; **I-0**

Rationale:

- The developer provided data from ACO performance score using the 2012 Medicare Full Sample which showed the crude US national Medicare FFS rate of acute, unplanned admissions per person-year among patients with heart failure was 85.5 per 100 person-years.
    - Among ACOs, the mean RSAAR for calendar year 2012 was 81.9 per 100 person-years (standard deviation = 11.6). The median RSAAR was 81.5 per 100 person-years (interquartile range [IQR] 73.6 to 88.8). The minimum RSAAR score was 53.7 per 100 person-years; the 5th percentile was 64.6 per 100 person-years; the 95th percentile was 101.7 per 100 person-years; and maximum score was 120.7 per 100 person-years.
    - They observed that 61 ACOs (53.5%) had RSAARs that were 'no different than the national rate' (of all Medicare FFS beneficiaries with heart failure). An additional 37 ACOs (32.5%) had 'better than the national rate' RSAAR scores and 16 (14.0%) were 'worse than the national rate, which signaled a gap in performance to the Standing Committee.
- The Standing Committee agreed that this measure fills an important gap and there is evidence of the relationship between clinical interventions and the ability to prevent hospitalizations. The Standing Committee noted that this measure will be helpful to accoutable care organizations (ACOs) and they attempt to improve quality and better understand their total costs but did express concerns that the measure could be challenging to use in a quality initiative program when the interventions to improve take time to establish and ACOs enter the program at different times.
- The Standing Committee suggested that future directions for measurement in this area could assess ED use, observation stays, and skilled nursing facility admissions.

2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure

- The Standing Committee agreed the measure met the evidence criterion.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-2**; **M-18**; **L-0**; **I-0** 2b. Validity: **M-14**; **L-6**; **I-0**

<u>Rationale</u>:

- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered an appropriate method of testing reliability.
    - The 2012 full Medicare sample was divided into two subsets of patients randomly. The developer calculated the measure score of all ACOs for each of the two subsets of patients. Each ACO was measured twice, but each measurement was made using distinct sets of measures. The interclass correlation coefficient (ICC) for the two subsets of patients was 0.81, which can be interpreted as excellent correlation, and thus reliable
- The Standing Committee raised concerns about the impact of sample size on reliability and questioned if there was a need for a minimum number of cases, particularly if the measure were to be applied to sample ACOs.
- The Standing Committee noted that this measure is calculated using fee-for-service claims and questioned how the transition to alternative payment models could impact this measure.
- The Standing Committee recommended that the developer continue to refine this measure to expand the population to patients under 65 to capture understudied populations and to promote public-private sector alignment.
- The developers provided a conceptual framework that was used to develop the risk adjustment model for this measure. This conceptual framework included 4 contextual domains that influence ACO performance including, physical environment, community resources, patient resources, and patient behavioral/personal preferences.
- The measure included demographic factors, and clinical risk factors present at the start of the measurement period.
- The measure developers reviewed 189 diagnosis groups included in the hierarchical condition category (HCC), and calculated the prevalence of each CC in the year preceding the measurement period. After examining the bi-variate analysis, the developers reduced the list to 22 candidate variables including age.
- The measure developers did not adjust for contextual factors that impact admissions; however, they did provide data demonstrating that including SDS adjustment did not make a meaningful difference to the measure score of the ACOs. The spearman correlation coefficient that estimated the difference in performance with and without SDS adjustment was 0.990. Thus, the results demonstrate that adjustment had little effect on the measure score.
- To assess the overall performance of their risk-adjustment model, the developers computed two summary statistics, including:
    - *Risk model discrimination statistics* (the model's ability to explain how successful the fit is in explaining the variation of the data. In this case, the r-sq value was 0.123. In other words, the model was able to explain 12.3% of the total deviance.
    - Overfitting indices (model calibration) [presented as (γ0, γ1)]:
        - The developer states that if the γ0 in the validation samples are substantially far from zero and the γ1 is substantially far from one, there is potential evidence of over-fitting. The calibration value of close to 0 at one end and close to 1 to the other end indicates good calibration of the model.
            - 2012 Development Sample (Index): (**0,1**)
            - 2012 Validation Sample: **(-0.0020, 1.0002)**
- Ultimately the Standing Committee agreed that this measure was reliable.
- The developer tested the validity of the measure using three different methods:

- Validity of the claims-based measures. The developer argues that other NQF endorsed mortality and readmission measures have been validated by comparing the claims to the medical records data elements. It is unclear if the risk adjustment validation approach that the developer cites is sufficiently similar to this measure and for this level of analysis and ambulatory patients.
- The developer also notes that this measure has been validated by using established measure development guidelines. While an important step for measure development, this method of validity testing has generally not been considered sufficient for demonstrating measure validity.
- Finally, the measure developer completed a systemic face validity assessment of this measure with 8 experts agreeing that this measure was a valid indicator of health care quality

- While the Standing Committee ultimately supported the developer's decision not to adjust for SDS factors that some of those factors did show a significant effect.
- .

3. Feasibility: H-12; M-7; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- All measure data elements are in defined fields in electronic claims and routinely generated or collected by and used by healthcare personnel during the provision of care, coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims).
- The Standing Committee agreed the measure was feasible.

4. Usability and Use: H-5; M-14; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is not currently used for public reporting or in an accountability program. However, this measure was included by CMS in the November 2014 Physician Fee Schedule final rule, and finalized adding the measure to the Medicare Shared Savings Program (MSSP) quality measure set. The measure is planned for pay-for-performance in the MSSP for 2017 reporting period.
- The Standing Committee agreed that this measure was useful but raised concerns that it may overlap with how CMS is using NQF #0277: Heart Failure Admission Rate (PQI 8) in the MSSP program.

5. Related and Competing Measures

- The Standing Committee raised concerns that that this measure may compete with NQF #0277 : Heart Failure Admission Rate (PQI 8), which calculates admissions with a principal diagnosis of heart failure per 100,000 population, ages 18 years and older and excludes cardiac procedure admissions, obstetric admissions, and transfers from other institutions. Measure #0277 and Measure #2886 both calculate the admissions of patients with heart failure.
- Measure #0277 measures those who are aged 18 years and older, and Measure #2886 only measures those aged 65 years and older.
- The Standing Committee will review these issues during a follow up call.

Standing Committee Recommendation for Endorsement: **Y-X**; **N-X**

Rationale

- The Standing Committee recognized the importance of reducing unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with heart failure and recommended the measure for endorsement.

6. Public and Member Comment

-

2886 Risk-Standardized Acute Admission Rates for Patients with Heart Failure
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes

Submission | Specifications

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with diabetes

Numerator Statement: The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)

Denominator Statement: The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of diabetes.

Exclusions: The measure excludes:

1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death).

Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Integrated Delivery System

Setting of Care: Ambulatory Care : Clinician Office/Clinic, Other

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-19; N-0**; 1b. Performance Gap: **H-7**; **M-13**; **L-0**; **I-0**

Rationale:

- The developer provided data from ACO performance score using the 2012 Medicare Full Sample which showed the mean risk-standardized acute admission rate (RSAAR) among ACOs for year 2012 is 39.6, median is 39.1.
    - They observed that 51 ACOs (44.7%) had RSAARs that were 'no different than the national rate' and 45 ACOs (39.5%) had RSAAR scores 'better than the national rate,' and 18 ACOs (15.8%) were 'worse than the national rate', which signaled a gap in performance to the Standing Committee.
- The Standing Committee agreed that this measure fills an important gap and there is evidence of the relationship between clinical interventions and the ability to prevent hospitalizations. The Standing Committee also noted that the measure shows evidence of disparities in care.
- The Standing Committee agreed the measure met the evidence criterion.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-2**; **M-17**; **L-0**; **I-0** 2b. Validity: **M-17**; **L-3**; **I-0**

Rationale:

- Datasets used for testing included Medicare Parts A and B claims, the denominator file, the Medicare Provider Analysis and Review (MedPAR) file, and the American Community Survey to derive the AHRQ SES index.
- With regard to data element reliability, the developer notes that the measure has been developed to avoid the use of claims data elements that are thought to be coded inconsistently across hospitals or providers, instead using fields that are consequential for payment and which are audited by CMS.
    - Summarizing the results of this analysis, the developer notes that the mean age and frequency of

risk-adjustment variables was similar among the two samples of 2012 data suggesting that the data elements are reliable across the samples.

- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method.
    - The 2012 full Medicare sample was divided into two subsets of patients randomly. The developer calculated the measure score of all ACOs for each of the two subsets of patients. Each ACO was measured twice, but each measurement was made using distinct sets of measures. The interclass correlation coefficient (ICC) for the two subsets of patients was 0.889, which can be interpreted as excellent correlation, and thus reliable.
- The developer tested the validity of the measure using three different methods:
    - Validity of the claims-based measures. The developer argues that other NQF endorsed mortality and readmission measures have been validated by comparing the claims to the medical records data elements. It is unclear if the risk adjustment validation approach that the developer cites is sufficiently similar to this measure and for this level of analysis and ambulatory patients.
    - The developer also notes that this measure has been validated by using established measure development guidelines. While an important step for measure development, this method of validity testing has generally not been considered sufficient for demonstrating measure validity.
    - Finally, the measure developer completed a systemic face validity assessment of this measure with 9 experts and two patients agreeing that this measure was a valid indicator of health care quality.
- The developers provided a conceptual framework that was used to develop the risk adjustment model for this measure. This conceptual framework included 4 contextual domains that influence ACO performance including, physical environment, community resources, patient resources, and patient behavioral/personal preferences.
- The measure included demographic factors, and clinical risk factors present at the start of the measurement period.
- The measure developers reviewed 189 diagnosis groups included in the hierarchical condition category (HCC), and calculated the prevalence of each CC in the year preceding the measurement period. After examining the bi-variate analysis, the developers reduced the list to 22 candidate variables including age.
- The measure developers did not adjust for contextual factors that impact admissions; however, they did provide data demonstrating that including SDS adjustment did not make a meaningful difference to the measure score of the ACOs. The spearman correlation coefficient that estimated the difference in performance with and without SDS adjustment was 0.981. Thus, the results demonstrate that adjustment had little effect on the measure score.
- To assess the overall performance of their risk-adjustment model, the developers computed two summary statistics, including:
    - *Risk model discrimination statistics* (the model's ability to explain how successful the fit is in explaining the variation of the data. In this case, the r-sq value was 0.218. In other words, the model was able to explain 21.8% of the total deviance.
    - Overfitting indices (model calibration) [presented as (γ0, γ1)]:
        - The developer states that if the γ0 in the validation samples are substantially far from zero and the γ1 is substantially far from one, there is potential evidence of over-fitting. The calibration value of close to 0 at one end and close to 1 to the other end indicates good calibration of the model.
            - 2012 Development Sample (Index): (**0,1**)
            - 2012 Validation Sample: **(0.0017, 1.0031)**
- The Standing Committee noted that the developed decided not to include SDS factors despite some change in model performance due to concerns about disparities and variations in performance.
- The Standing Committee raised questions about the classification of wound debridement as a planned

admission and therefore excluded from the measure. Ultimately the Standing Committee agreed with the developer's algorithm for exclusions.

- The Standing Committee noted the impact that self-selection bias could have on the results of this measure. Higher performing providers may be opting into forming ACOs leading to challenges comparing scores to the national average.

3. Feasibility: H-15; M-5; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- All measure data elements are in defined fields in electronic claims and routinely generated or collected by and used by healthcare personnel during the provision of care, coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims).
- The Standing Committee agreed the measure was feasible.

4. Usability and Use: H-5; M-14; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is not currently used for public reporting or in an accountability program. However, this measure was included by CMS in the November 2014 Physician Fee Schedule final rule, and finalized adding the measure to the Medicare Shared Savings Program (MSSP) quality measure set. The measure is planned for pay-for-performance in the MSSP for 2017 reporting period.
- Given the importance of managing diabetes in the ambulatory setting, the Standing Committee recommended that the developer explore ways to expand the admissions included in the measure. The Standing Committee noted that not all planned care represents a good outcome for the patient. Additionally the Standing Committee stressed the need not provide a disincentive to necessary acute care.

5. Related and Competing Measures

- This measure may compete with NQF #0272: Diabetes Short-Term Complications Admission Rate (PQI 01), which calculates admissions for a principal diagnosis of diabetes with short-term complications (ketoacidosis, hyperosmolarity, or coma) per 100,000 population, ages 18 years and older and excludes obstetric admissions and transfers from other institutions.
- This measure may compete with NQF #0274: Diabetes Long-Term Complications Admission Rate (PQI 03), which calculates Admissions for a principal diagnosis of diabetes with long-term complications (renal, eye, neurological, circulatory, or complications not otherwise specified) per 100,000 population, ages 18 years and older and excludes obstetric admissions and transfers from other institutions.
- This measure may compete with NQF #0638: Uncontrolled Diabetes Admission Rate (PQI 14), which calculates the admissions for a principal diagnosis of diabetes without mention of short-term (ketoacidosis, hyperosmolarity, or coma) or long-term (renal, eye, neurological, circulatory, or other unspecified) complications per 100,000 population, ages 18 years and older.
- All three of these related measures are also outcome measures and also measure admissions rates for patients with diabetes. Measures #0272, 0274, and 0638 measure those aged 18 years and older but Measure #2887 is only for those aged 65 years and older.
- Measures #0272, 0274, and 0638 are all in the hospital setting while Measure #2887 is in the ambulatory care setting.
- The Standing Committee will review these issues during a follow up call

Standing Committee Recommendation for Endorsement: **Y-18**; **N-2**

Rationale

- The Standing Committee recognized the importance of reducing unplanned hospital admissions among

2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes
Medicare Fee-for-Service (FFS) patients 65 years and older with diabetes and recommended the measure for endorsement.
6. Public and Member Comment •
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions

Submission | Specifications

Description: Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with multiple chronic conditions (MCCs)

Numerator Statement: The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)

Denominator Statement: Our target population is Medicare FFS patients aged 65 years and older whose combinations of chronic conditions put them at high risk of admission and whose admission rates could be lowered through better care. The National Quality Forum's (NQF's) "Multiple Chronic Conditions Measurement Framework," which defines patients with multiple chronic conditions 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 [1]."

Operationally, the measure cohort includes patients with diagnoses in two or more of eight chronic disease groups:

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. Heart failure
8. 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 5 million patients in 2012).

Citations:

1. National Quality Forum (NQF). Multiple Chronic Conditions Measurement Framework. 2012; http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=71227

Exclusions: The measure excludes:

1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death).

Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Integrated Delivery System

Setting of Care: Ambulatory Care : Clinician Office/Clinic

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Y-20; N-0**; 1b. Performance Gap: **H-4**; **M-16**; **L-0**; **I-0**

Rationale:

- The developer noted improvements in access to care, supporting self-care in the home, coordinating care across providers, and integrating social work, nursing, and medical services all have the potential to

improve admission rates for patients with multiple chronic conditions.

- Using data from the 2012 Medicare Full Sample with 4,937,344 patients, that was composed of 239,551 patients in 114 ACOs, and compared with the 71.9 admissions (per 100 person-years) - the US national Medicare FFS rate of acute, unplanned admissions among patients with MCCs, they found that:
  - The mean risk-standardized acute admission rate (RSAAR) among ACOs for year 2012 was 69.3, median was 68.5.
  - They observed that 45 ACOs (39.5%) had RSAARs that were 'no different than the national rate' and 22 ACOs (19.3%) had RSAAR scores 'worse than the national rate,' and 47 ACOs (41.2%) were 'better than the national rate", which signaled a gap in performance to the Standing Committee.
- The Standing Committee noted the need to for measures assessing multiple chronic conditions. The Standing Committee felt this measure could be an important first step to assessing the impact of frailty on readmissions.
- The Standing Committee felt there was a performance gap and that there were interventions an ACO could perform to improve performance.
- The Standing Committee agreed that this measure met the evidence criteria.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-3**; **M-17**; **L-0**; **I-0** 2b. Validity: **M-16**; **L-4**; **I-0**

<u>Rationale</u>:

- The developer's approach to assessing score-level reliability was to consider the extent to which assessments of a hospital using different but randomly-selected subsets of patients produce similar measures of hospital performance. The developers refer to this as a "test-retest" approach; it may also be called a "split-half" method. This is generally considered an appropriate method of testing reliability.
  - The 2012 full Medicare sample was divided into two subsets of patients randomly. The developer calculated the measure score of all ACOs for each of the two subsets of patients. Each ACO was measured twice, but each measurement was made using distinct sets of measures. The interclass correlation coefficient (ICC) for the two subsets of patients was 0.84, which can be interpreted as excellent correlation, and thus reliable.
- This measure estimates the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. 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."
- The developer tested the validity of the measure using three different methods:
  - Validity of the claims-based measures. The developer argues that other NQF endorsed mortality and readmission measures have been validated by comparing the claims to the medical records data elements. It is unclear if the risk adjustment validation approach that the developer cites is sufficiently similar to this measure and for this level of analysis and ambulatory patients.
  - The developer also notes that this measure has been validated by using established measure development guidelines. While an important step for measure development, this method of validity testing has generally not been considered sufficient for demonstrating measure validity.
  - Finally, the measure developer completed a systemic face validity assessment of this measure with 9 experts and two patients agreeing that this measure was a valid indicator of health care quality.
- The developers provided a conceptual framework that was used to develop the risk adjustment model for this measure. This conceptual framework included 4 contextual domains that influence ACO performance including, physical environment, community resources, patient resources, and patient behavioral/personal preferences.
- The measure included demographic factors, and clinical risk factors present at the start of the measurement period.

2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions

- The measure developers reviewed 189 diagnosis groups included in the hierarchical condition category (HCC), and calculated the prevalence of each CC in the year preceding the measurement period. After examining the bi-variate analysis, the developers reduced the list to 46 candidate variables including age.
- The measure developers did not adjust for contextual factors that impact admissions; however, they did provide data demonstrating that including SDS adjustment did not make a meaningful difference to the measure score of the ACOs. The spearman correlation coefficient that estimated the difference in performance with and without SDS adjustment was 0.992. Thus, the results demonstrate that adjustment had little effect on the measure score.
- To assess the overall performance of their risk-adjustment model, the developers computed two summary statistics, including:
    - Risk model discrimination statistics (the model's ability to explain how successful the fit is in explaining the variation of the data. In this case, the r-sq value was 0.123. In other words, the model was able to explain 12.3% of the total deviance.
    - Overfitting indices (model calibration) [presented as (γ0, γ1)]:
        - The developer states that if the γ0 in the validation samples are substantially far from zero and the γ1 is substantially far from one, there is potential evidence of over-fitting. The calibration value of close to 0 at one end and close to 1 to the other end indicates good calibration of the model.
            - 2012 Development Sample (Index): (0,1)
            - 2012 Validation Sample: (-0.0015, 1.0011)
- Given the complexity of this measure, the Standing Committee raised concerns about converting the data from ICD-9 to ICD-10; ultimately the Standing Committee agreed the measure was valid.
- The Standing Committee agreed this measure met the scientific acceptability criteria.

3. Feasibility: H-12; M-8; L-0; I-0

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c.Susceptibility to inaccuracies/ unintended consequences identified 3d. Data collection strategy can be implemented)

Rationale:

- All measure data elements are in defined fields in electronic claims and routinely generated or collected by and used by healthcare personnel during the provision of care, coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims).
- The Standing Committee agreed the measure was feasible.

4. Usability and Use: H-4; M-16; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is not currently used for public reporting or in an accountability program. However, this measure was included by CMS in the November 2014 Physician Fee Schedule final rule, and finalized adding the measure to the Medicare Shared Savings Program (MSSP) quality measure set. The measure is planned for pay-for-performance in the MSSP for 2017 reporting period.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-20**; **N-0**

Rationale

- The Standing Committee recognized the importance of reducing unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with MCCs and recommended the measure for endorsement.

6. Public and Member Comment

-

2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions
7. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X
8. Board of Directors Vote: Y-X; N-X
9. Appeals

Measure Not Recommended

2884 30-Day Unplanned Readmissions for Cancer Patients

Submission

Description: 30-Day Unplanned Readmissions for Cancer Patients is a cancer-specific measure. It provides the rate at which all adult cancer patients (= 18 years old), regardless of payer type, have an unplanned re-hospitalization within 30 days of an index admission. The readmission is defined as a subsequent inpatient admission to the reporting facility, which occurs within 30 days of the discharge date of an eligible index admission.

Numerator Statement: This outcome measure demonstrates the rate at which adult cancer patients (=18 years old at the index admission) are readmitted to a PPS-exempt Cancer Hospital (PCH) within 30 days of discharge from an index admission at the same PCH. The numerator includes all eligible patients with a readmission to a PCH within 30 days of the discharge date from an index admission with an admission status of urgent or emergency

Denominator Statement: All adult inpatient admissions with a diagnosis of malignant cancer at PCHs over the defined measurement period. The outcome measure examines the rate of unplanned readmissions within 30 days of discharge of this population.

Exclusions: The following patients are excluded from the denominator population: 1) patients transferred to another acute care facility during the index admission; 2) having missing or incomplete data; 3) admitted to an inpatient hospice bed; and, 4) discharged Against Medical Device (AMA).

Adjustment/Stratification: «risk_adjustment_type» «risk_adjustment_other» «risk_adjustment_methodology» «stratification»

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Seattle

STANDING COMMITTEE MEETING [06/08/2016-06/09/2016]

1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence: 1b. Performance Gap, 1c. High Priority)

1a. Evidence: **Y-17; N-0;** 1b. Performance Gap: **H-1**; **M-16**; **L-0**; **I-1**

Rationale:

- Cancer is the second leading cause of death in the United States. Approximately 1.7 million Americans are diagnosed with cancer each year but there is no measure to assess readmission rates for this disease. Cancer patients are also currently excluded from all-cause readmission rates such as NQF #1789.
- Unadjusted readmission rates to dedicated cancer facilities range from 14.5 percent to 15.8 percent.
- For many patients readmission may be preventable and should be addressed to lower costs and improve patient outcomes. Readmissions may be prevented by ensuring adequate treatment during the index hospitalization and post-discharge.
- The Standing Committee recommended that the developers separate out payer class as a marker of socioeconomic challenges. In particular the Standing Committee raised concerns about the unique challenges Medicaid patients face when seeking treatment for cancer and recommended that they not be categorized with patients who are opting to pay for treatment out of pocket.
- The Standing Committee also suggested the developer consider ways to track readmissions to other facilities and to consider a longer time window.

2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-0**; **M-5**; **L-13**; **I-1**

Rationale:

- The developer has assessed reliability at the data element level. The reliability of the measure was testing by comparing the level of agreement with the planned/unplanned indicator based on the sample chart

2884 30-Day Unplanned Readmissions for Cancer Patients
review. A Kappa score was calculated for the overall agreement of the two measures and the facility-level agreement. • Inter-rater reliability analyses (Kappa) were performed to determine consistency between Planned/Unplanned readmission type and inclusion in the measure numerator for individual participating facilities. Kappa scores ranged from 0.080 to 1.000 with asymptotic standard error ranging from 0.000 to 0.113. • The developer notes that a moderate level of agreement (0.772) resulted when Kappa scores across the ten participating facilities were averaged. However, while seven out of the ten participating facilities have Kappa scores above 0.800, three centers had scores ranging from 0.080 to 0.690. Variation in applied definitions of "planned" and/or "unplanned" readmissions is one explanation for the widespread Kappa scores. A second source of variation may be the internal facility's guidelines for determining the type of admission. Third, some variation may be due to numerator exclusion criteria (i.e., admissions with a primary diagnosis of chemotherapy or radiation therapy encounter or progression of disease). • The Standing Committee raised concerns about the performance of this outlier and that it may be challenging to implement this measure broadly. • The Standing Committee also noted that the measure only tracks readmissions to the same facility. However, a patient could be readmitted to a different facility. The Standing Committee had concerns that a hospital's location and a patient's ability to seek care at a different facility could impact the reliability of the measure. Variability in rates could be driven by the healthcare market in a given location rather than facility quality. • The measure did not pass reliability.

Appendix B: NQF All-Cause Admissions and Readmissions Portfolio and Related Measures

NQF's portfolio of measures related to admissions and readmissions consists of X measures. Some measures within the admissions and readmissions portfolio have been assigned, for various reasons, to other Standing Committees, including for example, Perinatal (NICU readmissions), Pulmonary (PICU readmissions and length of stay, COPD and asthma admission rates), and Renal (dialysis facility hospitalizations).

All Cause/All Condition Specific Population Based Measures

Measure Number	Measure Title
1768	Plan All-Cause Readmissions [NCQA]
2504	30-day Rehospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries [CMS]
2503	Hospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries [Colorado Foundation for Medical Care]
2888*	Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions [Yale/CORE]

*Denotes measures reviewed in this current project

Condition Specific Population Based Measures

Measure Number	Measure Title
0272	Diabetes Short-Term Complications Admission Rate (PQI 1) [AHRQ]
0273	Perforated Appendix Admission Rate (PQI 2) [AHRQ]
0274	Diabetes Long-Term Complications Admission Rate (PQI 3) [AHRQ]
0277	Heart Failure Admission Rate (PQI 8) [AHRQ]
0279	Bacterial Pneumonia Admission Rate (PQI 11) [AHRQ]
0280	Dehydration Admission Rate (PQI 10) [AHRQ]
0281	Urinary Tract Infection Admission Rate (PQI 12) [AHRQ]
0283	Asthma in Younger Adults Admission Rate (PQI 15) [AHRQ]
0638	Uncontrolled Diabetes Admission Rate (PQI 14) [AHRQ]

Admissions Measures for Pediatric Quality Indicators

Measure Number	Measure Title
0727	Gastroenteritis Admission Rate (pediatric) [AHRQ]
0728	Asthma Admission Rate (Pediatric) [AHRQ]
2886*	Risk-Standardized Acute Admission Rates for Patients with Heart Failure [Yale/CORE]
2887*	Risk-Standardized Acute Admission Rates for Patients with Diabetes [Yale-CORE]

Hospital All-Cause/All-Condition Readmission Measures

Measure Number	Measure Title
0335	PICU Unplanned Readmission Rate [Virtual PICU Systems, LLC]
1789*	Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) [CMS]
2393	Pediatric All-Condition Readmission Measure [Center of Excellence for Pediatric Quality Measurement]
2879*	Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data [Yale/CORE]

*Denotes measures reviewed in this current project

Cardiovascular Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
0330*	Hospital 30-day, all-cause, risk-standardized readmission rate following heart failure hospitalization for patients 18 and older [CMS]
0505	Thirty-day all-cause risk standardized readmission rate following acute myocardial infarction (AMI) hospitalization [CMS]
0695	Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) [American College of Cardiology]
2514	Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate [STS]
2515	Hospital 30-day, all-cause, unplanned, risk-standardized readmission rate (RSRR) following coronary artery bypass graft (CABG) surgery [CMS]
2880*	Excess days in acute care (EDAC) after hospitalization for heart failure [Yale/CORE]
2881*	Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI) [Yale/CORE]

*Denotes measures reviewed in this current project

Pulmonary Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
0506*	Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalization. [CMS]
1891*	Hospital 30-Day, All-Cause, Risk-Standardized Readmission Rate (RSRR) following Chronic Obstructive Pulmonary Disease (COPD) Hospitalization [CMS]
2414	Pediatric Lower Respiratory Infection Readmission Measure [Center of Excellence for Pediatric Quality Measurement]
2882*	Excess days in acute care (EDAC) after hospitalization for pneumonia

*Denotes measures reviewed in this current project

Surgical Condition-Specific Hospital Readmission Measures

Measure Number	Measure Title
2513	Hospital 30-Day All-Cause Risk-Standardized Readmission Rate (RSRR) following Vascular Procedures [CMS]
1551	Hospital-level 30-day, all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) [CMS]

Setting-Specific Readmission Measures

Measure Number	Measure Title
0171*	Acute Care Hospitalization (Risk-Adjusted) [CMS]
0173*	Emergent Care (Risk Adjusted)
1463	Standardized Hospitalization Ratio for Admissions [CMS]
2375	PointRight OnPoint-30 SNF Rehospitalizations [AHCA]
2510	Skilled Nursing Facility 30-Day All-Cause Readmission Measure (SNFRM) [RTI]
2380	Rehospitalization During the First 30 Days of Home Health [CMS]
2505	Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health [CMS]
2512	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Long-Term Care Hospitals (LTCHs) [CMS]
2502	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facilities [CMS]
2496	Standardized Readmission Ratio (SRR) for dialysis facilities [CMS]
2539	Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy [CMS]
2827*	PointRight® Pro Long Stay(TM) Hospitalization Measure (PointRight)
2858*	Discharge to Community [ACHA]
2860*	Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)

Appendix C: All-Cause Admissions and Readmissions Portfolio—Use in Federal Programs

NQF #	Title	Federal Programs: Finalized as of July 8, 2016
0171	Acute Care Hospitalization During the First 60 Days of Home Health	Home Health Quality Reporting
0173	Emergency Department Use without Hospitalization During the First 60 Days of Home Health	Home Health Quality Reporting
0275	Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 5)	Medicare Shared Savings Program
0277	Heart Failure Admission Rate (PQI 8)	Medicare Shared Savings Program
0330	Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	Hospital Inpatient Quality Reporting, Hospital Readmission Reduction Program
0505	Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.	Hospital Inpatient Quality Reporting, Hospital Readmission Reduction Program
0506	Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	Hospital Inpatient Quality Reporting, Hospital Readmission Reduction Program
1551	Hospital-level 30-day, all-cause risk-	Hospital Inpatient Quality Reporting, Hospital Readmission Reduction Program

NQF #	Title	Federal Programs: Finalized as of July 8, 2016
	standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	
1891	Hospital 30-Day, All-Cause, Risk-Standardized Readmission Rate (RSRR) following Chronic Obstructive Pulmonary Disease (COPD) Hospitalization	Hospital Inpatient Quality Reporting, Hospital Readmission Reduction Program
1789	Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	Hospital Inpatient Quality Reporting, Medicare Shared Savings Program
2496	Standardized Readmission Ratio	End Stage Renal Disease-Quality Incentive Program
2380	Rehospitalization During the First 30 Days of Home Health	Home Health Quality Reporting
2502	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facility (IRF)	Inpatient Rehabilitation Facilities Quality Reporting
2505	Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health	Home Health Quality Reporting
2510	Skilled Nursing Facility 30-Day All-Cause Readmission Measure	Skilled Nursing Facility Value-Based Purchasing Program, Medicare Shared Savings Program

NQF #	Title	Federal Programs: Finalized as of July 8, 2016
2512	30-Day All Cause Post Long-Term Care Hospital (LTCH) Discharge Hospital Readmission Measure	Long-term Care Hospital Quality Reporting
2505	Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health	Home Health Quality Reporting
2539	Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy	Hospital Outpatient Quality Reporting Program, Ambulatory Surgery Center Quality Reporting Program

Appendix D: Project Standing Committee and NQF Staff

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Appendix E: Measure Specifications

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services
Description	Percentage of home health stays in which patients were admitted to an acute care hospital during the 60 days following the start of the home health stay.
Type	Outcome
Data Source	Administrative claims Denominator: Medicare Home Health Claims Numerator: Medicare Inpatient Claims Exclusions: Medicare Home Health Claims, Medicare Enrollment Data Risk Factors: Medicare Enrollment Data, Medicare Part A & B Claims Available at measure-specific web page URL identified in S.1 Attachment Data_Dictionaries_ffs_inst_and_non-inst_claims-635895196660789022.xls
Level	Facility
Setting	Home Health
Numerator Statement	Number of home health stays for patients who have a Medicare claim for an unplanned admission to an acute care hospital in the 60 days following the start of the home health stay.
Numerator Details	The 60 day time window is calculated by adding 60 days to the "from" date in the first home health claim in the series of home health claims that comprise the home health stay. Acute care hospitalization occurs (and the home health stay is included in the numerator) if the patient has at least one Medicare inpatient claim from short term or critical access hospitals (identified by CMS Certification Number ending in 0001-0879, 0800-0899, or 1300-1399) during the 60 day window. Inpatient claims for planned hospitalizations are excluded from the measure numerator. Planned hospitalizations are defined using the same criteria as the Yale Hospital-Wide All-Cause Unplanned Readmission Measure. Specifically, admissions are categorized as "planned" based on AHRQ Procedure and Condition CCS as well as other sets of ICD-9-CM procedure codes. These admissions are excluded unless they have a discharge condition category considered "acute or complication of care," which is defined using AHRQ Condition CCS. The definitions of AHRQ CCS can be found here: http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp#download The AHRQ CCS that define planned hospitalizations are found below and are AHRQ Procedure CCS unless otherwise noted. AHRQ CCS Description 45 PTCA 254 Rehabilitation (Condition CCS) 84 Cholecystectomy and common duct exploration 157 Amputation of lower extremity 44 CABG 78 Colorectal resection 51 Endarterectomy; vessel of head and neck 113 Transurethral resection of prostate 99 Other OR Gastrointestinal therapeutic procedures 48 Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator 45 Maintenance chemotherapy (Condition CCS) 211 Therapeutic radiology for cancer treatment 3 Laminectomy; excision intervertebral disc

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
	43 Heart valve procedures 152 Arthroplasty knee 158 Spinal fusion 55 Peripheral vascular bypass 52 Aortic resection; replacement or anastomosis 36 Lobectomy or pneumonectomy 153 Hip replacement; total and partial 60 Embolectomy and endarterectomy of lower limbs 85 Inguinal and femoral hernia repair 104 Nephrectomy; partial or complete 1 Incision and excision of CNS 124 Hysterectomy; abdominal and vaginal 167 Mastectomy 10 Thyroidectomy; partial or complete 114 Open prostatectomy 74 Gastrectomy; partial and total 119 Ooporectomy; unilateral and bilateral 154 Arthroplasty other than hip or knee ICD-9-CM procedure codes 30.5, 31.74, 34.6 Radial laryngectomy, revision of tracheostomy, scarification of pleura 166 Lumpectomy; quadrantectomy of breast 64 Bone marrow transplant 105 Kidney transplant 176 Other organ transplantation ICD-9-CM procedure codes 94.26, 94.27 Electroshock therapy Discharge AHRQ Condition CCS considered “acute or complication of care” are listed below. AHRQ CCS Description 237 Complications of device; implant or graft 106 Cardiac dysrhythmias Condition CCS 207, 225, 226, 227, 229, 230, 231, 232 Fracture 100 Acute myocardial infarction 238 Complications of surgical procedures or medical care 108 Congestive heart failure; nonhypertensive 2 Septicemia (except in labor) 146 Diverticulosis and diverticulitis 105 Conduction disorders 109 Acute cerebrovascular disease 145 Intestinal obstruction without hernia 233 Intracranial injury 116 Aortic and peripheral arterial embolism or thrombosis 122 Pneumonia (except that caused by TB or sexually transmitted disease) 131 Respiratory failure; insufficiency; arrest (adult) 157 Acute and unspecified renal failure 201 Infective arthritis and osteomyelitis (except that caused by TB or sexually transmitted disease)

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
	153 Gastrointestinal hemorrhage 130 Pleurisy; pneumothorax; pulmonary collapse 97 Peri-; endo-; and myocarditis; cardiomyopathy 127 Chronic obstructive pulmonary disease and bronchiectasis 55 Fluid and electrolyte disorders 159 Urinary tract infection 245 Syncope 139 Gastroduodenal ulcer (except hemorrhage) 160 Calculus of urinary tract 112 Transient cerebral ischemia
Denominator Statement	Number of home health stays that begin during the 12-month observation period.
Denominator Details	A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days. Each home health payment episode is associated with a Medicare home health (HH) claim, so home health stays are constructed from claims data using the following procedure. 1.First, retrieve HH claims with a "from" date (FROM_DT) during the 12-month observation period or the 120 days prior to the beginning of the observation period and sequence these claims by "from" date for each beneficiary. 2.Second, drop claims with the same "from" date and "through" date (THROUGH_DT) and claims listing no visits and no payment. Additionally, if multiple claims have the same "from" date, keep only the claim with the most recent process date. 3.Third, set Stay_Start_Date(1) equal to the "from" date on the beneficiary's first claim. Step through the claims sequentially to determine which claims begin new home health stays. If the claim "from" date is more than 60 days after the "through" date on the previous claim, then the claim begins a new stay. If the claim "from" date is within 60 days of the "through" date on the previous claim, then the claim continues the stay associated with the previous claim. 4.Fourth, for each stay, set Stay_Start_Date(n) equal to the "from" date of the first claim in the sequence of claims defining that stay. Set Stay_End_Date(n) equal to the "through" date on the last claim in that stay. Confirm that Stay_Start_Date(n+1) – Stay_End_Date(n) > 60 days for all adjacent stays. 5.Finally, drop stays that begin before the 12-month observation window. Note the examining claims from the 120 days before the beginning of the 12-month observation period is necessary to ensure that stays beginning during the observation period are in fact separated from previous home health claims by at least 60 days.
Exclusions	The following are excluded: 1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death. 2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. 3) Home health stays in which the patient receives service from multiple agencies during the first 60 days. 4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay.
Exclusion details	Four types of home health stays are excluded from the measure denominator: 1.Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the start of the home health stay, for the 60 days following the start of the home health stay, or until death.

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
	• Both enrollment status and beneficiary death date are identified using the Medicare Enrollment Database (EDB). 2.Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. • Exclude the stay if LUPAIND = L for the first claim in the home health stay. 3.Home health stays in which the patient receives service from multiple agencies during the first 60 days. • Define Initial_Provider = PROVIDER on the first claim in the home health stay. • If Intial_Provider does not equal PROVIDER for a subsequent claim in the home health stay AND if the "from" date of the subsequent claim is within 60 days of Stay_Start_Date, then exclude the stay. 4.Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the start of the home health stay. •Enrollment status is identified using the Medicare Enrollment Database (EDB).
Risk Adjustment	Statistical risk model Multinomial logit with outcomes of "No acute event", "Emergency Department without Hospitalization", and "Acute Care Hospitalization". Risk factors include: Prior Care Setting – The main categories are community (i.e., no prior care setting), outpatient emergency room, inpatient-acute (IP-acute), inpatient rehabilitation facility (IRF), psychiatric facility, long-term care hospital (LTCH), and skilled nursing facility (SNF). The hierarchy of setting is SNF, most recent inpatient stay (including IP-acute, IRF, LTCH, and psychiatric facility), outpatient ER, and community. Acumen used the five cohorts from the Yale Hospital-Wide All-Cause Unplanned Readmission Measure to segregate the IP-acute category. The five cohorts are: 1.Surgery/Gynecology: admissions likely cared for by surgical or gynecological teams, based on AHRQ procedure categories; 2.Cardiorespiratory: admissions treated by the same care teams with very high readmission rates, such as for pneumonia, chronic obstructive pulmonary disease, and heart failure; 3.Cardiovascular: admissions treated by separate cardiac or cardiovascular team in large hospitals, such as for acute myocardial infarctions; 4.Neurology: admissions for neurological conditions, such as stroke, that may be treated by a separate neurology team in large hospitals; and 5.Medicine: admissions for all other non-surgical patients. These cohorts were designed to account for differences in readmission risk for surgical and non-surgical patients. Finally, the IP-acute categories and the SNF category were further refined by length of stay. Each of the five IP-acute categories are separated into stays of length 0 to 3 days, 4 to 8 days, and 9 or more days, while the SNF categories are split into stays of length 0 to 13, 14 to 41, and 42 and more days. A patient cared for in both a skilled nursing facility and an inpatient hospital during the 30 days prior to starting home health care is included in the skilled nursing categories and not the inpatient categories. The length of stay is determined from the last inpatient or skilled nursing stay prior to beginning home health care. Age and Gender Interactions – Age is subdivided into 12 bins for each gender: aged 0-34, 35-44, 45-54, five-year age bins from 55 to 95, and a 95+ category. Using a categorical age variable allows the model to account for the differing effects of age and gender. Age is determined based on the patient's age at Stay_Start_Date. CMS Hierarchical condition categories (HCCs) –

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
	HCCs were developed for the risk adjustment model used in determining capitation payments to Medicare Advantage plans and are calculated using Part A and B Medicare claims. While the CMS-HHC model uses a full year of claims data to calculate HCCs, for these measures, we use only 6 months of data to limit the number of home health stays excluded due to missing HCC data. All 2012 HCCs and CCs that are not hierarchically ranked that were statistically significant predictors of ACH and ED use are included in the model. Details of the CMS-HCC model and the code lists for defining the HCCs can be found here: https://www.cms.gov/MedicareAdvtgSpecRateStats/06_Risk_adjustment.asp A description of the development of the CMS-HCC model can be found here: https://www.cms.gov/HealthCareFinancingReview/Downloads/04Summerpg119.pdf ESRD and Disability Status – Original End Stage Renal Disease (ESRD) and current ESRD status are included as risk factors. Original disabled status and male, and original disabled status and female, are also included. Medicare beneficiaries with ESRD or disabled status represent a fundamentally different health profile. Interaction Terms – All interaction terms included in the 2012 HCC risk adjustment models that were statistically significant predictors of ED Use and ACH were included. Interaction terms account for the additional effect two risk factors may have when present simultaneously, which is more than the additive effect of each factor separately. Provided in response box S.15a
Stratification	Not applicable
Type Score	Rate/proportion better quality = lower score
Algorithm	1.Construct Home Health Stays from HH Claims (see 2a1.7 for details) 2.Identify numerator window (60 days following Stay_Start_Date) for each stay and exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during the numerator window or until patient death. 3.Exclude stays that begin with a LUPA or that involve a provider change during the numerator window 4.Link stays to enrollment data by beneficiary. 5.Exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during the 6 months prior to Stay_Start_Date. 6.Calculate demographic risk factors for each stay (age, gender, etc.) using enrollment data. 7.Link to Part A and Part B claims for 6 months prior to Stay_Start_Date for each beneficiary 8.Calculate prior care setting indicators, HCCs, and HCC interactions. 9.Link to Inpatient (IP) claims from Short Stay and Critical Access hospitals (excluding planned hospitalizations - see 2a1.3 for details) for numerator window (60 days following Stay_Start_Date) 10.Set Hospital Admission indicator (Hosp_Admit = 1) if any IP claims are linked to the stay in step 9. 11.Using coefficients from the multinomial logit risk model and risk factors calculated in steps 6 and 8, calculate the predicted probability of being included in the measure numerator for each stay (Pred_Hosp). Additionally calculate the average of Pred_Hosp across all stays that are included in the measure denominator (not excluded in steps 3 or 5) and call this value National_pred_Hosp. 12.Calculate observed and risk adjusted rates for each home health agency (Initial_Provider): a.Calculate the observed rate of Acute Care Hospitalization as the fraction all (non-excluded) HH Stays with that agency as Initial_Provider that are also included in the measure numerator

	0171 Acute Care Hospitalization During the First 60 Days of Home Health
	(Hosp_Admit = 1). Call the value Agency_obs_Hosp. b.Calculate the agency predicted rate of Acute Care Hospitalization by taking the average of Pred_ Hosp across all (non-excluded) stays with that agency as Initial_Provider. Call this value Agency_pred_Hosp. c.Calculate the risk adjusted rate of Acute Care Hospitalization using the following formula: Agency_riskadj_Hosp = National_pred_Hosp + (Agency_obs_Hosp – Agency_pred_Hosp). If an agency's calculated risk adjusted rate is negative, that agency will have a publicly reported rate of 0% Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	5.1 Identified measures: 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 2380 : Rehospitalization During the First 30 Days of Home Health 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: The home health (HH) Acute Care Hospitalization (ACH) and Emergency Department Use (ED-Use) without Hospitalization measures are harmonized with the Rehospitalization measures (NQF numbers 2505 and 2380) and with CMS' Hospital-Wide All-Cause Unplanned Readmission (HWR) measure (NQF 1789) in the definition of unplanned hospitalizations . They differ from other post-acute hospital readmission measures, however, in the definition of eligible post-acute stays, in the risk adjustment approach, and by measuring emergency department use as an outcome. The differences arise due to the unique nature of home health care as a post-acute setting. The ACH and ED-Use measures were initially developed and later leveraged to construct the Rehospitalization measures by further restricting the ACH and ED-Use measures' eligible population by requiring a prior proximal inpatient hospital stay within 5 days from the start of HH. Finally, both pairs of measures are risk adjusted using patient-level predicted probabilities calculated from a multinomial logistic regression. Risk factors that are accounted for in both pairs of measures include demographics and health status as measured by both CMS' Hierarchical Condition Categories (HCCs) found on claims in the previous six months. The Rehospitalization measures leverage the prior proximal inpatient hospital claim to obtain the patient's Diagnosis Related Group (DRG) and also risk adjust for the Activities of Daily Living (ADL) fields on the Outcome and Assessment Information Set (OASIS) assessment of the initial home health stay. The risk-adjusted rates for the ACH and ED-Use measures are publicly reported. However, due to a large number of relatively small home health agencies treating previously hospitalized patients, the measure developer determined that reporting home health agencies' risk-adjusted rates could lead to misleading conclusions, since small home health agencies' risk-adjusted rates tend to be unstable. Therefore, the risk-adjusted rates for the home health Rehospitalization measures are publicly reported as categorizations (i.e., "Better than Expected", "Same as Expected", and "Worse than Expected"). While the Acute Care Hospitalization and Emergency Department Use without Hospitalization measures differ from other post-acute care measures in some regards, these differences arise from the unique nature of home care as well as from a desire for harmonization across home health quality measures. 5b.1 If competing, why superior or rationale for additive value: Not applicable; there are no other measures that report acute care hospitalization rates for home health patients.

	0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services
Description	Percentage of home health stays in which patients used the emergency department but were not admitted to the hospital during the 60 days following the start of the home health stay.
Type	Outcome
Data Source	Administrative claims Denominator: Medicare Home Health Claims Numerator: Medicare Inpatient Claims Exclusions: Medicare Home Health Claims, Medicare Enrollment Data Risk Factors: Medicare Enrollment Data, Medicare Part A & B Claims Available at measure-specific web page URL identified in S.1 Attachment Data_Dictionaries_ffs_inst_and_non-inst_claims.xls
Level	Facility
Setting	Home Health
Numerator Statement	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 60 days following the start of the home health stay.
Numerator Details	The 60 day time window is calculated by adding 60 days to the "from" date in the first home health claim in the series of home health claims that comprise the home health stay. If the patient has any Medicare outpatient claims with any ER revenue center codes (0450-0459, 0981) during the 60 day window AND if the patient has no Medicare inpatient claims for admission to an acute care hospital (identified by the CMS Certification Number on the IP claim ending in 0001-0879, 0800-0899, or 1300-1399) during the 60 day window, then the stay is included in the measure numerator.
Denominator Statement	Number of home health stays that begin during the 12-month observation period.
Denominator Details	A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days. Each home health payment episode is associated with a Medicare home health (HH) claim, so home health stays are constructed from claims data using the following procedure. 1.First, retrieve HH claims with a "from" date (FROM_DT) during the 12-month observation period or the 120 days prior to the beginning of the observation period and sequence these claims by "from" date for each beneficiary. 2.Second, drop claims with the same "from" date and "through" date (THROUGH_DT) and claims listing no visits and no payment. Additionally, if multiple claims have the same "from" date, keep only the claim with the most recent process date. 3.Third, set Stay_Start_Date(1) equal to the "from" date on the beneficiary's first claim. Step through the claims sequentially to determine which claims begin new home health stays. If the claim "from" date is more than 60 days after the "through" date on the previous claim, then the claim begins a new stay. If the claim "from" date is within 60 days of the "through" date on the previous claim, then the claim continues the stay associated with the previous claim. 4.Fourth, for each stay, set Stay_Start_Date(n) equal to the "from" date of the first claim in the sequence of claims defining that stay. Set Stay_End_Date(n) equal to the "through" date on the last claim in that stay. Confirm that Stay_Start_Date(n+1) – Stay_End_Date(n) > 60 days for all adjacent stays. 5.Finally, drop stays that begin before the 12-month observation window. Note the examining claims from the 120 days before the beginning of the 12-month observation

	0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
	period is necessary to ensure that stays beginning during the observation period are in fact separated from previous home health claims by at least 60 days.
Exclusions	The following are excluded: 1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death. 2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. 3) Home health stays in which the patient receives service from multiple agencies during the first 60 days. 4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay.
Exclusion details	Four types of home health stays are excluded from the measure denominator: 1.Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the start of the home health stay, for the 60 days following the start of the home health stay, or until death. • Both enrollment status and beneficiary death date are identified using the Medicare Enrollment Database (EDB). 2.Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. • Exclude the stay if LUPAIND = L for the first claim in the home health stay. 3.Home health stays in which the patient receives service from multiple agencies during the first 60 days. • Define Initial_Provider = PROVIDER on the first claim in the home health stay. • If Intial_Provider does not equal PROVIDER for a subsequent claim in the home health stay AND if the "from" date of the subsequent claim is within 60 days of Stay_Start_Date, then exclude the stay. 4.Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the start of the home health stay. •Enrollment status is identified using the Medicare Enrollment Database (EDB).
Risk Adjustment	Statistical risk model Multinomial logit with outcomes of "No acute event", "Emergency Department use but no Hospitalization", and "Acute Care Hospitalization". Risk factors include: Prior Care Setting – The main categories are community (i.e., no prior care setting), outpatient emergency room, inpatient-acute (IP-acute), inpatient rehabilitation facility (IRF), psychiatric facility, long-term care hospital (LTCH), and skilled nursing facility (SNF). The hierarchy of setting is SNF, most recent inpatient stay (including IP-acute, IRF, LTCH, and psychiatric facility), outpatient ER, and community. Acumen used the five cohorts from the Yale Hospital-Wide All-Cause Risk Standardization Readmission Measure to segregate the IP-acute category. The five cohorts are: 1.Surgery/Gynecology: admissions likely cared for by surgical or gynecological teams, based on AHRQ procedure categories; 2.Cardiorespiratory: admissions treated by the same care teams with very high readmission rates, such as for pneumonia, chronic obstructive pulmonary disease, and heart failure; 3.Cardiovascular: admissions treated by separate cardiac or cardiovascular team in large hospitals, such as for acute myocardial infarctions; 4.Neurology: admissions for neurological conditions, such as stroke, that may be treated by a separate neurology team in large hospitals; and

	0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
	5.Medicine: admissions for all other non-surgical patients. These cohorts were designed to account for differences in readmission risk for surgical and non-surgical patients. Finally, the IP-acute categories and the SNF category were further refined by length of stay. Each of the five IP-acute categories are separated into stays of length 0 to 3 days, 4 to 8 days, and 9 or more days, while the SNF categories are split into stays of length 0 to 13, 14 to 41, and 42 and more days. A patient cared for in both a skilled nursing facility and an inpatient hospital during the 30 days prior to starting home health care is included in the skilled nursing categories and not the inpatient categories. The length of stay is determined from the last inpatient or skilled nursing stay prior to beginning home health care. Age and Gender Interactions – Age is subdivided into 12 bins for each gender: aged 0-34, 35-44, 45-54, five-year age bins from 55 to 95, and a 95+ category. Using a categorical age variable allows the model to account for the differing effects of age and gender. Age is determined based on the patient's age at Stay_Start_Date. CMS Hierarchical condition categories (HCCs) – HCCs were developed for the risk adjustment model used in determining capitation payments to Medicare Advantage plans and are calculated using Part A and B Medicare claims. While the CMS-HHC model uses a full year of claims data to calculate HCCs, for these measures, we use only 6 months of data to limit the number of home health stays excluded due to missing HCC data. All 2012 HCCs and CCs that are not hierarchically ranked that were statistically significant predictors of ACH and ED use are included in the model. Details of the CMS-HCC model and the code lists for defining the HCCs can be found here: https://www.cms.gov/MedicareAdvtgSpecRateStats/06_Risk_adjustment.asp A description of the development of the CMS-HCC model can be found here: https://www.cms.gov/HealthCareFinancingReview/Downloads/04Summerpg119.pdf ESRD and Disability Status – Original End Stage Renal Disease (ESRD) and current ESRD status are included as risk factors. Original disabled status and male, and original disabled status and female, are also included. Medicare beneficiaries with ESRD or disabled status represent a fundamentally different health profile. Interaction Terms – All interaction terms included in the 2012 HCC risk adjustment models that were statistically significant predictors of ED Use and ACH were included. Interaction terms account for the additional effect two risk factors may have when present simultaneously, which is more than the additive effect of each factor separately. Provided in response box S.15a
Stratification	Not applicable
Type Score	Rate/proportion better quality = lower score
Algorithm	1.Construct Home Health Stays from HH Claims (see 2a1.7 for details) 2.Identify numerator window (60 days following Stay_Start_Date) for each stay and exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during the numerator window or until patient death. 3.Exclude stays that begin with a LUPA or that involve a provider change during the numerator window 4.Link stays to enrollment data by beneficiary 5.Exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during

	0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
	the 6 months prior to Stay_Start_Date. 6.Calculate demographic risk factors for each stay (age, gender, etc.) using enrollment data. 7.Link to Part A and Part B claims for 6 months prior to Stay_Start_Date for each beneficiary 8.Calculate prior care setting indicators, HCCs, and HCC interactions. 9.Link to Inpatient (IP) claims from Short Stay and Critical Access hospitals(excluding planned hospitalizations) for the numerator window (60 days following Stay_Start_Date) – see specifications for the home health Acute Care Hospitalization (NQF 0171) measure for details. 10.Set Hospital Admission indicator (Hosp_Admit = 1) if any IP claims are linked to the stay in step 9. These stays are not included in the ED Use without Hospitalization measure numerator. 11.Link to Outpatient claims with revenue center codes indicating Emergency Department use for the numerator window (60 days following Stay_Start_Date). 12.Set Outpatient ED Use indicator (OP_ED = 1) if any outpatient claims are linked to the stay in step 11. 13.Flag stays for inclusion in the measure numerator (ED_noHosp = 1) if OP_ED =1 and NOT Hosp_Admit = 1. 14.Using coefficients from the multinomial logit risk model and risk factors calculated in steps 6 and 8, calculate the predicted probability of being included in the measure numerator for each stay (Pred_ED_noHosp). Additionally calculate the average of Pred_ED_noHosp across all stays that are included in the measure denominator (not excluded in steps 3 or 5) and call this value National_pred_ED. 15.Calculate observed and risk adjusted rates for each home health agency (Initial_Provider): a.Calculate the observed rate of Emergency Department Use without Hospitalization as the fraction all (non-excluded) HH Stays with that agency as Initial_Provider that are also included in the measure numerator (ED_noHosp = 1). Call the value Agency_obs_ED. b.Calculate the agency predicted rate of Emergency Department use without Hospitalization by taking the average of Pred_ED_noHosp across all (non-excluded) stays with that agency as Initial_Provider. Call this value Agency_pred_ED. c.Calculate the risk adjusted rate of Emergency Department use without Hospitalization using the following formula: Agency_riskadj_ED = National_pred_ED + (Agency_obs_ED – Agency_pred_ED). If an agency's calculated risk adjusted rate is negative, that agency will have a publicly reported rate of 0% Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	5.1 Identified measures: 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 2505 : Emergency Department Use without Hospital Readmission During the First 30 Days of Home Health 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: The home health (HH) Acute Care Hospitalization (ACH) and Emergency Department Use (ED-Use) without Hospitalization measures are harmonized with the Rehospitalization measures (NQF numbers 2505 and 2380) and with CMS' Hospital-Wide All-Cause Unplanned Readmission (HWR) measure (NQF 1789) in the definition of unplanned hospitalizations . They differ from other post-acute hospital readmission measures, however, in the definition of eligible post-acute stays, in the risk adjustment approach, and by measuring emergency department use as an outcome. The differences arise due to the unique nature of home health care as a post-acute setting. The ACH and ED-Use measures were initially developed and later leveraged to construct the Rehospitalization measures by further restricting the ACH and ED-Use measures' eligible population by requiring a prior proximal

	0173 Emergency Department Use without Hospitalization During the First 60 Days of Home Health
	inpatient hospital stay within 5 days from the start of HH. Finally, both pairs of measures are risk adjusted using patient-level predicted probabilities calculated from a multinomial logistic regression. Risk factors that are accounted for in both pairs of measures include demographics and health status as measured by both CMS' Hierarchical Condition Categories (HCCs) found on claims in the previous six months. The Rehospitalization measures leverage the prior proximal inpatient hospital claim to obtain the patient's Diagnosis Related Group (DRG) and also risk adjust for the Activities of Daily Living (ADL) fields on the Outcome and Assessment Information Set (OASIS) assessment of the initial home health stay. The risk-adjusted rates for the ACH and ED-Use measures are publicly reported. However, due to a large number of relatively small home health agencies treating previously hospitalized patients, the measure developer determined that reporting home health agencies' risk-adjusted rates could lead to misleading conclusions, since small home health agencies' risk-adjusted rates tend to be unstable. Therefore, the risk-adjusted rates for the home health Rehospitalization measures are publicly reported as categorizations (i.e., "Better than Expected", "Same as Expected", and "Worse than Expected"). While the Acute Care Hospitalization and Emergency Department Use without Hospitalization measures differ from other post-acute care measures in some regards, these differences arise from the unique nature of home care as well as from a desire for harmonization across home health quality measures. 5b.1 If competing, why superior or rationale for additive value: Not applicable; there are no other measures that report emergency department use without hospitalization rates for home health patients.

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
Status	Submitted
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals or Veterans Health Administration (VA) hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the HF readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0330_HF_Readmission_S2b_Data_Dictionary_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index HF admission. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
	unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index HF admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the heart failure readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2015 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Readmission Measures for HF, version 4.0" posted in data field A.1 or at https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890435217&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DRdmn_AMIHFPNCOPDSTK_Msr_UpdtRpt.pdf&blobcol=urldata&blobtable=MungoBlobs.
Denominator Statement	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with either a principal discharge diagnosis of HF (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals or Veterans Health Administration (VA) hospitals. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Having a principal discharge diagnosis of heart failure; 2. Enrolled in Medicare FFS Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and 5. Not transferred to another acute care facility.

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
	This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older and those aged 65 years or older (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define HF: 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart disease with heart failure 402.91 Unspecified hypertensive heart disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease 428.0 Congestive heart failure, unspecified 428.1 Left heart failure 428.20 Systolic heart failure, unspecified 428.21 Acute systolic heart failure 428.22 Chronic systolic heart failure 428.23 Acute on chronic systolic heart failure 428.30 Diastolic heart failure, unspecified 428.31 Acute diastolic heart failure 428.32 Chronic diastolic heart failure 428.33 Acute on chronic diastolic heart failure 428.40 Combined systolic and diastolic heart failure, unspecified 428.41 Acute combined systolic and diastolic heart failure 428.42 Chronic combined systolic and diastolic heart failure 428.43 Acute on chronic combined systolic and diastolic heart failure 428.9 Heart failure, unspecified ICD-10 Codes that define the patient cohort: I110 Hypertensive heart disease with heart failure I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease I509 Heart failure, unspecified I501 Left ventricular failure I5020 Unspecified systolic (congestive) heart failure

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
	I5021 Acute systolic (congestive) heart failure I5022 Chronic systolic (congestive) heart failure I5023 Acute on chronic systolic (congestive) heart failure I5030 Unspecified diastolic (congestive) heart failure I5031 Acute diastolic (congestive) heart failure I5032 Chronic diastolic (congestive) heart failure I5033 Acute on chronic diastolic (congestive) heart failure I5040 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure I5041 Acute combined systolic (congestive) and diastolic (congestive) heart failure I5042 Chronic combined systolic (congestive) and diastolic (congestive) heart failure I5043 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The readmission measures excludes admissions: 1. Ending in discharges against medical advice Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 2. Without at least 30 days of post-discharge enrollment in FFS Medicare Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted. 3. Occurring within 30 days of discharge from an index admission Rationale: This exclusion ensures that no hospitalization will be considered as both a readmission and an index admission within the same measure. 4. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission Rationale: Patients with these procedures are a highly-selected group of patients with a different risk of the readmission outcome.
Exclusion details	1. Discharges against medical advice are identified using the discharge disposition indicator in claims data. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. 4. Procedure codes for LVAD implantation or heart transplantation are identified by the corresponding codes included in claims data. The list of codes used is attached in field S.2b. (Data Dictionary or Code Table).
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, “Standards for Statistical Models Used for Public Reporting of Health Outcomes” (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
	hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk-adjustment variables is: Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts; Male (%) Comorbidities History of Coronary Artery Bypass Graft (CABG) surgery (ICD-9 diagnosis code V45.81; ICD-9 procedure codes 36.10-36.16) Cardio-respiratory failure and shock (CC 79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Other or unspecified heart disease (CC 94) Vascular or circulatory disease (CC 104-106) Metastatic cancer or acute leukemia (CC 7) Cancer (CC 8-12) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Liver or biliary disease (CC 25-30) Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency or other unspecified anemias and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/psychosis (CC 51-53) Major psychiatric disorders (CC 54-56)

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	Depression (CC 58) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Stroke (CC 95-96) Chronic Obstructive Pulmonary Disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Dialysis status (CC 130) Renal failure (CC 131) Nephritis (CC 132) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge from the index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality.

	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
	The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). References: Keenan PS, Normand SL, Lin Z, et al. An administrative claims measure suitable for profiling hospital performance on the basis of 30-day all-cause readmission rates among patients with heart failure. Circulation. Cardiovascular Quality and Outcomes. Sep 2008;1(1):29-37. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
Status	Submitted
Steward	Centers for Medicare & Medicaid Services
Description	The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Readmission is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. CMS annually reports the measure for patients who are 65 years or older and are enrolled in fee-for-service (FFS) Medicare hospitalized in non-federal hospitals. Please note this measure has been substantially updated since the last submission; as described in S.3., the cohort has been expanded. Throughout this application we refer to this measure as version 8.2.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years of data was used to calculate the AHRQ SES composite index score. 4. Data sources for the all-payer update: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0506_PN_Readmission_S2b_Readmission_Data_Dictionary_v1.0.xlsx

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients 18 and older discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index pneumonia admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The planned readmission algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The planned readmission algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. The planned readmission algorithm is applied to the pneumonia measure without modifications. The planned readmission algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).
Denominator Statement	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or over or (2) patients aged 18 years or older. We have specifically tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis; and with a complete claims history for the 12 months prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of pneumonia, including aspiration pneumonia; or Principal discharge diagnosis of sepsis (not including severe sepsis), with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA but no secondary discharge diagnosis of severe sepsis. 2. Enrolled in Medicare fee-for-service (FFS) 3. Aged 65 or over 4. Not transferred from another acute care facility 5. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older; and those aged 65 years or over (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9 codes that define patients with pneumonia: 480.0 Pneumonia due to adenovirus 480.1 Pneumonia due to respiratory syncytial virus 480.2 Pneumonia due to parainfluenza virus 480.3 Pneumonia due to SARS-associated coronavirus 480.8 Pneumonia due to other virus not elsewhere classified 480.9 Viral pneumonia, unspecified 481 Pneumococcal pneumonia 482.0 Pneumonia due to Klebsiella pneumoniae 482.1 Pneumonia due to Pseudomonas 482.2 Pneumonia due to Hemophilus influenzae 482.30 Pneumonia due to Streptococcus, unspecified 482.31 Pneumonia due to Streptococcus, group A 482.32 Pneumonia due to Streptococcus, group B 482.39 Pneumonia due to other Streptococcus 482.40 Pneumonia due to Staphylococcus, unspecified 482.41 Methicillin susceptible pneumonia due to Staphylococcus aureus 482.42 Methicillin resistant pneumonia due to Staphylococcus aureus 482.49 Other Staphylococcus pneumonia 482.81 Pneumonia due to anaerobes 482.82 Pneumonia due to escherichia coli 482.83 Pneumonia due to other gram-negative bacteria 482.84 Pneumonia due to Legionnaires' disease 482.89 Pneumonia due to other specified bacteria 482.9 Bacterial pneumonia, unspecified 483.0 Pneumonia due to mycoplasma pneumoniae

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	483.1 Pneumonia due to chlamydia 483.8 Pneumonia due to other specified organism 485 Bronchopneumonia, organism unspecified 486 Pneumonia, organism unspecified 487.0 Influenza with pneumonia 488.11 Influenza due to identified 2009 H1N1 influenza virus with pneumonia ICD-9 codes that define patients with aspiration pneumonia: 507.0 Pneumonitis due to inhalation of food or vomitus ICD-9 codes that define patients with sepsis (not including severe sepsis [995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): 038.0 Streptococcal septicemia 038.10 Staphylococcal septicemia, unspecified 038.11 Methicillin susceptible Staphylococcus aureus septicemia 038.12 Methicillin resistant Staphylococcus aureus septicemia 038.19 Other staphylococcal septicemia 038.2 Pneumococcal septicemia [Streptococcus pneumoniae septicemia] 038.3 Septicemia due to anaerobes 038.40 Septicemia due to gram-negative organism, unspecified 038.41 Septicemia due to hemophilus influenzae [H. influenzae] 038.42 Septicemia due to escherichia coli [E. coli] 038.43 Septicemia due to pseudomonas 038.44 Septicemia due to serratia 038.49 Other septicemia due to gram-negative organisms 038.8 Other specified septicemias 038.9 Unspecified septicemia 995.91 Sepsis --- ICD-10 codes that define patients with pneumonia: J12.0 Adenoviral pneumonia J12.1 Respiratory syncytial virus pneumonia J12.2 Parainfluenza virus pneumonia J12.81 Pneumonia due to SARS-associated coronavirus J12.89 Other viral pneumonia J12.9 Viral pneumonia, unspecified J13 Pneumonia due to Streptococcus pneumoniae J18.1 Lobar pneumonia, unspecified organism J15.0 Pneumonia due to Klebsiella pneumoniae J15.1 Pneumonia due to Pseudomonas J14 Pneumonia due to Hemophilus influenzae J15.4 Pneumonia due to other streptococci J15.3 Pneumonia due to streptococcus, group B J15.20 Pneumonia due to staphylococcus, unspecified

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	J15.211 Pneumonia due to Methicillin susceptible staphylococcus J15.212 Pneumonia due to Methicillin resistant staphylococcus J15.29 Pneumonia due to other staphylococcus J15.8 Pneumonia due to other specified bacteria J15.5 Pneumonia due to Escherichia coli J15.6 Pneumonia due to other aerobic Gram-negative bacteria A48.1 Legionnaires' disease J15.8 Pneumonia due to other specified bacteria J15.9 Unspecified bacterial pneumonia J15.7 Pneumonia due to Mycoplasma pneumoniae J16.0 Chlamydial pneumonia J16.8 Pneumonia due to other specified infectious organisms J18.0 Bronchopneumonia, unspecified organism J18.9 Pneumonia, unspecified organism J11.00 Influenza due to unidentified influenza virus with unspecified type of pneumonia J12.9 Viral pneumonia, unspecified J10.08 Influenza due to other identified influenza virus ICD-10 codes that define patients with aspiration pneumonia: J69.0 Pneumonitis due to inhalation of food and vomit ICD-10 codes that define patients with sepsis (not including severe sepsis [ICD-9 995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): A40.9 Streptococcal sepsis, unspecified A41.2 Sepsis due to unspecified staphylococcus A41.01 Sepsis due to Methicillin susceptible Staphylococcus A41.02 Sepsis due to Methicillin resistant Staphylococcus A41.1 Sepsis due to other specified staphylococcus A40.3 Sepsis due to Streptococcus pneumoniae A41.4 Sepsis due to anaerobes A41.50 Gram-negative sepsis, unspecified A41.3 Sepsis due to Hemophilus influenzae A41.51 Sepsis due to Escherichia coli [E. coli] A41.52 Sepsis due to Pseudomonas A41.53 Sepsis due to Serratia A41.59 Other Gram-negative sepsis A41.89 Other specified sepsis A41.9 Sepsis, unspecified organism An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The readmission measures exclude index admissions for patients: 1. Discharged against medical advice (AMA); 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Admitted within 30 days of a prior index admission.

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
Exclusion details	1. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Pneumonia admissions within 30 days of discharge from a qualifying pneumonia index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of admission for age, sex, and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age, sex, and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk adjustment variables is: Demographics Male Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts. Comorbidities History of Coronary Artery Bypass Graft (CABG) (ICD-9 codes V45.81, 36.10–36.16) History of infection (CC1, 3-6) Septicemia/sepsis (CC 2) Metastatic cancer or acute leukemia (CC 7)

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	Lung, upper digestive tract, and other severe cancers (CC 8) Other major cancers (CC 9-10) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency or other unspecified anemias and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/psychosis (CC 51-53) Major psychiatric disorders (CC 54-56) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Cardio-respiratory failure or shock (CC 78-79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Stroke (CC 95-96) Vascular or circulatory disease (CC 104-106) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Pleural effusion/pneumothorax (CC 114) Other lung disorders (CC 115) End-stage renal disease or dialysis (CC 129-130) Renal failure (CC 131) Urinary tract infection (CC 135) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) Vertebral fractures (CC 157) Other injuries (CC 162) Respirator dependence/tracheostomy (CC 77) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day, all-cause, RSRRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix; and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2008). Reference: Krumholz H, Normand S-LT, Keenan P, et al. Hospital 30-Day Pneumonia Readmission Measure Methodology. 2008. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window) 0231 : Pneumonia Mortality Rate (IQI #20) 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	0279 : Bacterial Pneumonia Admission Rate (PQI 11) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_1789_HWR_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
	the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).
Denominator Statement	The measure includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort patients must be: 1. Enrolled in Medicare fee-for-service (FFS) Part A for the 12 months prior to the date of admission and during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal short-term acute care hospital; and 4. Not transferred to another acute care facility. The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections.” There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk. The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams. The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses. The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate cardiac or cardiovascular team. The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team. The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
	cohorts are attached in data field S.2b (Data Dictionary or Code Table).
Exclusions	The measure excludes index admissions for patients: 1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals; 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Discharged against medical advice (AMA); 4. Admitted for primary psychiatric diagnoses; 5. Admitted for rehabilitation; or 6. Admitted for medical treatment of cancer.
Exclusion details	1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB). 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary. 5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of proestheses; and adjustment of devices). 6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. We use a fixed, common set of variables in all our models for simplicity and ease of data collection and analysis. However, we estimate a hierarchical logistic regression model for each specialty cohort separately, and the coefficients associated with each variable may vary across specialty cohorts. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using inpatient Medicare FFS claims data. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The models also include a condition-specific indicator for all

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
	AHRQ CCS categories with sufficient volume (defined as those with more than 1,000 admissions nationally each year for Medicare FFS data) as well as a single indicator for conditions with insufficient volume in each model. The final set of risk adjustment variables are listed in the attached Data Dictionary. Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts Comorbidities Metastatic cancer or acute leukemia (CC 7) Severe cancer (CC 8-9) Other cancers (CC 10-12) Severe hematological disorders (CC 44) Coagulation defects and other specified hematological disorders (CC 46) Iron deficiency or other unspecified anemias and blood disease (CC 47) End-stage liver disease (CC 25-26) Pancreatic disease (CC 32) Dialysis status (CC 130) Renal failure (CC 131) Transplants (CC 128, 174) Severe infection (CC 1, 3-5) Other infectious diseases and pneumonias (CC 6, 111-113) Septicemia/shock (CC 2) Congestive heart failure (CC 80) Coronary atherosclerosis or angina, cerebrovascular disease (CC 81-84, 89, 98-99, 103-106) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Cardio-respiratory failure or shock (CC 79) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Decubitus ulcer or chronic skin ulcer (CC 148-149) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Seizure disorders and convulsions (CC 74) Respirator dependence/tracheostomy status (CC 77) Drug/alcohol psychosis or dependence (CC 51-52) Psychiatric comorbidity (CC 54-56, 58, 60) Hip fracture/dislocation (CC 158) Principal Diagnoses Refer to the 2015 Measure Updates and Specifications: Hospital-Wide All-Cause Unplanned Readmission - Version 4.0 referenced here for the full lists of principal diagnosis AHRQ CCS categories included in each specialty cohort risk adjustment model. References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
	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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the patient level, it models the log-odds of hospital readmission within 30 days of discharge using age, selected clinical covariates, and a hospital-specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals. Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality. For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period. The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012).

	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
	References: Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs. Accessed 30 April, 2014. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) 0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0171 : Acute Care Hospitalization During the First 60 Days of Home Health 0173 : Emergency Department Use without Hospitalization During the First 60 Days of Home Health 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1768 : Plan All-Cause Readmissions (PCR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Standing Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the risk-standardized rate of unplanned, all-cause readmissions to a hospital for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified for evaluating hospital performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients

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	who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years of data was used to calculate the AHRQ SES composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the COPD readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_1891_COPD_Readmission_S2b_Readmission_Data_Dictionary_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients discharged from the hospital with a

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index COPD admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 3.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the COPD readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).
Denominator Statement	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have explicitly tested the measure in both age groups. The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD (see codes below) OR a principal discharge diagnosis of respiratory failure (see codes below) with a secondary discharge diagnosis of acute exacerbation of COPD (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of COPD with exacerbation 2. Enrolled in Medicare fee-for-service (FFS) 3. Aged 65 or over

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	4. Discharged alive from a non-federal acute care hospital 5. Not transferred from another acute care facility 6. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission. This measure can also be used for an all-payer population aged 40 years and older. We have explicitly tested the measure in both patients aged 40 years and older and those aged 65 years or older (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define COPD: 491.21 Obstructive chronic bronchitis with (acute) exacerbation 491.22 Obstructive chronic bronchitis with acute bronchitis 491.8 Other chronic bronchitis 491.9 Unspecified chronic bronchitis 492.8 Other emphysema 493.20 Chronic obstructive asthma, unspecified 493.21 Chronic obstructive asthma with status asthmaticus 493.22 Chronic obstructive asthma with (acute) exacerbation 496 Chronic airway obstruction, not elsewhere classified 518.81 Acute respiratory failure (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 518.82 Other pulmonary insufficiency, not elsewhere classified (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 518.84 Acute and chronic respiratory failure (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 799.1 Respiratory arrest (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) ICD-9-CM codes used to define acute exacerbation of COPD: 491.21 Obstructive chronic bronchitis with (acute) exacerbation 491.22 Obstructive chronic bronchitis with acute bronchitis 493.21 Chronic obstructive asthma with status asthmaticus 493.22 Chronic obstructive asthma with (acute) exacerbation --- ICD-10-CM codes used to define COPD: J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation J44.0 Chronic obstructive pulmonary disease with acute lower respiratory infection J41.8 Mixed simple and mucopurulent chronic bronchitis J42 Unspecified chronic bronchitis J43.9 Emphysema, unspecified J44.9 Chronic obstructive pulmonary disease, unspecified J96.00 Acute respiratory failure, unspecified whether with hypoxia or hypercapnia J96.90 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia J80 Acute respiratory distress syndrome

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	J96.20 Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia R09.2 Respiratory arrest ICD-10-CM codes used to define acute exacerbation of COPD: J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation J44.0 Chronic obstructive pulmonary disease with acute low respiratory infection An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The readmission measures exclude index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index admission.
Exclusion details	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. COPD admissions within 30 days of discharge from a qualifying COPD index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day, all-cause, RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk adjustment variables is:

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts. Comorbidities History of mechanical ventilation (ICD-9 procedure codes: 93.90, 96.70, 96.71, 96.72) Sleep apnea (ICD-9 diagnosis codes: 327.20, 327.21, 327.23, 327.27, 327.29, 780.51, 780.53, 780.57) Respirator dependence/respiratory failure (CC 77-78) Cardio-respiratory failure and shock (CC 79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Chronic atherosclerosis or angina (CC 83-84) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Other and unspecified heart disease (CC 94) Vascular or circulatory disease (CC 104-106) Fibrosis of lung and other chronic lung disorder (CC 109) Pneumonia (CC 111-113) History of infection (CC 1, 3-6) Metastatic cancer and acute leukemia (CC 7) Lung, upper digestive tract, and other severe cancers (CC 8) Lymphatic, head and neck, brain, and other major cancers; breast, colorectal and other cancers and tumors; other respiratory and heart neoplasms (CC 9-11) Other digestive and urinary neoplasms (CC 12) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Other endocrine/metabolic/nutritional disorders (CC 24) Pancreatic disease (CC 32) Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency and other/unspecified anemia and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol psychosis or dependence (CC 51-52) Major psychiatric disorders (CC 54-56) Depression (CC 58) Anxiety disorders (CC 59) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Polyneuropathy (CC 71) Stroke (CC 95-96) Renal failure (CC 131) Decubitus ulcer or chronic skin ulcer (CC 148-149) Cellulitis, local skin infection (CC 152)

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	Vertebral fractures (CC 157) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day, all-cause, RSRRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge from the index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix; and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011).

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	Reference: Grosso L, Lindenauer P, Wang C, et al. Hospital-level 30-day Readmission Following Admission for an Acute Exacerbation of Chronic Obstructive Pulmonary Disease. 2011. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after Pulmonary Rehabilitation 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0070 : Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%) 0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05) 1561 : Relative Resource Use for People with COPD (RCO) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

	2827 PointRight® Pro Long Stay(TM) Hospitalization Measure
Status	Standing Committee Review
Steward	American Health Care Association
Description	The PointRight Pro Long Stay Hospitalization Measure is an MDS-based, risk-adjusted measure of the rate of hospitalization of long-stay patients (aka "residents") of skilled nursing facilities (SNFs) averaged across the year, weighted by the number of stays in each quarter.
Type	Outcome
Data Source	Electronic Clinical Data SNF-Minimum Data Set (MDS) version 3.0. Available in attached appendix at A.1 No data dictionary
Level	Facility
Setting	Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility
Numerator Statement	The numerator for the measure is the sum over four quarters of the counts of hospitalizations of the quarterly denominator populations, where hospitalizations comprise discharges directly from the SNF to an acute care hospital. The count of hospitalizations excludes discharges from the SNF to LTACHs, IRFs, and psychiatric hospitals, and excludes admissions to acute care hospitals that directly follow a discharge from the SNF to a setting other than an acute care hospital. However, if a patient is discharged from a SNF directly to an acute care hospital during a quarter at risk, the hospitalization will be counted in the numerator even if the patient was discharged to a setting other than an acute care hospital earlier in that quarter. Hospitalizations are counted over at-risk intervals of 3 months at a time because this period is long enough to yield nonzero numerators even for SNFs with low rates of hospitalization, yet short enough so that almost all of the denominator population will be present in the facility for all, or almost all, of the period. The latter feature makes the calculation simpler than if the risk exposure was calculated by days or weeks.Four quarters of denominators and four quarters of numerators are summed to yield the values for the full measure period.
Numerator Details	The numerator for a quarter is the number, during the quarter, of discharges from the SNF directly to an acute care hospital of patients in the denominator population for that quarter as indicated by MDS item A2100=03 'discharge status = acute hospital'. A patient in the quarterly denominator population can contribute multiple times to the quarterly numerator. Discharges to LTACHs, IRFs, and mental hospitals are not included in the numerator, nor are acute hospital admissions directly following a discharge from the SNF to a setting other than an acute care hospital. As noted above, if a patient is discharged from a SNF directly to an acute care hospital during a quarter at risk, the hospitalization will be counted in the numerator even if the patient was discharged to a setting other than an acute care hospital earlier in that quarter. The numerator for the measure is the sum of the quarterly numerators for the four quarters in the 12 month measure period.
Denominator Statement	The quarterly denominator population consists exactly of those patients present in the SNF on the first day of the quarter (the "snapshot date") who meet the criterion for long stay on that date. The denominator for a quarter is the number of patients in the quarterly denominator population. The denominator for the measure is the sum of the quarterly denominators for the four quarters in the 12 month measure period. The criterion for a patient's having a long stay is a cumulative length of stay in the facility of more than 100 days as of the snapshot date. The cumulative length of stay of a patient is the length of the current stay as of the snapshot date and plus the full lengths of stay of any previous stays that are linked to it. According to the criteria for linkage of stays used in the present measure, a stay in a SNF is linked to a subsequent stay in the SNF if the patient was discharged from the SNF to the community and was readmitted to the SNF within 10 days or fewer. All stays in a sequence of linked stays are included in the sum of days used to determine a patient's cumulative length of

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	stay. In these criteria the term "community" comprises private residences and all organized settings that are primarily residential in character, including senior housing, independent living facilities, board and care homes, and assisted living facilities. A patient can contribute multiple times to the denominator for a 12 month measure period. For example, a resident continuously present in the facility for a full year would contribute four to the denominator.
Denominator Details	The denominator population for a quarter is a subset of the patients present in the SNF on the snapshot date (the first day of the quarter). A patient is in that subset if his or her cumulative length of stay as of the snapshot date is more than 100 days. The cumulative length of stay is calculated by taking the length of stay of the current admission as of the snapshot date and adding the lengths of stay of any linked stays at the same SNF. The length of the current admission as of the snapshot date is the snapshot date minus the entry date for the current admission, which is MDS item A1600. A stay is linked to a subsequent stay if the patient is discharged to the community (A2100=01) and admitted to the same SNF within 10 days or less (i.e., A1600 for the second stay minus A2100 for the first stay is less than or equal to 10 days). The denominator for a quarter is the number of residents in the denominator population for that quarter. The denominator for the measure, which reports on a full year's performance, is the sum of the denominators for the four quarters that constitute that year.
Exclusions	There are no exclusions from the denominator; all patients in the facility on the snapshot date who meet the long stay criterion on that date are included. However, the measure will not be reported for a SNF if the annual unknown outcome rate is greater than 10%.The definition of the annual unknown outcome rate is provided in S.11.
Exclusion details	The denominator of the annual unknown outcome rate is the sum of the four quarterly denominators. The numerator of the annual unknown outcome rate is the sum over the four quarters of the numbers of quarterly denominator patients with an unknown outcome in the quarter at risk. An outcome is regarded as unknown if it cannot be reasonably inferred or conservatively imputed. The numerator of the unknown outcome rate is the sum of the quarterly unknown outcome counts for the four quarters in the year. The quarterly unknown outcome count is the number of patients in the quarterly denominator for whom it is not known and cannot be reasonably inferred or imputed that the patient was or was not hospitalized during the quarter (e.g. they did not have an MDS discharge assessment completed or a subsequent regularly scheduled MDS assessment completed indicating they resided in the SNF the entire time). It would be known that a patient was hospitalized during the quarter if he or she had a discharge MDS with an acute care hospital as a discharge disposition. It would be known that a patient was not hospitalized during the quarter if he or she had an MDS assessment with an assessment reference date (item A2300) following the end of the quarter at risk and had an admission date (item A1600) on or prior to the snapshot date. If the patient has a discharge MDS during the quarter at risk and is subsequently readmitted to the same SNF within the same quarter it is assumed that there was a second discharge during that quarter (whether to an acute care hospital or elsewhere) if and only if there is a discharge MDS with an assessment reference date within that quarter. If there is an admission to the SNF from an acute care hospital during the quarter at risk but no preceding discharge MDS, we then make the inference that the preceding discharge was directly to an acute care hospital and the inferred discharge is counted in the numerator of the measure. If a patient has no MDS assessment of any kind with an assessment reference date 100 days or fewer after the latest MDS in the interval starting 10 days before the snapshot date and ending one day before the end of the quarter the patient's outcome is regarded as unknown. If the count N of patients with unknown outcomes is 10% or less of the denominator, N*0.8 is added to the numerator (see S.22). If N is more than 10% of the denominator the measure is not reported.
Risk	Statistical risk model

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Adjustment	The risk adjustment model for PointRight Pro Long Stay Hospitalization Rate begins by segmenting the quarterly denominator population for each quarter into four groups based on the duration of the patient's current stay in the SNF. The denominator population is segmented into these four groups because even after controlling for the other risk adjusters, significant variation by length of stay remains and the coefficients within the length of stay groups are different. For each group the risk of one or more discharges from the SNF directly to an acute care hospital during the quarter is estimated by a logistic regression. (Note that the dependent variable is a binary variable rather than the count of hospitalizations of the patient during the quarter.) The independent variables in each logistic regression model come from the patient's most recent MDS 3.0 assessment prior to the snapshot date that has the variable. (Not all of the independent variables in the logistic regressions are present on every type of MDS assessment; this implies that it is sometimes necessary to extract independent variables from two or more discrete MDS assessments.) The four logistic regression models use subsets of the following set of independent variables. In S.18 below, MDS items corresponding to each listed variable are provided. Active Diagnoses (A diagnosis is "active" if it affects the patient's current clinical status or treatment plan. An active diagnosis must be documented in the medical record by a physician or physician extender to be checked off in the MDS. Diagnoses are used in the model only if they are indicated in check boxes on Section I of the MDS; if they are indicated by write-in codes in MDS item I8000 they are not utilized in determining the values of the independent variables.): -Anemia -Chronic Lung Disease (including Asthma and COPD) -Chronic Lung Disease receiving oxygen therapy at least one time in the 14 days prior to the MDS date -Diabetes Mellitus receiving insulin at least once in the 7 days prior to the MDS assessment reference date -Gastroesophageal Reflux Disease (GERD) or Ulcer (esophageal, gastric, or duodenal) -Heart Failure -Hypertension -Viral Hepatitis -Neurogenic Bladder -Renal Insufficiency, Renal Failure, or End-Stage Renal Disease Incontinence: -Total bowel incontinence Demographics: -Age 90 or over -Male Medications received at least once within the 7 days prior to the MDS assessment reference date: -Anticoagulant -Antibiotic Context of Care: -Current stay began with admission from an acute care hospital -In this SNF 6 months before the snapshot date (whether or not in the facility continuously for the 6 months preceding the snapshot date -In this SNF 12 months before the snapshot date (whether or not in the facility continuously for the 12 months preceding the snapshot date -Natural log of (the length of the current stay as of the snapshot date minus 100 days). (Linked stays are not included in this calculation.) Symptoms:

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	-Dyspnea (shortness of breath or trouble breathing) on exertion Skin condition: -Surgical wound(s) Hospice Status: -Receiving hospice care while resident in the facility, at some time during the 14 days prior to the MDS assessment reference date Treatments (given in the facility at least once in the 14 days preceding the MDS assessment reference date): -IV fluid or medication -Oxygen therapy Socioeconomic Status: - Medicaid beneficiary (as indicated by having a Medicaid number or having a Medicaid number pending) - Black or African-American race/ethnicity (as described the patient or family, either as a sole identity or one of several, e.g., black and Caucasian, black and Latino) Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The formula for a facility's adjusted PointRight Pro Hospitalization Rate is: [Observed rate of all hospitalizations]/[Expected rate of all hospitalizations]*[National average rate of all hospitalizations]. The observed and expected rates are updated quarterly and the national benchmark rate is updated annually; the national benchmark rate used in the calculation is the most recently calculated benchmark rate at the time the observed and expected rates are calculated. The procedure for calculating the adjusted rate is (a numeric example can be found in the appendix at Figure A.3): 1) Calculate the observed rate. •The denominator for a quarter is the number of residents present in the facility on the first day of a calendar quarter who qualify as long stay on that day •The numerator for a quarter is number of hospitalizations of residents in the denominator population for that quarter, where hospitalization means discharge from the SNF directly to an acute care hospital, either with no return to the SNF or with return to the SNF after at least one midnight outside the SNF. The numerator excludes: (1) hospitalizations occurring after a patient has been discharged somewhere other than an acute care hospital and (2) hospitalizations at psychiatric hospitals, rehabilitation hospitals, or LTACHs. The numerator includes: (1) "observations stays" if these involve at least one midnight away from the SNF and (2) "planned" hospitalizations. •The observed PointRight Pro Long Stay Hospitalization Rate is the sum of the four quarterly numerators divided by the sum of the four quarterly denominators. 2. Calculate the expected rate. •Calculate the expected number of first hospitalizations of the quarterly denominator population for each of the four quarters in the measure period and sum them; multiply the sum by 1.2528 to obtain the expected number of total hospitalizations for the 12-month measure period. Divide this number by the sum of the quarterly denominators to get the expected rate for the measure period. 3. Calculate the national benchmark rate (this will be updated annually, while the observed and expected rates will be updated quarterly).

	2827 PointRight® Pro Long Stay(TM) Hospitalization Measure
	•The national benchmark rate is the observed PointRight Pro Long Stay Hospitalization Rate for a denominator population consisting of the denominator populations for all SNFs in the largest available national sample that have complete non-discharge MDS data for all of their patients for all four quarters in the measure period and have 100% known outcomes for all patients in their denominator populations for all four quarters in the measure period. For a given member of a quarterly denominator population a known outcome means either that the patient had a discharge MDS submitted with a discharge date within the quarter and a discharge destination filled in, that the patient was readmitted from an acute care hospital during the quarter, or that the patient had a quarterly or other MDS submitted in the 100 days following the end of the quarter that gave an admission date prior to the snapshot date for the given quarter. Procedure for Calculating the Measure: 1.Establish a 12-month measure period comprising of four calendar quarters (each three months in length). For each quarter, the (quarterly) denominator is the number of residents who qualify as long stay for that quarter, i.e. whose cumulative length of stay as of the snapshot date (the first day of the quarter) is more than 100 days. (Cumulative length of stay is defined as the sum of the lengths of stay of the current stay and all stays linked to it.) The sum of the quarterly denominators for the four quarters constitutes the denominator for the measure period. 2.For the quarterly denominator population determine the number of (direct) acute care hospitalizations of the residents in that quarter (the quarterly numerator). The count of the hospitalizations is the quarterly numerator. The sum of the quarterly numerators for the four quarters constitutes the numerator for the measure. As noted above the count includes only admissions to acute care hospitals directly from the SNF. Planned (or presumptively planned) hospitalizations are included, as are observation stays. Hospitalizations subsequent to a discharge somewhere other than an acute care hospital, and hospitalizations at LTACHs and specialty hospitals are excluded. 3.Divide the total numerator by the total denominator to obtain the observed rate for the SNF. 4.Calculate the estimated probability of a first hospitalization for each member of each quarterly denominator population using the predictive model described above, and sum these probabilities to get the expected number of first hospitalizations per quarter for the total 12 month denominator population. Sum these expected numbers over the four quarters of the measure period to get the expected number of first hospitalizations for the measure period. Multiply this result by 1.2528 to get the expected number of total hospitalizations for the total measure period denominator population, and divide this by the total measure period denominator to get the expected PointRight Pro Long Stay Hospitalization Rate for the measure period. 5.Divide the observed rate by the expected rate and multiply by the most recent national benchmark rate to obtain the Adjusted PointRight Pro Long Stay Hospitalization Rate. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: Currently there are no NQF-endorsed measures of hospitalizations for long stay nursing home patients. 5b.1 If competing, why superior or rationale for additive value: There are no competing measures at this time.

	2858 Discharge to Community
Status	Standing Committee Review
Steward	American Health Care Association
Description	The Discharge to Community measure determines the percentage of all new admissions from a hospital who are discharged back to the community alive and remain out of any skilled nursing center for the next 30 days. The measure, referring to a rolling year of MDS entries, is calculated each quarter. The measure includes all new admissions to a SNF regardless of payor source.
Type	Outcome
Data Source	Electronic Clinical Data Minimum Data Set (MDS) 3.0 Available in attached appendix at A.1 No data dictionary
Level	Facility
Setting	Post Acute/Long Term Care Facility : Nursing Home/Skilled Nursing Facility
Numerator Statement	The outcome measured is the number of new admissions from an acute care hospital discharge to community from a skilled nursing center. More specifically, the numerator is the number of stays discharged back to the community (i.e. private home, apartment, board/care, assisted living, or group home as indicated on the MDS discharge assessment form) from a skilled nursing center within 100 days of admission and remain out of any skilled nursing center for at least 30 days.
Numerator Details	Data for the numerator comes from MDS 3.0 discharge assessments. The numerator is the number of new admissions from an acute care hospital discharged back to the community (as indicated by MDS item A2100=01 'discharge into the community') alive from a skilled nursing center within 100 days of admission and remain out of any skilled nursing center for at least 30 days. All new admissions (regardless of payor status at time of admission to the facility or time of discharge back to the community) are counted as long as they are discharged back to the community within 100 days and do not have a subsequent stay in any nursing center within 30 days. The "within 100 days from admission" time frame is measured by subtracting date of admission (MDS item A1900 "admission date") from date of discharge (MDS item A2000 "discharge date"). Subsequent stays in any nursing center within 30 days of discharge are determined by subtracting admission date (MDS item A1900 "admission date") from target date (MDS itemTRGT_DT) and ensuring that this isn't greater than 130 days (i.e. 100 days (of admission for this entry) + 30 days (after discharge) <=130). Stays that discharge to death are not counted as a discharge in the numerator.
Denominator Statement	The denominator is the total number of all admissions from an acute hospital (MDS item A1800 "entered from"=03 (indicating an "acute care hospital") to a center over the previous 12 months, who did not have a prior stay in a nursing center for the prior 100 days (calculated by subtracting 100 from the admission date (MDS item A1900 "admission date"). Please note, the denominator only includes admissions from acute hospitals (MDS item A1800 "entered from"=03 (indicating an "acute care hospital") regardless of payor status.
Denominator Details	The denominator is the number of all stays (regardless of payor status) admitted from an acute care hospital (as indicated by MDS item A1800 "entered from"= 03 "acute care hospital") to a center over the prior 12 months, who did not have a prior stay in a nursing center for the prior 100 days (as indicated by MDS item A1600 "most recent admission/entry or reentry to this facility: entry date," and item A1800 "entered from"). For example, if the "entry date" (MDS item A1600) is within 100 days from the current admission and the "entered from" (MDS item A1800) is 02 "another nursing home" then these patients are excluded from denominator. Note that our stay grouping algorithm allows interruptions in the stay, so long as the patient returns to the same facility within 100 days of the original admission. Once a new stay has started,

	2858 Discharge to Community
	if the patient discharges from the SNF and then returns to the same facility within 100 days of the original admission date, then that subsequent time in the SNF is considered to be part of that original stay. Then, when the patient discharges and does not return to the facility (within 100 days of the original admission date), the discharge status code (community discharge, acute hospital, etc.) is the final outcome. For example, if Bill first entered the SNF on February 14th and then was hospitalized on March 10th, returned to the same SNF on March 15th, and then discharged to the community on April 1st, and never came back to the SNF, then Bill would count once in the denominator and once in the numerator. The original and subsequent stay start dates are identified using the entry date, MDS item A1600.
Exclusions	The denominator has three exclusions (see below). First, stays for patients less than 55 years of age are excluded from the measure. Second, stays for which we do not where the patient entered from, or for which we do not observe the patient's discharge, are excluded from being counted in the denominator. Third, stays with no available risk adjustment data (clinical and demographic characteristics listed in Section S.14) on any MDS assessment within 18 days of SNF admission are excluded from the measure. Note, while not denominator exclusions, we also suppress the data for facilities that have fewer than 30 stays in the denominator, or for whom the percent of stays with a known outcome is less than 90%. The suppression of risk adjusted to community rates for facilities with fewer than 30 stays in the denominator is to improve the reliability of the measure, as detailed in the testing section (2b3). The suppression of rates for facilities for whom fewer than 90% of stays had a known outcome is done to improve the reliability of the measure and avoid perverse incentives about submitting MDS assessments for patients not discharged to the community.
Exclusion details	First, individuals less than 55 years of age (as indicated by subtracting birth date, MDS item A0900, from admission date, MDS item A1900) are excluded from the measure. Second, exclusions are made for admissions for which there is missing data over the previous 12 months for MDS item A1800 "Entered From" or MDS item A2100 "Discharge Status". Third, if individuals have no available risk adjustment data on any MDS assessment within 18 days of SNF admission, they are excluded from the measure. As noted above, in addition to the denominator exclusions, we also suppress data for facilities that have fewer than 30 stays in the denominator or for whom the percent of stays with a known outcome is less than 90%. Facilities with fewer than 30 stays in the denominator, are identified by counting the stays remaining after applying the exclusions in this section to the denominator. Facilities for whom fewer than 90% of stays have known outcomes, are measured by looking at all entries for the facility and seeing how many of those entries also have a discharge assessment.
Risk Adjustment	Statistical risk model Risk adjustment for the measure was completed by means of logistic regression using independent variables drawn from the admission to SNF and discharge from SNF MDS 3.0 assessments. When information was not available on the admission MDS assessment, information from the next available MDS of any type (except discharge MDS assessment) was used, as long as the MDS was completed within 18 days of admission to the center; if no such complete assessment exists on entry or within 18 days, the stay is excluded from the denominator per the denominator exclusions. The following lists the variables used in the logistic regression risk adjustment model. There are 60 different MDS items, which are encoded across 116 variables in the final risk model (e.g., age and age-squared; interaction terms; etc.). The respective MDS 3.0 codes used to determine whether or not each variable contributes to the calculation are provided in Section S.15 below. Demographic:

	2858 Discharge to Community
	-Age -Gender -Marital Status Functional Status: -Vision -Makes Self-understood -Ability to Understand Functional Status (cognitive, mobility and self care): -Any Sign/symptom of Delirium -Major Depression -Behavioral Code (i.e. Hallucination, Delusion, Physical Behavior, Verbal Behavior, Other Behavior) -Any Rejection of Care -Medicare RUG IV Hierarchical Group -Activities (i.e Bed Mobility, Transfer, Walk in Corridor, Locomotion, Eating, and Personal Hygiene) -ADL summary (Combination of Bed Mobility, Transfer, Locomotion, Dressing, Eating, Toilet Use, Hygiene) -ADL*Cognitive Impairment: Interaction Term -Bathing -Balance (i.e. Moving from Seated to Standing, Walking, Turning Around and Facing the Opposite Direction, and Moving On and Off Toilet) -Urinary Incontinence -Bowel Incontinence Prognosis: -Any acute Hospitalization within 30 days of Admission -Special Treatment/Programs: Hospice Post-Admission - Life Expectancy of less than 6 months Clinical Conditions: -Shortness of Breath when Exertion -Shortness of Breath when Sitting Shortness of Breath when Lying Flat -Any Swallowing Disorder -Weight Loss -Pressure Ulcer -Wound Infection -Hemiplegia -Paraplegia Clinical Treatments: -Oxygen Post-admit -Tracheostomy Post-admit -Ventilator Post-admit -Dialysis Post-admit -Max Number Injections -Antipsychotic Use Clinical Diagnosis:

	2858 Discharge to Community
	-Anemia -Heart Failure -Hypertension -Pneumonia -Septicemia -Urinary Tract Infection (UTI) -Viral Hepatitis -Diabetes Mellitus -Hyperkalemia -Hyperlipidemia -Hip Fracture -Other Fracture -Alzheimer's Disease -Stroke -Dementia -Huntington's -Malnutrition -Anxiety Disorder -Depression -Manic Depression -Psychotic -Schizophrenia -Asthma, COPD, Chronic Lung Disease Provided in response box S.15a
Stratification	Not Applicable
Type Score	Rate/proportion better quality = higher score
Algorithm	The formula for the risk-adjusted discharge to community rate is: ((Observed discharge to community alive within 100 days of admission and remaining out of any SNF for at least 30 days rate)/ (Expected discharge to community alive within 100 days of admission and remaining out of any SNF for at least 30 days rate)) * (National discharge to community alive within 100 days of admission and remaining out of any SNF for at least 30 days rate). Note: The national rate and the expected rate need to be calculated for the same time period so that their ratio across the nation will center around 1.0, i.e., the risk adjustment does not systematically bias up or down the rates.We recommend the national rate and expected rates be recalibrated at least annually. 1. Build the denominator population, applying exclusions: -Establish the 12 month rolling time period and collect all the assessments for an admissions from an acute care hospital (for patients who did not have a prior stay in a nursing center for the prior 100 days) that fall within the time period. -Identify all MDS assessments through the stay, up to discharge. If no discharge is observed, the stay does not have a known outcome and is excluded from the denominator population. Note that if the patient is discharged (e.g., a hospitalization after which the patient returns to the SNF), but then returns to the same SNF within 100 days of the original admission, then the stay is continued to be ongoing, and we continue to search for the final discharge. -If the stay had missing data on the "admitted from" MDS item (to identify admissions from the

	2858 Discharge to Community
	acute hospital) or on the "discharged to" item (to identify discharges to the community). -Identify whether the patient was seen in a SNF in the 30 days after discharge from the current stay, which indicates the patient's outcome was not a successful community discharge for the purpose of this measure. This is accomplished by looking for any MDS for that individual in any SNF during the 30 day widow following SNF discharge to the community. -Identify any MDS assessments for the patient in the 100 days prior to the stay's admission. If any are found, exclude the stay from the denominator. -If the patient was under 55 years of age on admission to the stay, exclude the stay from the denominator population. 2. Observed Rate Calculation: -The formula for a facility's observed discharge to community rate is: (The number of stays discharged back to the community (i.e. private home, apartment, board/care, assisted living, or group home as indicated on the MDS 3.0 discharge assessment form) from a skilled nursing center within 100 days of admission and remain out of any skilled nursing center for at least 30 days)/ (all admissions from an acute hospital to a center over the prior 12 months that do not meet the exclusions) -The numerator is the number of stays in the denominator that are discharged back to the community from a SNF within 100 days of admission and remain out of any skilled nursing center for at least 30 days upon discharge, during a rolling 12 month period. -For example, if a center discharged 130 stays (that were admitted from an acute care hospital and that did not have a prior stay in a nursing center for the prior 100 days), but 30 of them were readmitted to a skilled nursing center within 30 days following discharge, the numerator would be 100 (i.e. 130-30=100). -Divide the numerator by the denominator to obtain the observed rate for the skilled nursing center. 3. Expected Rate Calculation -See S.15 -For each SNF, calculate the facility-level mean of the stay-level expected rates of discharging back to the community, from the calculation in S.15; this is the overall expected rate of discharging back to the community for the SNF based on its denominator population. 4. National Average -The national average is calculated as the sum of all residents in the nation who were discharged to the community (and remained out of a SNF for at least 30 days) divided by the sum of all admissions to SNF (regardless of payor status) from acute care hospitals during a calendar year and did not have a prior stay in the nursing home. 5. Divide the observed rate by the expected rate and multiply by the national rate to obtain the adjusted discharge to community rate for the center. 6. Suppress the risk adjusted discharge to community rates for SNFs with fewer than 30 stays in the denominator, or with a "known outcome rate" of less than 90%. The known outcome rate for the facility is the proportion of stays in the denominator (excepting the known outcome exclusion) for which the outcome is unknown. No diagram provided
Copyright / Disclaimer	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: Not Applicable

	2858 Discharge to Community
	5b.1 If competing, why superior or rationale for additive value: Not Applicable

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services
Description	This facility-level measure estimates an all-cause, unplanned, 30-day, risk-standardized readmission rate for adult Medicare fee-for-service (FFS) patients with a principal discharge diagnosis of a psychiatric disorder or dementia/Alzheimer's disease. The performance period for the measure is 24 months.
Type	Outcome
Data Source	Administrative claims For measure calculation, the following Medicare files are required: • Medicare Denominator tables • Beneficiary cross reference file • Institutional claims (Part A) • Non-institutional claims (Part B)—physician carrier/non-DME Index admissions and readmissions are identified in the Medicare Part A data. Comorbid conditions for risk adjustment are identified in the Medicare Part A and Part B data in the 12 months prior to and including the index admission. Demographic and fee-for-service (FFS) enrollment information are identified in the Medicare Denominator tables. No data collection instrument provided Attachment S2b_Data_Dictionary-IPF_Readmission-635896801988101932.xlsx
Level	Facility
Setting	Behavioral Health/Psychiatric : Inpatient
Numerator Statement	The measure estimates the incidence of unplanned, all-cause readmissions to IPFs or short-stay acute care hospitals following discharge from an eligible IPF index admission. We defined readmission as any admission that occurs on or between Days 3 and 30 post-discharge, except those considered planned.
Numerator Details	The risk-adjusted outcome measure does not have a traditional numerator and denominator. This section describes the outcome being measured. A readmission is defined as any admission, for any reason, to an IPF or a short-stay acute care hospital (including critical access hospitals) that occurs within 3-30 days after the discharge date from an eligible index admission to an IPF, except those considered planned. Subsequent admissions on Days 0, 1, and 2 are not counted as readmissions due to transfers/interrupted stay policy. See exclusions for details. PLANNED READMISSION ALGORITHM The measure uses the CMS 30-day Hospital-Wide All-Cause Unplanned Readmission (HWR) Measure,Planned Readmission Algorithm version 3.0 Available at https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Measure-Methodology.html The planned readmission algorithm follows two principles to identify planned readmissions: • Select procedures and diagnoses such as transplant surgery, maintenance chemotherapy/radiotherapy/immunotherapy, rehabilitation, and forceps delivery are considered always planned (summarized in the Data Dictionary, Tables PR1 and PR2). • Some procedures such as colorectal resection or aortic resection, are considered either planned or unplanned depending on the accompanying principal discharge diagnosis (Data Dictionary, Table PR3). Specifically, a procedure is considered planned if it does not coincide with a principal discharge diagnosis of an acute illness or complication (Data Dictionary, Table PR4). In the psychiatric patient population, electroconvulsive therapy (ECT) accounted for 41.8% of all

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
	potentially planned procedures.
Denominator Statement	The target population for this measure is Medicare FFS beneficiaries aged 18 years and older discharged from an inpatient psychiatric facility with a principal diagnosis of a psychiatric disorder. Eligible index admissions require enrollment in Medicare Parts A and B for 12 months prior to the index admission, the month of admission, and at least 30 days post discharge. Patients must be discharged alive to a non-acute setting (not transferred). A readmission within 30 days is eligible as an index admission, if it meets all other eligibility criteria.
Denominator Details	The risk-adjusted outcome measure does not have a traditional numerator and denominator. This section describes the target population for measurement. The target population for this measure is adult Medicare FFS beneficiaries discharged from an IPF. The measure is based on all eligible index admissions from the target population. An eligible index admission is defined as any IPF admission with the following: • Admitted to an IPF • Discharged with a principal diagnosis that indicates psychiatric disorder (AHRQ CCS 650-670) • Discharged alive • Age 18 or older at admission • Enrolled in Medicare FFS Parts A and B during the 12 months before the admission date, month of admission, and at least one month after the month of discharge from the index admission The measure uses the Clinical Classifications Software (CCS) developed by the Agency for Healthcare Research and Quality (AHRQ), available at https://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp, to group ICD9-CM codes into clinically coherent groups. This measure is limited to admissions for psychiatric causes because IPFs are expected to admit patients who need inpatient care for a psychiatric principal diagnosis (Prospective Payment System for Inpatient Hospital Services. In: Services DoHaH, ed. 42. Vol 412. U.S. Government Publishing Office 2011:535-537). However, a small number of claims (8,658 or 1.1%) had discharge diagnoses that are not in the psychiatric condition categories of CCS 650-670. These admissions could represent coding errors or, more likely, cases where the admission was initiated for psychiatric reasons but during the course of care it became clear that a non-psychiatric illness was the primary diagnosis. Therefore, these admissions are not included in the measure cohort because either they are not typical of inpatient psychiatric facility admissions or they could represent unreliable data. A readmission to an IPF is counted as another index admission if all denominator criteria are met.
Exclusions	The measure excludes admissions for patients: • Discharged against medical advice (AMA) • With unreliable data (e.g. has a death date but also admissions afterwards) • With a subsequent admission on day of discharge and following 2 days (transfers/interrupted stay period)
Exclusion details	DISCHARGE AGAINST MEDICAL ADVICE Index admissions where there is an indicator in the claims data that patients left against medical advice (AMA) are excluded because the facility may have limited opportunity to complete treatment and prepare for discharge. UNRELIABLE DATA Index admissions with unreliable demographic and death information are excluded from the denominator. Unreliable demographic information is defined as age greater than 115 years or missing gender. Unreliable death information is defined as

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
	• An admission with a discharge status of "dead" but the person has subsequent admissions; • The death date is prior to the admission date; or • The death date is within the admission and discharge dates for an admission but the discharge status is not "dead". TRANSFERS/INTERRUPTED STAYS Index admissions that result in a transfer or interrupted stay are excluded because transfers and interrupted stays cannot always be distinguished from true readmissions in the claims data. This exclusion is defined as an index admission with a readmission on Days 0, 1, or 2 post-discharge.
Risk Adjustment	Statistical risk model Hierarchical logistic regression is used to estimate a risk standardized readmission rate. CANDIDATE AND FINAL RISK FACTOR VARIABLES Four types of risk factors were considered based on empirical analysis, literature review, and clinical judgment: 1. Principal discharge diagnosis of the IPF index admission: Discharge diagnoses were summarized into 13 distinct principal discharge risk variables using a modified version of AHRQ CCS. 2. Comorbidity risk variables: Identified from secondary diagnoses of the index admission and primary or secondary diagnoses of in- and outpatient encounters during the 12-month look-back period using modified CMS condition categories (CC) 3. Other risk factors variables from literature such as history of discharge AMA, aggression and self-harm 4. Age and gender FINAL SET OF RISK-ADJUSTMENT VARIABLES Age (7 levels), gender Principal discharge diagnoses (13) CCS 650 Adjustment disorder CCS 651 Anxiety CCS 652/654/655 ADD/Developmental/Childhood disorders CCS 653 Dementia CCS 656 Impulse control disorders CCS 657.1 Bipolar disorder CCS 657.2rc Depressive disorder CCS 658 Personality disorder CCS 659.1 Schizo-affective disorder CCS 659.2 Psychosis CCS 660 Alcohol disorder CCS 661 Drug Disorder CCS 670/663 Other mental disorder Comorbidities: 26 non-psychiatric CC, 12 psychiatric CC groups CC Description (CC or ICD-9-CM) AMI (CC 81, 82) Anemia (CC 47) Arrhythmia (CC 92, 93) Asthma (CC 110) COPD/Fibrosis (CC 108, 109)

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
	Delirium (CC 48) Diabetes (CC 19, 119, 120) Diabetes complications (CC 15-18) Dialysis (CC 130) Endocrine disease (CC 22, 23) Heart disease (CC 83, 84, 89, 90, 104-106) Heart failure (CC 80) Hematological disorder (CC 44) Infection (CC 1, 3-5, 37, 152) Injury (CC 150, 151, 155, 156, 160, 162, 163) Liver disease (CC 25-29) Lung problems (CC 111-115) Malnutrition (CC 21) Metastasis (CC 7) Organ transplant (CC 174, 175) Other infection (CC 6) Pancreatic disease (CC 32) Peptic ulcer (CC 34) Seizures (CC 74) Uncompleted pregnancy (CC 142, 146, 147) Urinary tract disorder (CC 136) Adjustment disorder (ICD-9-CM 309.0, 309.22-309.24, 309.28-309.29, 309.3-309.4, 309.82-309.83, 309.89, 309.9, 309.1) Anxiety (ICD-9-CM 293.84, 300.01-300.02, 300.00, 300.09, 300.10, 300.20-300.23, 300.29, 300.3, 300.5, 313.0, 313.21, 313.22) Bipolar (ICD-9-CM 296.00-296.06, 296.10-296.16, 296.40-296.46, 296.50-296.56, 296.60-296.66, 296.7, 296.80-296.82, 296.89, 296.90, 296.99) Depression (ICD-9-CM 296.20-296.26, 296.30-296.36, E950.0-951.1, E951.8, E952.0-952.1, E952.8-953.1, E953.8-953.9, E954, E955.0-955.7, E955.9, E956, E957.0-957.2, E957.9-958.9, E959, 300.4, 311, V62.84) Developmental disability (CC 66 + ICD-9-CM 758.6-758.7, 758.81, 758.89, 758.9, 759.4, 759.89, 313.1, 313.3, 313.81-313.83, 315.00-315.02, 315.09, 315.1-315.2, 315.31-315.32, 315.34-315.35, 315.39, 315.4-315.5, 315.8-315.9, 313.23, 313.89, 313.9) Drug/alcohol disorder (CC 51, 52, 53 (except ICD9-CM 305.1) + ICD-9-CM CM 648.31-648.32, 648.34, 655.51, 648.30, 648.33, 655.50, 655.53, 980.0, 965.00-965.02, 965.09, 760.71-760.73, 760.75, 779.5, v654.2) Intellectual disability (CC 61-64) Other psych disorders (ICD-9-CM 300.11-300.13, 300.15-300.16, 300.19, 300.6-300.7, 300.81-300.82, 307.1, 307.51, 799.2, 799.21-799.25, 799.29, 300.89, 300.9, 308.0-308.4, 308.9, 312.8, 312.00-312.03, 312.10-312.13, 312.20-312.23, 312.4, 312.81-312.82, 312.89, 312.9, 307.0, 307.9, 307.20-307.23, 307.3, 307.6, 307.7, 309.21, 312.30-312.35, 312.39, 302.0-302.4, 302.50-302.53, 302.6, 302.70-302.76, 302.79, 302.81-302.85, 302.89, 302.9, 306.0-306.4, 306.50-306.53, 306.59, 306.6-306.9, 307.40-307.50, 307.52-307.54, 307.59, 307.80, 307.89, 316) Personality disorder (CC 57) Psychosis (CC 56 + ICD-9-CM 295.00-295.05, 295.10-295.15, 295.20-295.25, 295.30-295.35,

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
	295.40-295.45, 295.50-295.55, 295.60-295.65, 295.80-295.85, 295.90-295.95, 297.0-297.3, 297.8-297.9) PTSD (ICD-9-CM 309.81) Schizo-affective (ICD-9-CM 295.70-295.75) Discharged AMA in prior 12 months Suicide attempt/self-harm — identified by the presence of at least one inpatient or outpatient claim with diagnosis of suicidal attempt or self-harm in the 12-month look-back period. Aggression — identified by the presence an ICD-9-CM code indicating aggression as a secondary diagnosis on the index admission or on an inpatient or outpatient claim in the 12-month look-back period. Available in attached Excel or csv file at S.2b
Stratification	Not applicable
Type Score	Rate/proportion better quality = lower score
Algorithm	Key Algorithm Steps: 1. Identify all IPF admissions in the performance period. 2. Apply inclusion/exclusion criteria to identify index admissions. 3. Identify readmissions to IPF or short stay acute care hospitals within 30 days of discharge. 4. Apply the planned readmission algorithm to identify unplanned readmissions. 5. Identify risk factors in the 12 months prior to index admission. 6. Run hierarchical logistic regression to compute RSSR for each IPF. Hierarchical logistic regression is used to model the log-odds of readmission. The two-level specification allows reliable estimates for small-volume hospitals while accepting a certain amount of shrinkage toward the mean. The model includes risk factors as fixed effects and a hospital-specific intercept as random effect. The estimate of hospital-specific intercept reflects the quality of care received at an IPF after adjusting for case mix. A standardized risk ratio (SRR), which is the "predicted" number of readmissions over the "expected" number of readmissions, is calculated for each IPF. The "predicted" number of readmissions is the number of readmissions, given the IPF's performance and its observed case mix, which is calculated by summing the estimated probabilities of readmission for the index admissions contributing to the IPF, based on the IPF-specific intercept and all other risk factors. The "expected" number of readmissions is the number of readmissions given the national performance and its observed case mix, which is calculated by summing the estimated probabilities of readmission for the index admissions contributing to the IPF, based on the average intercept and all other risk factors. The confidence interval of the SRR is calculated by bootstrapping. An SRR greater than 1 indicates worse quality of care compared to the national average. An SRR less than 1 indicates better quality of care. The risk-standardized readmission rate (RSRR) is be calculated by multiplying SRR with the overall national readmission rate for better interpretation. No diagram provided
Copyright / Disclaimer	5.1 Identified measures: 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 1768 : Plan All-Cause Readmissions (PCR) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

	2860 Thirty-day all-cause unplanned readmission following psychiatric hospitalization in an inpatient psychiatric facility (IPF)
	1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 2375 : PointRight ® Pro 30™ 2380 : Rehospitalization During the First 30 Days of Home Health 2496 : Standardized Readmission Ratio (SRR) for dialysis facilities 2502 : All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facilities (IRFs) 2504 : 30-day Rehospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries 2510 : Skilled Nursing Facility 30-Day All-Cause Readmission Measure (SNFRM) 2512 : All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Long-Term Care Hospitals (LTCHs) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: This measure is harmonized to the extent possible with NQF 1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR), which is the most closely related measure. Both measures evaluate all-cause, unplanned readmissions following discharge for a broad range of diagnoses. The proposed measure specifically evaluates inpatient psychiatric facilities whereas NQF 1789 evaluates acute-care hospitals. The major differences are: The proposed measure for IPF excludes transfers on Days 0 and 1 and also subsequent admissions on Day 2 because billing procedures related to interrupted stays prevent distinguishing all readmissions during that period; NQF 1789 excludes transfers on Days 0 and 1. The proposed measure has only one risk model; NQF 1789 has 5 risk models for different patient cohorts. Although the proposed measure is also facility-wide, the cohort for this measure is all psychiatric conditions and multiple risk models were not needed. The proposed measure counts readmissions to IPFs and short-stay acute care hospitals (including critical access hospitals): NQF 1789 counts readmissions to short-stay acute care hospitals, not to IPFs. The proposed measure includes patients with psychiatric diagnoses of CCS 650-670: 1789 excludes CCS 650, 651, 652, 654, 655, 656, 657, 658, 659, 662, 670. 5b.1 If competing, why superior or rationale for additive value: There are no NQF-endorsed measures that address the same target population. NQF 1789 includes only some patients with psychiatric disorders (substance use and dementia).

	2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized readmission ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is Medicare Fee-for-Service beneficiaries who are 65 years or older. This Hybrid Hospital-Wide Readmission (HWR) measure is a re-engineered version of measure 1789, the Hospital-Wide All-Cause Unplanned Readmission Measure which was developed for patients 65 years and older using Medicare claims and is currently publically reported in the Hospital Inpatient Quality Reporting Program. This reengineered measure uses clinical data elements from patients' electronic health records in addition to claims data for risk adjustment.
Type	Outcome
Data Source	Administrative claims, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient claims: This data source contains claims data for FFS inpatient services including: Medicare inpatient hospital care as well as inpatient physician claims for the 12 months prior to and including the index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission. 3. Patients' electronic health records: The clinical data elements used in the risk models for this measure will be derived from patients EHRs. The measure was developed and tested using data from EHRs. No data collection instrument provided Attachment Hybrid_HWR_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator	The measure counts readmissions to any acute care hospital for any cause within 30 days of the

	2879 Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data
Details	date of discharge of the index admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 3.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and, 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).
Denominator Statement	The measure includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories)with a complete claims history for the 12 months prior to admission. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort, patients must be: • Enrolled in Medicare Fee-for-Service (FFS) Part A for the 12 months prior to the date of admission and during the index admission; • Aged 65 or over; • Discharged alive from a non-federal short-term acute care hospital; and, • Not transferred to another acute care facility. The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections.” There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk. The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams. The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses. The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in

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	large hospitals might be cared for by a separate cardiac or cardiovascular team. The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team. The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in Excel Data Dictionary data field S.2b.
Exclusions	The measure excludes index admissions for patients: 1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals; 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Discharged against medical advice (AMA); 4. Admitted for primary psychiatric diagnoses; 5. Admitted for rehabilitation; or 6. Admitted for medical treatment of cancer.
Exclusion details	1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB). 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached in Excel Data Dictionary data field S.2b. 5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of proestheses; and adjustment of devices). 6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary. The full list of the specific diagnosis and procedure CCS categories excluded from the specialty cohorts are attached in Excel Data Dictionary data field S.2b.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: This measure uses risk variables from both claims data and from electronic health records (EHR). Candidate variables were patient-level risk-adjusters that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age, indicators of comorbidity, and disease severity. For risk variables derived from claims data, only those variables in the current publicly reported claims-based Hospital-Wide All Cause Unplanned

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	Readmission Measure were considered as candidate variables. For each patient, risk variables were obtained from claims extending 12 months prior to and including the index admission and, for the clinical data elements from the electronic health record (EHR), only those captured during the index admission. These risk-adjusters are identified using inpatient Medicare FFS claims data. We use a fixed, common set of claims-based variables in all our models for simplicity and ease of data collection and analysis. However, we estimate a hierarchical logistic regression model for each specialty cohort separately, and the coefficients associated with each variable may vary across specialty cohorts. The model adjusts for casemix differences based on the clinical status of patients at the time of admission. For the claims data, we use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in the Excel Data Dictionary data field S.2b. In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The models also include a condition-specific indicator for all AHRQ CCS categories with sufficient volume (defined as those with more than 1,000 admissions nationally each year for Medicare FFS data) as well as a single indicator for conditions with insufficient volume in each model. In addition to the claims-derived candidate variables, we include clinical data elements derived from patients' electronic medical records as candidate variables. Unlike the uniform set of claims-variables used in the risk models, each of the five risk models includes a different set of clinical data elements because some variables were predictive of the readmission outcome some but not all of the specialty cohorts. The clinical data elements include the first vital signs captured within two hours of the start of the encounter and the results of several laboratory tests captured within 24 hours of the start of the encounter (complete blood count and basic chemistry profile). The final set of risk adjustment variables for each cohort are listed in the Excel Data Dictionary data field S.2b and attached Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data Technical Report. Some clinical data elements were also transformed into squared data values due to the non-linear relationship between the raw values and the readmission outcome. Demographics (Common to all risk models) Age-65 (years, continuous) for patients aged 65 and over cohorts Clinical Variables (Listed by risk model): Surgery Cohort: Systolic Blood Pressure Heart Rate Respiratory Rate Temperature Weight Cardiorespiratory Cohort: Bicarbonate Creatinine Glucose Hematocrit Sodium Systolic Blood Pressure

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	Heart Rate Oxygen Saturation WBC Count Temperature Cardiovascular Cohort: Bicarbonate Creatinine Hematocrit Potassium Sodium WBC Count Systolic Blood Pressure Heart Rate Oxygen Saturation Neurology Cohort: Creatinine Hematocrit Sodium WBC Count Systolic Blood Pressure Heart Rate Oxygen Saturation Respiratory Rate Medicine Cohort: Bicarbonate Creatinine Glucose Hematocrit Potassium Sodium WBC Count Systolic Blood Pressure Heart Rate Respiratory Rate Temperature Comorbidities (Common to each of the five risk models) Metastatic cancer or acute leukemia (CC 7) Severe cancer (CC 8-9) Other cancers (CC 10-12) Severe hematological disorders (CC 44) Coagulation defects and other specified hematological disorders (CC 46) Iron deficiency or other unspecified anemias and blood disease (CC 47) End-stage liver disease (CC 25-26)

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	Pancreatic disease (CC 32) Dialysis status (CC 130) Renal failure (CC 131) Transplants (CC 128, 174) Severe infection (CC 1, 3-5) Other infectious diseases and pneumonias (CC 6, 111-113) Septicemia/shock (CC 2) Congestive heart failure (CC 80) Coronary atherosclerosis or angina, cerebrovascular disease (CC 81-84, 89, 98-99, 103-106) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Cardio-respiratory failure or shock (CC 79) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Decubitus ulcer or chronic skin ulcer (CC 148-149) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Seizure disorders and convulsions (CC 74) Respirator dependence/tracheostomy status (CC 77) Drug/alcohol psychosis or dependence (CC 51-52) Psychiatric comorbidity (CC 54-56, 58, 60) Hip fracture/dislocation (CC 158) Principal Diagnoses Refer to the attached Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data Technical Report for the full lists of principal diagnosis AHRQ CCS categories included in each specialty cohort risk adjustment model. References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals. At the patient level, it

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	models the log-odds of hospital readmission within 30 days of discharge using age, selected clinical covariates, and a hospital-specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals. Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality. For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period. The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in the attached Hybrid Hospital-Wide Readmission Measure with Claims and Electronic Health Record Data Technical Report. References: Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. No diagram provided
Copyright / Disclaimer	5.1 Identified measures: 0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) 0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA)

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	1768 : Plan All-Cause Readmissions (PCR) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: N/A 5b.1 If competing, why superior or rationale for additive value: We did not include in our list of related measures any non-outcome measures, such as process measures, with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment wit

	2880 Excess days in acute care (EDAC) after hospitalization for heart failure
Status	Submitted
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for heart failure to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with heart failure by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient, Part B hospital outpatient claims and physician Carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. Data sources for the all-payer update No data collection instrument provided Attachment Heart_Failure_Excess_Days_in_Acute_Care_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index heart failure hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full-day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.
Numerator Details	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index heart failure admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates “exposure time” (the number of days each patient survives after

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	discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For development of this measure, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day heart failure readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician Carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.
Denominator Statement	The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-Federal acute care hospitals for heart failure. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of heart failure (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Having a principal discharge diagnosis of heart failure 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and, 5. Not transferred to another acute care facility. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart disease with heart failure

	2880 Excess days in acute care (EDAC) after hospitalization for heart failure
	402.91 Unspecified hypertensive heart disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage V or end stage renal disease 428.0 Congestive heart failure, unspecified 428.1 Left heart failure 428.20 Systolic heart failure, unspecified 428.21 Acute systolic heart failure 428.22 Chronic systolic heart failure 428.23 Acute on chronic systolic heart failure 428.30 Diastolic heart failure, unspecified 428.31 Acute diastolic heart failure 428.32 Chronic diastolic heart failure 428.33 Acute on chronic diastolic heart failure 428.40 Combined systolic and diastolic heart failure, unspecified 428.41 Acute combined systolic and diastolic heart failure 428.42 Chronic combined systolic and diastolic heart failure 428.43 Acute on chronic combined systolic and diastolic heart failure 428.9 Heart failure, unspecified An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge. For 2016 public reporting, the measure will also exclude: 4. Admissions with a procedure code for left ventricular assist device (LVAD) implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission. Patients with these procedures are a highly selected group of patients with different risk of the outcome. This exclusion will be added to the heart failure EDAC measure so that it remains fully harmonized with the CMS 30-day heart failure readmission measure. We did not exclude patients with LVAD or heart transplantation from the cohort of admissions used in the analyses for measure development and testing presented here.
Exclusion details	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Admissions within 30 days of discharge from a qualifying index admission are identified by

	2880 Excess days in acute care (EDAC) after hospitalization for heart failure
	comparing the discharge date from the index admission with subsequent admission dates. For 2016 public reporting: 4. Procedure codes for left ventricular assist device (LVAD) implantation or heart transplantation are identified by the corresponding codes included in claims data (see sheet "Cohort Exclusion Codes" in attached Data Dictionary).
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). The model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model. There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the existing, NQF-endorsed, CMS 30-day heart failure readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as "Age minus 65" [years above 65, continuous]) Comorbidities: 3. Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120)

	2880 Excess days in acute care (EDAC) after hospitalization for heart failure
	4. Iron deficiency or other unspecified anemias and blood disease (CC 47) 5. Congestive heart failure (CC 80) 6. Valvular or rheumatic heart disease (CC 86) 7. Chronic obstructive pulmonary disease (COPD) (CC 108) 8. End-stage renal disease or dialysis (CC 129-130) 9. Other urinary tract disorders (CC 136) 10. Specified arrhythmias and other heart rhythm disorders (CC 92-93) 11. Pneumonia (CC 111-113) 12. Renal failure (CC 131) 13. Vascular or circulatory disease (CC 104-106) 14. Disorders of fluid/electrolyte/acid-base (CC 22-23) 15. Coronary atherosclerosis or angina (CC 83-84) 16. Metastatic cancer or acute leukemia (CC 7) 17. Cancer (CC 8-12) 18. Decubitus ulcer or chronic skin ulcer (CC 148-149) 19. Dementia or other specified brain disorders (CC 49-50) 20. Stroke (CC 95-96) 21. Asthma (CC 110) 22. Acute coronary syndrome (CC 81-82) 23. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69,100-102,177-178) 24. Protein-calorie malnutrition (CC 21) 25. History of Coronary Artery Bypass Graft (CABG) (ICD-9-CM V45.81, 36.10-36.16) 26. Liver or biliary disease (CC 25-30) 27. Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) 28. Other gastrointestinal disorders (CC 36) 29. Severe hematological disorders (CC 44) 30. Drug/alcohol abuse/dependence/psychosis (CC 51-53) 31. Major psychiatric disorders (CC 54-56) 32. Depression (CC 58) 33. Other psychiatric disorders (CC 60) 34. Cardio-respiratory failure or shock (CC 79) 35. Other or unspecified heart disease (CC 94) 36. Fibrosis of lung or other chronic lung disorders (CC 109) 37. Nephritis (CC 132) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	Not applicable. This measure is not stratified.
Type Score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score

	2880 Excess days in acute care (EDAC) after hospitalization for heart failure
Algorithm	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe calculation of the predicted and expected values in the attached Appendix (Section 2.7). The measure reports, for each hospital, the difference ("excess") between each hospital's patients' average days in acute care ("predicted days"), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital ("expected days"). To be consistent with the reporting of the CMS 30-day heart failure readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day heart failure readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden. 5b.1 If competing, why superior or rationale for additive value: N/A

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for acute myocardial infarction (AMI) to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with AMI by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient claims, Part B hospital outpatient claims, and physician carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment AMI_Excess_Days_in_Acute_Care_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index AMI hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.
Numerator Details	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index AMI admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
	measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates "exposure time" (the number of days each patient survives after discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the CMS 30-day AMI EDAC measure, CMS used the Planned Readmission Algorithm without making any changes. For development, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day AMI readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.
Denominator Statement	The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-federal acute care hospitals for AMI. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of AMI (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided n S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Having a principal discharge diagnosis of AMI 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and,

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
	5. Not transferred to another acute care facility. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 410.00 Acute myocardial infarction of anterolateral wall, episode of care unspecified 410.01 Acute myocardial infarction of anterolateral wall, initial episode of care 410.10 Acute myocardial infarction of other anterior wall, episode of care unspecified 410.11 Acute myocardial infarction of other anterior wall, initial episode of care 410.20 Acute myocardial infarction of inferolateral wall, episode of care unspecified 410.21 Acute myocardial infarction of inferolateral wall, initial episode of care 410.30 Acute myocardial infarction of inferoposterior wall, episode of care unspecified 410.31 Acute myocardial infarction of inferoposterior wall, initial episode of care 410.40 Acute myocardial infarction of other inferior wall, episode of care unspecified 410.41 Acute myocardial infarction of other inferior wall, initial episode of care 410.50 Acute myocardial infarction of other lateral wall, episode of care unspecified 410.51 Acute myocardial infarction of other lateral wall, initial episode of care 410.60 True posterior wall infarction, episode of care unspecified 410.61 True posterior wall infarction, initial episode of care 410.70 Subendocardial infarction, episode of care unspecified 410.71 Subendocardial infarction, initial episode of care 410.80 Acute myocardial infarction of other specified sites, episode of care unspecified 410.81 Acute myocardial infarction of other specified sites, initial episode of care 410.90 Acute myocardial infarction of unspecified site, episode of care unspecified 410.91 Acute myocardial infarction of unspecified site, initial episode of care An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare; 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge; 4. Admitted and then discharged on the same day (because it is unlikely these are clinically significant AMIs).
Exclusion details	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. 4. Index admissions for patients admitted and then discharged on the same day are identified when the admission and discharge dates are equal.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, “Standards for Statistical Models Used for Public Reporting of Health Outcomes” (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). This model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
	(often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model. There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the existing, NQF-endorsed, CMS 30-day AMI readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as "Age-65" [years above 65, continuous]) Comorbidities: 3. Diabetes mellitus (DM) and DM complications (CC 15-20, 119-120) 4. Iron deficiency and other anemias and blood disease (CC 47) 5. Congestive heart failure (CC 80) 6. Valvular and rheumatic heart disease (CC 86) 7. COPD (CC108) 8. End-stage renal disease or dialysis (CC130) 9. Other urinary tract disorders (CC136) 10. Arrhythmias (CC 92-93) 11. Pneumonia (CC 111-113) 12. Renal failure (CC 131) 13. Vascular or circulatory disease (CC 104-106) 14. Disorders of fluid/electrolyte/acid-base (CC 22-23)

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
	15. Coronary atherosclerosis/other chronic ischemic heart disease (CC 84) 16. History of infection (CC 1,3-6) 17. Cerebrovascular disease (CC 97-99,103) 18. Metastatic cancer and acute leukemia (CC 7) 19. Cancer (CC 8-12) 20. Decubitus ulcer or chronic skin ulcer (CC 148-149) 21. Dementia and other specified brain disorders (senility)(CC 49-50) 22. Angina pectoris, old myocardial infarction (CC 83) 23. Stroke (CC 95-96) 24. Asthma (CC 110) 25. Acute coronary syndrome (CC 81-82) 26. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69,100-102,177-178) 27. Protein-calorie malnutrition (CC 21) 28. Anterior myocardial infarction (ICD-9-CM 410.00-410.19) 29. Other location of myocardial infarction (ICD-9-CM 410.20-410.69) 30. History of CABG (ICD-9-CM V45.81, 36.10-36.16) 31. History of PTCA (ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A. This measure is not stratified.
Type Score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score
Algorithm	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe calculation of the predicted and expected values in the attached Appendix (Section 2.7). The measure reports, for each hospital, the difference ("excess") between each hospital's patients' average days in acute care ("predicted days"), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital ("expected days"). To be consistent with the reporting of the CMS 30-day AMI readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia

	2881 Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)
	hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day AMI readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden. 5b.1 If competing, why superior or rationale for additive value: N/A

	2882 Excess days in acute care (EDAC) after hospitalization for pneumonia
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for pneumonia to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with pneumonia by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, the Center for Medicare and Medicaid Services (CMS) will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.
Type	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient, Part B hospital outpatient claims and physician carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. Data sources for the all-payer update No data collection instrument provided Attachment Pneumonia_Excess_Days_in_Acute_Care_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index pneumonia hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.
Numerator Details	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index pneumonia admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates “exposure time” (the number of days each patient survives after

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	discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the CMS 30-day pneumonia EDAC measure, CMS used the Planned Readmission Algorithm without making any changes. For development of this measure, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day pneumonia readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician Carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.
Denominator Statement	The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-Federal acute care hospitals for pneumonia. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of pneumonia (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided n S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of pneumonia, including aspiration pneumonia; or Principal discharge diagnosis of sepsis (not including severe sepsis), with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA but no secondary discharge diagnosis of severe sepsis. 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and, 5. Not transferred from another acute care facility.

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	International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 480.0 Pneumonia due to adenovirus 480.1 Pneumonia due to respiratory syncytial virus 480.2 Pneumonia due to parainfluenza virus 480.3 Pneumonia due to SARS-associated coronavirus 480.8 Pneumonia due to other virus not elsewhere classified 480.9 Viral pneumonia, unspecified 481 Pneumococcal pneumonia 482.0 Pneumonia due to Klebsiella pneumoniae 482.1 Pneumonia due to Pseudomonas 482.2 Pneumonia due to Hemophilus influenzae 482.30 Pneumonia due to Streptococcus, unspecified 482.31 Pneumonia due to Streptococcus, group A 482.32 Pneumonia due to Streptococcus, group B 482.39 Pneumonia due to other Streptococcus 482.40 Pneumonia due to Staphylococcus, unspecified 482.41 Methicillin susceptible pneumonia due to Staphylococcus aureus 482.42 Methicillin resistant pneumonia due to Staphylococcus aureus 482.49 Other Staphylococcus pneumonia 482.81 Pneumonia due to anaerobes 482.82 Pneumonia due to escherichia coli [E. coli] 482.83 Pneumonia due to other gram-negative bacteria 482.84 Pneumonia due to Legionnaires' disease 482.89 Pneumonia due to other specified bacteria 482.9 Bacterial pneumonia, unspecified 483.0 Pneumonia due to mycoplasma pneumoniae 483.1 Pneumonia due to chlamydia 483.8 Pneumonia due to other specified organism 485 Bronchopneumonia, organism unspecified 486 Pneumonia, organism unspecified 487.0 Influenza with pneumonia 488.11 Influenza due to identified 2009 H1N1 influenza virus with pneumonia ICD-9 codes that define patients with aspiration pneumonia: 507.0 Pneumonitis due to inhalation of food or vomitus ICD-9 codes that define patients with sepsis (not including severe sepsis [995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): 038.0 Streptococcal septicemia 038.10 Staphylococcal septicemia, unspecified 038.11 Methicillin susceptible Staphylococcus aureus septicemia 038.12 Methicillin resistant Staphylococcus aureus septicemia 038.19 Other staphylococcal septicemia 038.2 Pneumococcal septicemia

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	038.3 Septicemia due to anaerobes 038.40 Septicemia due to gram-negative organism, unspecified 038.41 Septicemia due to hemophilus influenzae 038.42 Septicemia due to escherichia coli [E. coli] 038.43 Septicemia due to pseudomonas 038.44 Septicemia due to serratia 038.49 Other septicemia due to gram-negative organisms 038.8 Other specified septicemias 038.9 Unspecified septicemia 995.91 Sepsis An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge;
Exclusion details	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Pneumonia admissions within 30 days of discharge from a qualifying pneumonia index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). This model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model. There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the current CMS 30-day pneumonia readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty)

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	that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as "Age-65" [years above 65, continuous]) Comorbidities: 3. History of Coronary Artery Bypass Graft (CABG) (ICD-9-CM V45.81, 36.10–36.16) 4. History of infection (CC 1, 3-6) 5. Septicemia/shock (CC 2) 6. Metastatic cancer or acute leukemia (CC 7) 7. Lung, upper digestive tract, and other severe cancers (CC 8) 8. Other major cancers (CC 9-10) 9. Diabetes Mellitus (DM) or DM complications (CC 15-20, 119, 120) 10. Protein-calorie malnutrition (CC 21) 11. Disorders of fluid, electrolyte, acid-base (CC 22, 23) 12. Other gastrointestinal disorders (CC 36) 13. Severe hematological disorders (CC 44) 14. Iron deficiency or other unspecified anemias and blood disease (CC 47) 15. Dementia or other specified brain disorders (CC 49, 50) 16. Drug/alcohol abuse/dependence/psychosis (CC 51-53) 17. Major psychiatric disorders (CC 54-56) 18. Other psychiatric disorders (CC 60) 19. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177, 178) 20. Cardio-respiratory failure or shock (CC 78, 79) 21. Congestive heart failure (CC 80) 22. Acute coronary syndrome (CC 81, 82) 23. Coronary atherosclerosis or angina (CC 83, 84) 24. Valvular or rheumatic heart disease (CC 86) 25. Specified arrhythmias and other heart rhythm disorders (CC 92, 93) 26. Stroke (CC 95, 96) 27. Vascular or circulatory disease (CC 104-106) 28. Chronic obstructive pulmonary disease (CC 108) 29. Fibrosis of lung and other chronic lung disorders (CC 109) 30. Asthma (CC 110) 31. Pneumonia (CC 111-113)

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	32. Pleural effusion/pneumothorax (CC 114) 33. Other lung disorders (CC 115) 34. End-stage renal disease or dialysis (CC 129, 130) 35. Renal failure (CC 131) 36. Urinary tract infection (CC 135) 37. Other urinary tract disorders (CC 136) 38. Decubitus ulcer or chronic skin ulcer (CC 148, 149) 39. Vertebral fractures (CC 157) 40. Other injuries (CC 162) 41. Respirator dependence/Tracheostomy (CC 77) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	Not applicable. This measure is not stratified.
Type Score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score
Algorithm	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe calculation of the predicted and expected values in the attached Appendix (Section 2.7). The measure reports, for each hospital, the difference ("excess") between each hospital's patients' average days in acute care ("predicted days"), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital ("expected days").To be consistent with the reporting of the CMS 30-day pneumonia readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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	5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day pneumonia readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden. 5b.1 If competing, why superior or rationale for additive value: N/A

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Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	Rate of risk-standardized acute, unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with heart failure
Type	Outcome
Data Source	Administrative claims Medicare administrative claims and enrollment data No data collection instrument provided Attachment Heart_Failure_ACO_Admission_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Integrated Delivery System
Setting	Ambulatory Care : Clinician Office/Clinic, Other ACO
Numerator Statement	The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)
Numerator Details	Note: The numerator of the measure score is the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. We use this field to define the outcome. 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 the Centers for Medicare & Medicaid Services (CMS) Planned Readmission Algorithm Version 3.0, 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 (i.e., those where the principal discharge diagnosis is major organ transplant, obstetrical delivery, or maintenance chemotherapy) as well as those admissions with a potentially planned procedure (e.g., total hip replacement or cholecystectomy) AND a non-acute principal discharge diagnosis code. To adapt the algorithm for this measure, we removed from the potentially planned procedure list two procedures, cardiac catheterization and amputation, because the need for these procedures might reflect progression of clinical conditions that potentially could have been managed in the ambulatory setting to avoid admissions for these procedures. For full details on the planned admission algorithm as adapted for this measure, please see Appendix A of the attached technical report. Appendix A of the attached technical report contains the detailed algorithm used to identify planned admissions. Among 2,123,190 admissions in the 2012 Medicare Full Sample, 145,443 (6.9%) were planned admissions. For ACO patients, there were 102,740 admissions; of these, 7,991 (7.8%) were planned admissions. For non-ACO patients, there were 2,020,450 admissions; of these, 137,452 (6.8%) were planned admissions. Please see Data Dictionary, sheet "S.6 ICD9-ICD10 Planned Algorithm," for the ICD-9 to ICD-10 crosswalk for the planned admission algorithm. Outcome Attribution: The outcome is attributed to the ACO to which the patient is assigned. Patients are assigned to ACOs according to the specific ACO program assignment algorithm. For example, for the Medicare Shared Savings Program, patient assignment is done retrospectively based on the plurality of care

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	received at that ACO during the measurement year. Information on ACO patient assignment can be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Citations: 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 Affairs. 2012 Jun 2012;31(6):1156-1166. Center for Medicare and Medicaid Services. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. 2013; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Accessed July 30, 2014. Centers for Medicare & Medicaid Services (CMS). Medicare Health Support. 2012; https://www.cms.gov/Medicare/Medicare-General-Information/CCIP/. Accessed March 27, 2014. Horwitz LI, Grady JN, Cohen DB, Lin Z, Volpe M, Ngo CK, Masica AL, Long T, Wang J, Keenan M, Montague J, Suter LG, Ross JS, Drye EE, Krumholz HM, Bernheim SM. Development and validation of an algorithm to identify planned readmissions from claims data. J Hosp Med 2015 Oct; 10(10):670-7. McCarthy D, Cohen A, Johnson MB. Gaining Ground: Care Management programs to reduce hospital admissions and readmissions among chronically ill and vulnerable patients. The Commonwealth Fund, New York. 2013.
Denominator Statement	The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of heart failure.
Denominator Details	Note: The denominator of the measure score is the expected admission rate for the ACO; we use this box to describe the measure cohort. The targeted patient population is Medicare FFS patients aged 65 years and older with a diagnosis of heart failure receiving ambulatory care during the measurement period. To be included in the cohort, patients must have one inpatient principal discharge diagnosis code of heart failure or two heart failure diagnosis codes in any position (inpatient and/or outpatient claims) within one or two years prior to the measurement period. We allowed for up to two years of claims to define the cohort since there is no specified optimal frequency of follow-up visits among ambulatory, stable patients (i.e., patients without a change in their symptoms may never be hospitalized and may only be seen annually). To be included in the cohort, patients must be enrolled full-time in both Part A and B during the year prior to the measurement period. Heart failure is defined using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes identified in Medicare Part A inpatient and outpatient claims data. Patients excluded from the cohort are identified using ICD-9-CM procedure codes in Medicare Part A inpatient and outpatient claims and the Medicare Denominator File. The ICD-9-CM codes that define the cohort and cohort exclusions are listed in the attached Excel file, sheets "S.9 Denominator Details – Cohort" and "S.11 Denominator Exclusions." An ICD-9-CM to ICD-10-CM code crosswalk is attached in data field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes: 1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). 2. Patients with left ventricular assist devices (LVADs).

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	Rationale: We exclude these patients because while they have a high risk of admission, they are low in prevalence and are clustered among a few ACOs.
Exclusion details	1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in FFS Part A using the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement period (Part A). 2. Patients with LVADs. We identify patients as having an LVAD based on ICD-9-CM procedure codes in Medicare Part A or B assigned to the patient within the two years prior to the measurement year. The ICD-9-CM codes are listed below and are also found in the attached Excel file, sheet "S.11 Denominator Exclusions." ICD-9-CM Code/Description 37.60/Implantation of heart and circulatory assist system(s) 37.62/Insertion of temporary non-implantable extracorporeal circulatory assist device 37.65/Implant of single ventricular (extracorporeal) external heart assist system 37.66/Insertion of implantable heart assist system 37.68/Insertion of percutaneous external heart assist device
Risk Adjustment	Statistical risk model We use a two-level hierarchical negative binomial model to estimate risk-standardized acute, unplanned admissions per person-year at risk for admission. This approach accounts for the clustering of patients within ACOs and variation in sample size. Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" [1-2]. The risk-standardization model includes age and 22 clinical variables. We define clinical variables using condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9 diagnosis codes [3]. A map showing the assignment of ICD-9 codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 CC to ICD-9." Data Dictionary, sheet "S.15 ICD9-ICD10 Pacemaker" contains the crosswalk of ICD-9 to ICD-10 codes for the pacemaker/cardiac resynchronization therapy/implantable cardiac device variable. Model Variables The risk-adjustment variables are: 1. Age 2. Pulmonary diseases (CC 107-110, 114-115) 3. Disability/Frailty (CC 21, 67-69, 100, 116, 148-149, 157, 177-178) 4. Other advanced organ failure (CC 77, 79) 5. Arrhythmia (CC 92-93) 6. Psychiatric Illness/Substance Abuse (CC 51-60) 7. Kidney disease (CC 128, 131-132) 8. Dialysis Status (CC 130) 9. Advanced cancer (CC 7-9, 11) 10. High risk cardiovascular conditions (CC 81-82, 89, 104) 11. Low risk cardiovascular conditions (CC 83-84, 94, 105-106) 12. Structural heart disease (CC 86-88) 13. Dementia (CC 49-50) 14. Diabetes with complications (CC 15-19, 119-120)

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	15. Gastrointestinal/genitourinary diseases (CC 29-31, 33-34, 133,176) 16. Hematologic diseases (CC 44, 46) 17. Infectious/immunologic diseases (CC 1, 3-5, 45, 85) 18. Liver disease (CC 25-28) 19. Neurological diseases (CC 48, 61, 65, 70-75, 95-99, 101-103,155) 20. Pacemaker/cardiac resynchronization therapy/implantable cardiac device (ICD-9-CM codes 00.50, 00.51, 00.52, 00.53, 00.54, V45.01, V53.31, V53.39, V45.02, V53.32, 37.7, 37.71, 37.72, 37.73, 37.74, 37.74, 37.76, 37.77, 37.78, 37.79 37.80, 37.81, 37.82, 37.83, 37.85, 37.86, 37.87, 37.89, 37.94, 37.95, 37.96, 37.97, 37.98, 37.99) 21. Iron deficiency anemia (CC 47) 22. Major organ transplant (CC 174) 23. Other organ transplant (CC 175) Citations: 1. Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation. 2006; 113 (3): 456-462. 2. Normand S-LT, Shahian DM. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci. 2007; 22 (2): 206-226. 3. Pope, G.C., Kautter, J., Ellis, R.P., et al.: Risk Adjustment for Medicare Capitation Payments Using the CMS-HCC Model. Health Care Financing Review. 2004; 25(4):119-141. Available in attached Excel or csv file at S.2b
Stratification	Not applicable. This measure is not stratified.
Type Score	Rate/proportion better quality = lower score
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 person-year, multiplied by the national rate of admissions per person-year among all Medicare FFS patients with heart failure – i.e., all eligible Medicare FFS patients with heart failure are used in the measure score calculation, and a score is generated for each ACO. For a full description of the modeling, please see the attached technical report (Section 3.5.5 and Appendix B of attached technical report). In brief, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within ACOs and accommodates the widely varying sizes of different ACOs. The measure uses a negative binomial model since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admission is determined based on a national sample of patients with heart failure. Stated another way, since the effects that risk factors exert on the number of admissions are estimated based on data from all ACO and non-ACO patients in the nation, the 'expected' number of admissions for each ACO is based on the performance of a national group of providers. 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 ACO-specific number of "predicted" admissions per person-year. The measure score is the ratio of predicted admissions over the expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering and sample-size variation.

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	The expected number of admissions is calculated based on the ACO's case mix and an intercept derived from a national average of all patients included in the cohort. The predicted number of admissions is calculated based on the ACO's case mix and the estimated ACO-specific intercept term. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per person-years at risk for hospitalization, for ease of interpretation. To place ACOs in performance categories, for each ACO RSAAR, one can calculate a 95% interval estimate (IE), which is similar to a confidence interval, using standard bootstrapping methods (further described in the Testing Form, Section 2b5.1). Using the 95% IEs, one can assign ACOs to one of three performance categories: 'better than the national rate,' 'no different than the national rate,' and 'worse than the national rate.' The ACO is 'better than the national rate' if the 95% IE is completely below the United States (US) national rate among Medicare FFS patients with heart failure; 'no different than the national rate' if the 95% IE is included in the US national rate among Medicare FFS patients with heart failure; and 'worse than the national rate' if the 95% IE is above the US national rate among Medicare FFS patients with heart failure. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0277 : Heart Failure Admission Rate (PQI 8) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The measures listed above are NQF-endorsed. There are several differences between our measure and these two NQF measures. 1. The cohort populations are different. The NQF measures focus on patients aged 18-65 years and 18+ years, respectively, for the two measures; thus, the cohorts have limited overlap. 2. The risk-adjustment models are different. NQF #0709 is not risk-adjusted; NQF #0277 is risk-adjusted for age and sex only, while our measures are fully risk-adjusted. 3. The outcomes measured (NQF 0709: potentially avoidable complications; NQF 0277: heart failure admissions) are different from our outcome of acute, all-cause admission rates. 5b.1 If competing, why superior or rationale for additive value: Not applicable.

	2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with diabetes
Type	Outcome
Data Source	Administrative claims Medicare administrative claims and enrollment data No data collection instrument provided Attachment Diabetes_ACO_Admission_Measure_NQF_Data_Dictionary_01-29-16_v1.0-635896799914719697.xlsx
Level	Integrated Delivery System
Setting	Ambulatory Care : Clinician Office/Clinic, Other ACO
Numerator Statement	The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)
Numerator Details	Note: The numerator of the measure score is the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. We use this field to define the outcome. 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 the Centers for Medicare & Medicaid Services (CMS) Planned Readmission Algorithm Version 3.0, 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 (i.e., those where the principal discharge diagnosis is major organ transplant, obstetrical delivery, or maintenance chemotherapy) as well as those admissions with a potentially planned procedure (e.g., total hip replacement or cholecystectomy) AND a non-acute principal discharge diagnosis code. To adapt the algorithm for this measure, we removed cardiac catheterization and amputation from the potentially planned procedure list. The need for these procedures might reflect progression of clinical conditions that potentially could have been managed in the ambulatory setting to avoid admissions for these procedures. For full details on the planned admission algorithm as adapted for this measure, please see Appendix A of the attached technical report. Appendix A of the attached technical report contains the detailed algorithm used to identify planned admissions. Among 2,940,537 admissions in the 2012 Medicare Full Sample, 353,191 (12.0%) were planned admissions. For ACO patients, there were 148,708 admissions; of these, 20,000 (13.5%) were planned admissions. For non-ACO patients, there were 2,791,829 admissions; of these, 333,192 (12.0%) were planned admissions. Please see Data Dictionary, sheet "S.6 ICD9-ICD10 Planned Algorithm," for the ICD-9 to ICD-10 crosswalk for the planned admission algorithm. Outcome Attribution: The outcome is attributed to the ACO to which the patient is assigned. Patients are assigned to ACOs according to the specific ACO program assignment algorithm. For example, for the Medicare

	2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes
	Shared Savings Program, patient assignment is done retrospectively based on the plurality of care received at that ACO during the measurement year. Information on ACO patient assignment can be found here: Information on ACO patient assignment can be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf.. Citations: 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 Affairs. 2012 Jun 2012;31(6):1156-1166. Center for Medicare and Medicaid Services. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. 2013; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Accessed July 30, 2014. Centers for Medicare & Medicaid Services (CMS). Medicare Health Support. 2012; https://www.cms.gov/Medicare/Medicare-General-Information/CCIP/. Accessed March 27, 2014. Horwitz LI, Grady JN, Cohen DB, Lin Z, Volpe M, Ngo CK, Masica AL, Long T, Wang J, Keenan M, Montague J, Suter LG, Ross JS, Drye EE, Krumholz HM, Bernheim SM. Development and validation of an algorithm to identify planned readmissions from claims data. J Hosp Med 2015 Oct; 10(10):670-7. McCarthy D, Cohen A, Johnson MB. Gaining Ground: Care Management programs to reduce hospital admissions and readmissions among chronically ill and vulnerable patients. The Commonwealth Fund, New York. 2013.
Denominator Statement	The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of diabetes.
Denominator Details	Note: The denominator of the measure score is the expected admission rate for the ACO; we use this box to describe the measure cohort. The targeted patient population is Medicare FFS patients aged 65 years and older with a diagnosis of diabetes receiving ambulatory care during the measurement period. To be included in the cohort, patients must have one inpatient or two outpatient diabetes diagnosis codes in any position within one or two years prior to the measurement period. We allowed for up to two years of claims to define the cohort since there is no specified optimal frequency of follow-up visits among ambulatory, stable patients (i.e., patients without a change in their symptoms may never be hospitalized and may only be seen annually). To be included in the cohort, patients must be enrolled full-time in both Part A and B during the year prior to the measurement period. Diabetes is defined using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes identified in Medicare Part A and Part B inpatient and outpatient claims data. Patients excluded from the cohort are identified using ICD-9-CM procedure codes in Medicare Part A inpatient and outpatient claims and the Medicare Denominator File. The ICD-9-CM codes that define the cohort are listed in the attached Excel file, sheets “S.9 Denominator Details – Cohort.” An ICD-9-CM to ICD-10-CM code crosswalk is attached in data field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes: 1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).
Exclusion	1. Patients without continuous enrollment in Medicare Part A for the duration of the

	2887 Risk-Standardized Acute Admission Rates for Patients with Diabetes
details	measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in FFS Part A using the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement period (Part A).
Risk Adjustment	Statistical risk model We use a two-level hierarchical negative binomial model to estimate risk-standardized acute, unplanned admissions per person-year at risk for admission. This approach accounts for the clustering of patients within ACOs and variation in sample size. Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" [1, 2]. The risk-standardization model includes age and 22 clinical variables. We define clinical variables using condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9 diagnosis codes [3]. A map showing the assignment of ICD-9 codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 CC to ICD-9." Data Dictionary, sheet "S.15 ICD10 Crosswalk-Risk model" contains the crosswalk of ICD-9 to ICD-10 codes for the diabetes severity index variable. Model Variables The risk-adjustment variables are: 1. Age 2. High Risk cardiovascular (CV) factors (CC 81, 82, 89, 104) 3. Low risk CV factors (CC 83, 84, 94, 105, 106) 4. Arrhythmia (CC 92, 93) 5. Advanced Cancer (CC 7, 8, 9, 11) 6. Dementia (CC 49, 50) 7. Heart failure (CC 80) 8. Dialysis (CC 130) 9. Disability/Frailty (CC 21, 67, 68, 100, 116, 148, 149, 157, 177, 178, 69) 10. Gastrointestinal and Genitourinary disorders (GI/GU) (CC 29, 30, 31, 33, 34, 133, 176) 11. Hematological disorders (CC 44, 46) 12. Infectious and immune disorders (CC 1, 3, 4, 5, 45, 85) 13. Kidney disease (CC 128, 131, 132) 14. Liver disease (CC 25, 26, 27, 28) 15. Neurological disorders (CC 48, 61, 65, 70, 72, 73, 74,75, 95, 96, 97, 98, 99, 101, 102, 103, 155) 16. Psychiatric Illness/Substance abuse (CC 51, 52, 53, 54, 55, 56, 57, 58, 59, 60) 17. Pulmonary disease (CC 107, 108, 109, 110, 114, 115) 18. Other advanced organ failure (CC 77, 79) 19. Diabetes severity index (number of complications associated with diabetes based on ICD-9 codes; see Testing form 2b.4.3 for details and Excel file, sheet "S.15 Diabetes Severity Index" for the list of ICD-9 codes.) 20. Iron deficiency anemia (CC 47) 21. Major organ transplant (CC 174) 22. Other organ transplant (CC 175) 23. Hip fracture/Major fracture (CC 158, 159)

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	Citations: 1. Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation. 2006; 113 (3): 456-462. 2. Normand S-LT, Shahian DM. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci. 2007; 22 (2): 206-226. 3. Pope, G.C., Kautter, J., Ellis, R.P., et al.: Risk Adjustment for Medicare Capitation Payments Using the CMS-HCC Model. Health Care Financing Review. 2004; 25(4):119-141. Available in attached Excel or csv file at S.2b
Stratification	Not applicable. This measure is not stratified.
Type Score	Rate/proportion better quality = lower score
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 person-year, multiplied by the national rate of admissions among all Medicare FFS patients with diabetes – i.e., all eligible Medicare FFS patients with diabetes are used in the measure score calculation, and a score is generated for each ACO. For a full description of the modeling, please see the attached technical report (Section 3.5.5 and Appendix B of attached technical report). In brief, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within ACOs and accommodates the widely varying sizes of different ACOs. The measure uses a negative binomial model since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admission is determined based on a national sample of patients with diabetes. Stated another way, since the effects that risk factors exert on the number of admissions are estimated based on data from all ACO and non-ACO patients in the nation, the 'expected' number of admissions for each ACO is based on the performance of a national group of providers. 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 ACO specific number of "predicted" admissions per person-year. The measure score is the ratio of predicted admissions over the expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering and sample-size variation. The expected number of admissions is calculated based on the ACO's case mix and national average intercept. The predicted number of admissions is calculated based on the ACO's case mix and the estimated ACO-specific intercept term. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per person-years at risk for hospitalization, for ease of interpretation. To place ACOs in performance categories, for each ACO RSAAR, one can calculate a 95% interval estimate (IE), which is similar to a confidence interval, using standard bootstrapping methods (further described in the Testing Form, Section 2b5.1). Using the 95% IEs, one can assign ACOs to one of three performance categories: 'better than the national rate,' 'no different than the national rate,' and 'worse than the national rate.' The ACO is 'better than the national rate' if the 95% IE is completely below the United States (US) national rate among Medicare FFS patients with

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	diabetes; 'no different than the national rate' if the 95% IE is included in the US national rate among Medicare FFS patients with diabetes; and 'worse than the national rate' if the 95% IE is above the US national rate among Medicare FFS patients with diabetes. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0575 : Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Control (<8.0%) 0059 : Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Poor Control (>9.0%) 0063 : Comprehensive Diabetes Care: LDL-C Screening 0018 : Controlling High Blood Pressure 0272 : Diabetes Short-Term Complications Admission Rate (PQI 01) 0285 : Lower-Extremity Amputation among Patients with Diabetes Rate (PQI 16) 0274 : Diabetes Long-Term Complications Admission Rate (PQI 03) 0638 : Uncontrolled Diabetes Admission Rate (PQI 14) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The measures listed above differ in several important ways from the proposed measure: 1. The measure differs in the outcome. The NQF# 0018, 0059, 0063, and 0575 are measures of surrogate outcomes and focus on risk factor control; in contrast, the proposed measure directly evaluates the results of care and assesses an outcome experienced by patients. The NQF # 0709, 0272, 0274, 0638, and 0285 are measures of specific types of hospital admissions; in contrast, the proposed measure includes all-cause acute admissions to capture broad vulnerabilities of older patients with diabetes to acute exacerbations of their underlying condition as well as co-existing comorbidities. 2. The measure differs in risk adjustment. The existing measures are either not adjusted or adjusted for age and sex. In contrast, the proposed measure is fully adjusted for a broad range of clinical factors that contribute to the risk for admission, allowing for fair comparisons of ACO performance. 3. The measure differs in the target population. Existing measures include adults with ages 18 to 75 or 18 to 65 years of age. In contrast, the target population for the proposed measure are all Medicare FFS beneficiaries with a diagnosis of diabetes, who are 65 years or older. Thus, the focus is focus is on older, complex adults with diabetes. 5b.1 If competing, why superior or rationale for additive value: Not applicable.

	2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions
Status	Standing Committee Review
Steward	Centers for Medicare & Medicaid Services (CMS)
Description	Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with multiple chronic conditions (MCCs)
Type	Outcome
Data Source	Administrative claims Medicare administrative claims and enrollment data No data collection instrument provided Attachment MCC_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Integrated Delivery System
Setting	Ambulatory Care : Clinician Office/Clinic
Numerator Statement	The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)
Numerator Details	Note: The numerator of the measure score is the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. We use this field to define the outcome. 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 the Centers for Medicare & Medicaid Services (CMS) Planned Readmission Algorithm Version 3.0, 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 (i.e., those where the principal discharge diagnosis is major organ transplant, obstetrical delivery, or maintenance chemotherapy) as well as those admissions with a potentially planned procedure (e.g., total hip replacement or cholecystectomy) AND a non-acute principal discharge diagnosis code. Admissions that include potentially planned procedures that might represent complications of ambulatory care, such as cardiac catheterization, are not considered planned. To adapt the algorithm for this measures, we removed from the potentially planned procedure list two procedures, cardiac catheterization and amputation, because the need for these procedures might reflect progression of clinical conditions that potentially could have been managed in the ambulatory setting to avoid admissions for these procedures. For full details of the planned admission algorithm as adapted, please see Appendix C of the attached technical report. Please see Data Dictionary, sheet "S.6 ICD9-ICD10 Planned Algorithm," for the ICD-9 to ICD-10 crosswalk for the planned admission algorithm. Outcome Attribution: The outcome is attributed to the ACO to which the patient is assigned. Patients are assigned to ACOs according to the specific ACO program assignment algorithm. For example, for the Medicare Shared Savings Program, patients are retrospectively assigned to an ACO if they obtained the plurality of their primary care through the ACO's providers during the measurement year. Information on ACO patient assignment can be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-

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	Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Citations: 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 Affairs. 2012 Jun 2012;31(6):1156-1166. Center for Medicare and Medicaid Services. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. 2013; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Accessed July 30, 2014. Centers for Medicare & Medicaid Services (CMS). Medicare Health Support. 2012; https://www.cms.gov/Medicare/Medicare-General-Information/CCIP/. Accessed March 27, 2014. Horwitz LI, Grady JN, Cohen DB, Lin Z, Volpe M, Ngo CK, Masica AL, Long T, Wang J, Keenan M, Montague J, Suter LG, Ross JS, Drye EE, Krumholz HM, Bernheim SM. Development and validation of an algorithm to identify planned readmissions from claims data. J Hosp Med 2015 Oct; 10(10):670-7. McCarthy D, Cohen A, Johnson MB. Gaining Ground: Care Management programs to reduce hospital admissions and readmissions among chronically ill and vulnerable patients. The Commonwealth Fund, New York. 2013.
Denominator Statement	Our target population is Medicare FFS patients aged 65 years and older whose combinations of chronic conditions put them at high risk of admission and whose admission rates could be lowered through better care. The National Quality Forum's (NQF's) "Multiple Chronic Conditions Measurement Framework," which defines patients with multiple chronic conditions 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 [1]." Operationally, the measure cohort includes patients with diagnoses in two or more of eight chronic disease groups: 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. Heart failure 8. 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 5 million patients in 2012). Citations: 1. National Quality Forum (NQF). Multiple Chronic Conditions Measurement Framework. 2012; http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=71227
Denominator Details	Note: The denominator of the measure score is the expected number of admissions for the ACO given its case mix; we use this box to describe the measure cohort. The cohort is Medicare FFS patients aged 65 years and older receiving ambulatory care during the measurement period with diagnoses that fall into two or more of eight chronic disease groups: 1. AMI

	2888 Risk-Standardized Acute Admission Rates for Patients with Multiple Chronic Conditions
	2. Alzheimer's disease and related disorders or senile dementia 3. Atrial fibrillation 4. CKD 5. COPD and asthma 6. Depression 7. Heart failure 8. Stroke and TIA The disease groups are defined using nine chronic condition categories in CMS's Chronic Condition Data Warehouse (CCW) [1]. We combined two CCW categories into a single chronic disease group – COPD and asthma. Sheet "S.9 Denominator Details-Cohort" in the attached Data Dictionary Excel file identifies the claim algorithms and the specific International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes for each of the eight chronic disease groups. These are fully aligned with the CCW chronic condition categories. In the CCW, the chronic condition categories are defined using ICD-9-CM diagnoses codes and are assigned to patients using validated claims algorithms for Medicare beneficiaries (based on one to three years of claims data). The measure uses these CCW definitions. To be included in the cohort, patients must also be enrolled full-time in both Medicare Parts A and B during the year prior to the measurement period. Citations: 1. Buccaneer. CCW Chronic Conditions: Combined Medicare and Medicaid Data. 2012; https://www.ccwdata.org/cs/groups/.../chron_cond_algo_req_proc.pd. Accessed July 30, 2014.
Exclusions	The measure excludes: 1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).
Exclusion details	1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in FFS Part A using the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement period (Part A).
Risk Adjustment	Statistical risk model 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" [1-2]. The risk-standardization model has 45 variables: age, each of the eight chronic disease groups, and 36 comorbidity variables. We define clinical variables primarily using CMS's Condition Categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes [3].

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	A map showing the assignment of ICD-9-CM codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 CC to ICD-9." Where ICD-9-CM codes in CCs overlap with those used in the variables that define the eight chronic disease groups, we removed those ICD-9-CM codes from the CCs to eliminate the overlap. Some variables are also defined by subsets of ICD-9-CM codes within CCs. A map showing the assignment of ICD-9-CM codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 Risk model CC to ICD-9." In the Data Dictionary, sheet "S.15 Risk Variable Definitions" provides the detailed CC and ICD-9-CM definitions for the clinical comorbidities, and sheet "S.15 Risk model ICD9-ICD10" contains the crosswalk of ICD-9-CM to ICD-10-CM codes for the risk model variables defined with ICD-9-CM codes. The risk-adjustment variables are: Demographic 1. Age (continuous variable) Eight chronic disease groups: 1. AMI 2. Alzheimer's disease and related disorders or senile dementia 3. Atrial fibrillation 4. CKD 5. COPD and asthma 6. Depression 7. Heart failure 8. Stroke and TIA Clinical comorbidities defined using CCs or ICD-9-CM codes: 1. Dialysis status (CC 130) 2. Respiratory failure (CC 77, 78, 79) 3. Advanced liver disease (CC 25 [remove ICD-9-CM 572.4], 26, 27, 28) 4. Pneumonia (CC 111, 112, 113) 5. Septicemia/shock (CC 2) 6. Marked disability/frailty (CC 21, 67, 68, 148, 149, 177, 178) 7. Pleural effusion/pneumothorax (CC 114) 8. Hematological diseases (CC 44 [remove ICD-8 283.11], 46) 9. Advanced cancer (CC 7, 8, 9, 11) 10. Infectious and immunologic diseases (CC 1, 3, 4 [remove ICD-9-CM 160.0, 160.1, 160.2, 160.3, 160.4, 160.5, 160.6], 5, 45, 85) 11. Severe cognitive impairment (CC 48, 75, 61, 62) 12. Major organ transplant status (CC 174, 128) 13. Pulmonary heart disease (ICD-9-CM 415.0, 416.0, 416.1, 416.8, 416.9, 417.0, 417.1, 417.8, 417.9) 14. Cardiomyopathy (ICD-9-CM 425.2, 425.4, 425.5, 425.7, 425.8, 425.9, 429.0, 429.1, 425.11, 425.18) 15. Gastrointestinal disease (CC 29, 30, 31, 33, 34) 16. Bone/joint/muscle infections/necrosis (CC 37) 17. Iron deficiency anemia (CC 47) 18. Diabetes with complications (CC 16, 17, 18, 19, 119, 120) 19. Ischemic heart disease except AMI (CC 82, 83, 84, 94; ICD-9-CM 429.5, 429.6) 20. Other lung disorders (CC 109, 115)

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	21. Vascular or circulatory disease (CC 104, 105 [remove ICD-9-CM 440.1, 442.1], 106) 22. Other significant endocrine disorders (CC 22 [remove ICD-9-CM 271.4, 588.81]) 23. Other disability and paralysis (CC 69, 100, 101, 116) 24. Substance abuse (CC 51, 52, 53) 25. Pancreatic disease (CC 32) 26. Other neurologic disorders (CC 71, 72, 73, 74, 102, 103) 27. Arrhythmia (except atrial fibrillation) (CC 92, 93 [remove ICD-9-CM 427.31]) 28. Hypertension (CC 91) 29. Hip or vertebral fracture (CC 157, 158) 30. Lower-risk cardiovascular disease (CC 86, 87, 88) 31. Cerebrovascular disease (CC 98, 99) 32. Other malignancy (CC 10 [remove ICD-9-CM 189.0 and 189.9]) 33. Morbid obesity (ICD-9-CM V853.5, V853.6, V853.7, V853.8, 278.01, V853.9, V854.4, V854.5, V854.3) 34. Urinary disorders (CC 133 [remove ICD-9-CM 753.21, 753.20, 753.29, 753.22, 753.23], 136 [remove ICD-9-CM 587, 588.0, 588.1, 588.9, 588.89, 753.12, 753.13, 753.15, 753.16, 753.19]) 35. Hypertensive heart and renal disease or encephalopathy (CC 89) 36. Psychiatric disorders other than depression (CC 51-54, 56, 57, 59, 60) Citations: 1. Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation. 2006; 113 (3): 456-462. 2. Normand S-LT, Shahian DM. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci. 2007; 22 (2): 206-226. 3. Pope, G.C., Kautter, J., Ellis, R.P., et al.: Risk Adjustment for Medicare Capitation Payments Using the CMS-HCC Model. Health Care Financing Review. 2004; 25(4):119-141. Available in attached Excel or csv file at S.2b
Stratification	Not applicable. This measure is not stratified.
Type Score	Rate/proportion better quality = lower score
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 person-year among all Medicare FFS patients with MCCs. All eligible Medicare FFS patients with MCCs are used in the measure score calculation, and a score is generated for each ACO. In brief, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within ACOs and accommodates the widely varying sizes of different ACOs. The measure uses a negative binomial model since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admission is determined based on a national sample of patients with MCCs. Stated another way, since the effects that risk factors exert on the number of admissions are estimated based on data from all ACO and non-ACO patients in the nation, the expected number of admissions for each ACO is based on the performance of a national group of providers. The second level of the model estimates a random-intercept term that reflects the ACO's

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	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 ACO-specific number of "predicted" admissions per person-year. The measure score is the ratio of predicted admissions over the expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering and sample-size variation. The expected number of admissions is calculated based on the ACO's case mix and national average intercept. The predicted number of admissions is calculated based on the ACO's case mix and the estimated ACO-specific intercept term. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per person-years at risk for hospitalization, for ease of interpretation. To place ACOs in performance categories, for each ACO RSAAR, one can calculate a 95% interval estimate (IE), which is similar to a confidence interval, using standard bootstrapping methods (further described in the Testing Form, Section 2b5.1). Using the 95% IE, one can assign ACOs to one of three performance categories: 'better than the national rate,' 'no different than the national rate,' and 'worse than the national rate.' The ACO is 'better than the national rate' if the 95% IE is completely below the U.S. national rate among Medicare FFS patients with MCCs; 'no different than the national rate' if the 95% IE is included in the U.S. national rate among Medicare FFS patients with MCCs; and 'worse than the national rate' if the 95% IE is above the U.S. national rate among Medicare FFS patients with MCCs. Available in attached appendix at A.1
Copyright / Disclaimer	5.1 Identified measures: 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: Not applicable. 5b.1 If competing, why superior or rationale for additive value: Not applicable.

Appendix F: Related and Competing Measures

Comparison of NQF #0330 and NQF #2880

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals or Veterans Health Administration (VA) hospitals.	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for heart failure to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with heart failure by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.
Type	Outcome	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient, Part B hospital outpatient claims and physician Carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	(SES) composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the HF readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0330_HF_Readmission_S2b_Data_Dictionary_v1.0.xlsx	Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. Data sources for the all-payer update No data collection instrument provided Attachment Heart_Failure_Excess_Days_in_Acute_Care_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility	Facility
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index HF admission. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index heart failure hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	day. Each readmission day is counted as one full-day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index HF admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the heart failure readmission measure, CMS used the Planned	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index heart failure admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates "exposure time" (the number of days each patient survives after discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2015 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Readmission Measures for HF, version 4.0" posted in data field A.1 or at https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890435217&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DRdmn_AMIHFPNCOPDSTK_Msr_UpdtRpt.pdf&blobcol=urldata&blobtable=MungoBlobs.	readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For development of this measure, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day heart failure readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician Carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.
Denominator Statement	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with either a principal discharge diagnosis of HF (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals or Veterans Health Administration (VA) hospitals. Additional details are provided in S.9 Denominator Details.	The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-Federal acute care hospitals for heart failure. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of heart failure (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.
Denominato	To be included in the measure cohort used in public reporting,	To be included in the measure cohort used in public reporting, patients

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r Details	patients must meet the following additional inclusion criteria: 1. Having a principal discharge diagnosis of heart failure; 2. Enrolled in Medicare FFS Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and 5. Not transferred to another acute care facility. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older and those aged 65 years or older (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define HF: 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart disease with heart failure 402.91 Unspecified hypertensive heart disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease,	must meet the following inclusion criteria: 1. Having a principal discharge diagnosis of heart failure 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and, 5. Not transferred to another acute care facility. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart disease with heart failure 402.91 Unspecified hypertensive heart disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage V or end stage renal disease 428.0 Congestive heart failure, unspecified 428.1 Left heart failure

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease 428.0 Congestive heart failure, unspecified 428.1 Left heart failure 428.20 Systolic heart failure, unspecified 428.21 Acute systolic heart failure 428.22 Chronic systolic heart failure 428.23 Acute on chronic systolic heart failure 428.30 Diastolic heart failure, unspecified 428.31 Acute diastolic heart failure 428.32 Chronic diastolic heart failure 428.33 Acute on chronic diastolic heart failure 428.40 Combined systolic and diastolic heart failure, unspecified 428.41 Acute combined systolic and diastolic heart failure 428.42 Chronic combined systolic and diastolic heart failure 428.43 Acute on chronic combined systolic and diastolic heart failure 428.9 Heart failure, unspecified ICD-10 Codes that define the patient cohort: I110 Hypertensive heart disease with heart failure I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease I509 Heart failure, unspecified I501 Left ventricular failure I5020 Unspecified systolic (congestive) heart failure	428.20 Systolic heart failure, unspecified 428.21 Acute systolic heart failure 428.22 Chronic systolic heart failure 428.23 Acute on chronic systolic heart failure 428.30 Diastolic heart failure, unspecified 428.31 Acute diastolic heart failure 428.32 Chronic diastolic heart failure 428.33 Acute on chronic diastolic heart failure 428.40 Combined systolic and diastolic heart failure, unspecified 428.41 Acute combined systolic and diastolic heart failure 428.42 Chronic combined systolic and diastolic heart failure 428.43 Acute on chronic combined systolic and diastolic heart failure 428.9 Heart failure, unspecified An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	I5021 Acute systolic (congestive) heart failure I5022 Chronic systolic (congestive) heart failure I5023 Acute on chronic systolic (congestive) heart failure I5030 Unspecified diastolic (congestive) heart failure I5031 Acute diastolic (congestive) heart failure I5032 Chronic diastolic (congestive) heart failure I5033 Acute on chronic diastolic (congestive) heart failure I5040 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure I5041 Acute combined systolic (congestive) and diastolic (congestive) heart failure I5042 Chronic combined systolic (congestive) and diastolic (congestive) heart failure I5043 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).	
Exclusions	The readmission measures excludes admissions: 1. Ending in discharges against medical advice Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 2. Without at least 30 days of post-discharge enrollment in FFS Medicare Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted. 3. Occurring within 30 days of discharge from an index admission Rationale: This exclusion ensures that no hospitalization will be considered as both a readmission and an index admission within the same measure. 4. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge. For 2016 public reporting, the measure will also exclude: 4. Admissions with a procedure code for left ventricular assist device (LVAD) implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission. Patients with these procedures are a highly selected group of patients with different risk of the outcome. This exclusion will be added to the heart failure EDAC measure so that it remains fully harmonized with the CMS 30-day heart failure readmission measure. We did not exclude patients with LVAD or heart transplantation from the cohort of admissions used in the analyses for measure development and testing presented here.

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	Rationale: Patients with these procedures are a highly-selected group of patients with a different risk of the readmission outcome.	
Exclusion Details	1. Discharges against medical advice are identified using the discharge disposition indicator in claims data. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. 4. Procedure codes for LVAD implantation or heart transplantation are identified by the corresponding codes included in claims data. The list of codes used is attached in field S.2b. (Data Dictionary or Code Table).	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. For 2016 public reporting: 4. Procedure codes for left ventricular assist device (LVAD) implantation or heart transplantation are identified by the corresponding codes included in claims data (see sheet "Cohort Exclusion Codes" in attached Data Dictionary).
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). The model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model.

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk-adjustment variables is: Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts; Male (%) Comorbidities History of Coronary Artery Bypass Graft (CABG) surgery (ICD-9 diagnosis code V45.81; ICD-9 procedure codes 36.10-36.16) Cardio-respiratory failure and shock (CC 79) Congestive heart failure (CC 80)	There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the existing, NQF-endorsed, CMS 30-day heart failure readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as “Age minus 65” [years above 65, continuous])

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Other or unspecified heart disease (CC 94) Vascular or circulatory disease (CC 104-106) Metastatic cancer or acute leukemia (CC 7) Cancer (CC 8-12) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Liver or biliary disease (CC 25-30) Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency or other unspecified anemias and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/psychosis (CC 51-53) Major psychiatric disorders (CC 54-56) Depression (CC 58) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Stroke (CC 95-96) Chronic Obstructive Pulmonary Disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Dialysis status (CC 130)	Comorbidities: 3. Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) 4. Iron deficiency or other unspecified anemias and blood disease (CC 47) 5. Congestive heart failure (CC 80) 6. Valvular or rheumatic heart disease (CC 86) 7. Chronic obstructive pulmonary disease (COPD) (CC 108) 8. End-stage renal disease or dialysis (CC 129-130) 9. Other urinary tract disorders (CC 136) 10. Specified arrhythmias and other heart rhythm disorders (CC 92-93) 11. Pneumonia (CC 111-113) 12. Renal failure (CC 131) 13. Vascular or circulatory disease (CC 104-106) 14. Disorders of fluid/electrolyte/acid-base (CC 22-23) 15. Coronary atherosclerosis or angina (CC 83-84) 16. Metastatic cancer or acute leukemia (CC 7) 17. Cancer (CC 8-12) 18. Decubitus ulcer or chronic skin ulcer (CC 148-149) 19. Dementia or other specified brain disorders (CC 49-50) 20. Stroke (CC 95-96) 21. Asthma (CC 110) 22. Acute coronary syndrome (CC 81-82) 23. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69,100-102,177-178) 24. Protein-calorie malnutrition (CC 21) 25. History of Coronary Artery Bypass Graft (CABG) (ICD-9-CM V45.81, 36.10-36.16) 26. Liver or biliary disease (CC 25-30) 27. Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) 28. Other gastrointestinal disorders (CC 36) 29. Severe hematological disorders (CC 44)

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	Renal failure (CC 131) Nephritis (CC 132) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Available in attached Excel or csv file at S.2b	30. Drug/alcohol abuse/dependence/psychosis (CC 51-53) 31. Major psychiatric disorders (CC 54-56) 32. Depression (CC 58) 33. Other psychiatric disorders (CC 60) 34. Cardio-respiratory failure or shock (CC 79) 35. Other or unspecified heart disease (CC 94) 36. Fibrosis of lung or other chronic lung disorders (CC 109) 37. Nephritis (CC 132) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A	Not applicable. This measure is not stratified.
Type Score	Rate/proportion better quality = lower score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge from the index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe calculation of the predicted and expected values in the attached Appendix (Section 2.7).

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.	The measure reports, for each hospital, the difference ("excess") between each hospital's patients' average days in acute care ("predicted days"), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital ("expected days"). To be consistent with the reporting of the CMS 30-day heart failure readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). References: Keenan PS, Normand SL, Lin Z, et al. An administrative claims measure suitable for profiling hospital performance on the basis of 30-day all-cause readmission rates among patients with heart failure. Circulation. Cardiovascular Quality and Outcomes. Sep 2008;1(1):29-37. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1	
Submission items	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-	5.1 Identified measures: 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day heart failure readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts

	0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	2880: Excess days in acute care (EDAC) after hospitalization for heart failure
	outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden. 5b.1 If competing, why superior or rationale for additive value: N/A

Comparison of NQF #506 and NQF #2882

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
Steward	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level 30-day, all-cause, risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Readmission is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. CMS annually reports the measure for patients who are 65 years or older and are enrolled in fee-for-service (FFS) Medicare hospitalized in non-federal hospitals. Please note this measure has been substantially updated since the last submission; as described in S.3., the cohort has been expanded. Throughout this application we refer to this measure as version 8.2.	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for pneumonia to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with pneumonia by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, the Center for Medicare and Medicaid Services (CMS) will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.
Type	Outcome	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. The American Community Survey (2008-2012): The American	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient, Part B hospital outpatient claims and physician carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	Community Survey data is collected annually and an aggregated 5-years of data was used to calculate the AHRQ SES composite index score. 4. Data sources for the all-payer update: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0506_PN_Readmission_S2b_Readmission_Data_Dictionary_v1.0.xlsx	well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. Data sources for the all-payer update No data collection instrument provided Attachment Pneumonia_Excess_Days_in_Acute_Care_NQF_Data_Dictionary_01-29-16_v1.0.xlsx
Level	Facility	Facility
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	date of discharge from the index admission for patients 18 and older discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	as an unplanned readmission for any cause within 30 days from the date of discharge from the index pneumonia hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index pneumonia admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The planned readmission algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The planned readmission algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index pneumonia admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates “exposure time” (the number of days each patient survives after discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. The planned readmission algorithm is applied to the pneumonia measure without modifications. The planned readmission algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).	The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the CMS 30-day pneumonia EDAC measure, CMS used the Planned Readmission Algorithm without making any changes. For development of this measure, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day pneumonia readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician Carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.
Denominat	This claims-based measure can be used in either of two patient	The target population for this measure is Medicare FFS beneficiaries aged

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
or Statement	cohorts: (1) patients aged 65 years or over or (2) patients aged 18 years or older. We have specifically tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis; and with a complete claims history for the 12 months prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.	65 years and older hospitalized at non-Federal acute care hospitals for pneumonia. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of pneumonia (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided n S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of pneumonia, including aspiration pneumonia; or Principal discharge diagnosis of sepsis (not including severe sepsis), with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA but no secondary discharge diagnosis of severe sepsis. 2. Enrolled in Medicare fee-for-service (FFS) 3. Aged 65 or over 4. Not transferred from another acute care facility 5. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older; and those aged 65 years or over (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of pneumonia, including aspiration pneumonia; or Principal discharge diagnosis of sepsis (not including severe sepsis), with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA but no secondary discharge diagnosis of severe sepsis. 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and, 5. Not transferred from another acute care facility. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 480.0 Pneumonia due to adenovirus 480.1 Pneumonia due to respiratory syncytial virus 480.2 Pneumonia due to parainfluenza virus

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	measure are: ICD-9 codes that define patients with pneumonia: 480.0 Pneumonia due to adenovirus 480.1 Pneumonia due to respiratory syncytial virus 480.2 Pneumonia due to parainfluenza virus 480.3 Pneumonia due to SARS-associated coronavirus 480.8 Pneumonia due to other virus not elsewhere classified 480.9 Viral pneumonia, unspecified 481 Pneumococcal pneumonia 482.0 Pneumonia due to Klebsiella pneumoniae 482.1 Pneumonia due to Pseudomonas 482.2 Pneumonia due to Hemophilus influenzae 482.30 Pneumonia due to Streptococcus, unspecified 482.31 Pneumonia due to Streptococcus, group A 482.32 Pneumonia due to Streptococcus, group B 482.39 Pneumonia due to other Streptococcus 482.40 Pneumonia due to Staphylococcus, unspecified 482.41 Methicillin susceptible pneumonia due to Staphylococcus aureus 482.42 Methicillin resistant pneumonia due to Staphylococcus aureus 482.49 Other Staphylococcus pneumonia 482.81 Pneumonia due to anaerobes 482.82 Pneumonia due to escherichia coli 482.83 Pneumonia due to other gram-negative bacteria 482.84 Pneumonia due to Legionnaires' disease 482.89 Pneumonia due to other specified bacteria 482.9 Bacterial pneumonia, unspecified 483.0 Pneumonia due to mycoplasma pneumoniae 483.1 Pneumonia due to chlamydia 483.8 Pneumonia due to other specified organism	480.3 Pneumonia due to SARS-associated coronavirus 480.8 Pneumonia due to other virus not elsewhere classified 480.9 Viral pneumonia, unspecified 481 Pneumococcal pneumonia 482.0 Pneumonia due to Klebsiella pneumoniae 482.1 Pneumonia due to Pseudomonas 482.2 Pneumonia due to Hemophilus influenzae 482.30 Pneumonia due to Streptococcus, unspecified 482.31 Pneumonia due to Streptococcus, group A 482.32 Pneumonia due to Streptococcus, group B 482.39 Pneumonia due to other Streptococcus 482.40 Pneumonia due to Staphylococcus, unspecified 482.41 Methicillin susceptible pneumonia due to Staphylococcus aureus 482.42 Methicillin resistant pneumonia due to Staphylococcus aureus 482.49 Other Staphylococcus pneumonia 482.81 Pneumonia due to anaerobes 482.82 Pneumonia due to escherichia coli [E. coli] 482.83 Pneumonia due to other gram-negative bacteria 482.84 Pneumonia due to Legionnaires' disease 482.89 Pneumonia due to other specified bacteria 482.9 Bacterial pneumonia, unspecified 483.0 Pneumonia due to mycoplasma pneumoniae 483.1 Pneumonia due to chlamydia 483.8 Pneumonia due to other specified organism 485 Bronchopneumonia, organism unspecified 486 Pneumonia, organism unspecified 487.0 Influenza with pneumonia 488.11 Influenza due to identified 2009 H1N1 influenza virus with pneumonia ICD-9 codes that define patients with aspiration pneumonia: 507.0 Pneumonitis due to inhalation of food or vomitus

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	485 Bronchopneumonia, organism unspecified 486 Pneumonia, organism unspecified 487.0 Influenza with pneumonia 488.11 Influenza due to identified 2009 H1N1 influenza virus with pneumonia ICD-9 codes that define patients with aspiration pneumonia: 507.0 Pneumonitis due to inhalation of food or vomitus ICD-9 codes that define patients with sepsis (not including severe sepsis [995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): 038.0 Streptococcal septicemia 038.10 Staphylococcal septicemia, unspecified 038.11 Methicillin susceptible Staphylococcus aureus septicemia 038.12 Methicillin resistant Staphylococcus aureus septicemia 038.19 Other staphylococcal septicemia 038.2 Pneumococcal septicemia [Streptococcus pneumoniae septicemia] 038.3 Septicemia due to anaerobes 038.40 Septicemia due to gram-negative organism, unspecified 038.41 Septicemia due to hemophilus influenzae [H. influenzae] 038.42 Septicemia due to escherichia coli [E. coli] 038.43 Septicemia due to pseudomonas 038.44 Septicemia due to serratia 038.49 Other septicemia due to gram-negative organisms 038.8 Other specified septicemias 038.9 Unspecified septicemia 995.91 Sepsis ---------- ICD-10 codes that define patients with pneumonia:	ICD-9 codes that define patients with sepsis (not including severe sepsis [995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): 038.0 Streptococcal septicemia 038.10 Staphylococcal septicemia, unspecified 038.11 Methicillin susceptible Staphylococcus aureus septicemia 038.12 Methicillin resistant Staphylococcus aureus septicemia 038.19 Other staphylococcal septicemia 038.2 Pneumococcal septicemia 038.3 Septicemia due to anaerobes 038.40 Septicemia due to gram-negative organism, unspecified 038.41 Septicemia due to hemophilus influenzae 038.42 Septicemia due to escherichia coli [E. coli] 038.43 Septicemia due to pseudomonas 038.44 Septicemia due to serratia 038.49 Other septicemia due to gram-negative organisms 038.8 Other specified septicemias 038.9 Unspecified septicemia 995.91 Sepsis An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	J12.0 Adenoviral pneumonia J12.1 Respiratory syncytial virus pneumonia J12.2 Parainfluenza virus pneumonia J12.81 Pneumonia due to SARS-associated coronavirus J12.89 Other viral pneumonia J12.9 Viral pneumonia, unspecified J13 Pneumonia due to Streptococcus pneumoniae J18.1 Lobar pneumonia, unspecified organism J15.0 Pneumonia due to Klebsiella pneumoniae J15.1 Pneumonia due to Pseudomonas J14 Pneumonia due to Hemophilus influenzae J15.4 Pneumonia due to other streptococci J15.3 Pneumonia due to streptococcus, group B J15.20 Pneumonia due to staphylococcus, unspecified J15.211 Pneumonia due to Methicillin susceptible staphylococcus J15.212 Pneumonia due to Methicillin resistant staphylococcus J15.29 Pneumonia due to other staphylococcus J15.8 Pneumonia due to other specified bacteria J15.5 Pneumonia due to Escherichia coli J15.6 Pneumonia due to other aerobic Gram-negative bacteria A48.1 Legionnaires' disease J15.8 Pneumonia due to other specified bacteria J15.9 Unspecified bacterial pneumonia J15.7 Pneumonia due to Mycoplasma pneumoniae J16.0 Chlamydial pneumonia J16.8 Pneumonia due to other specified infectious organisms J18.0 Bronchopneumonia, unspecified organism J18.9 Pneumonia, unspecified organism J11.00 Influenza due to unidentified influenza virus with unspecified type of pneumonia J12.9 Viral pneumonia, unspecified	

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	J10.08 Influenza due to other identified influenza virus ICD-10 codes that define patients with aspiration pneumonia: J69.0 Pneumonitis due to inhalation of food and vomit ICD-10 codes that define patients with sepsis (not including severe sepsis [ICD-9 995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): A40.9 Streptococcal sepsis, unspecified A41.2 Sepsis due to unspecified staphylococcus A41.01 Sepsis due to Methicillin susceptible Staphylococcus A41.02 Sepsis due to Methicillin resistant Staphylococcus A41.1 Sepsis due to other specified staphylococcus A40.3 Sepsis due to Streptococcus pneumoniae A41.4 Sepsis due to anaerobes A41.50 Gram-negative sepsis, unspecified A41.3 Sepsis due to Hemophilus influenzae A41.51 Sepsis due to Escherichia coli [E. coli] A41.52 Sepsis due to Pseudomonas A41.53 Sepsis due to Serratia A41.59 Other Gram-negative sepsis A41.89 Other specified sepsis A41.9 Sepsis, unspecified organism An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).	
Exclusions	The readmission measures exclude index admissions for patients: 1. Discharged against medical advice (AMA); 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Admitted within 30 days of a prior index admission.	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge;
Exclusion Details	1. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data.	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Pneumonia admissions within 30 days of discharge from a qualifying pneumonia index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.	Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Pneumonia admissions within 30 days of discharge from a qualifying pneumonia index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of admission for age, sex, and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age, sex, and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). This model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model. There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the current CMS 30-day pneumonia readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk adjustment variables is: Demographics Male Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts. Comorbidities History of Coronary Artery Bypass Graft (CABG) (ICD-9 codes V45.81, 36.10–36.16) History of infection (CC1, 3-6) Septicemia/sepsis (CC 2) Metastatic cancer or acute leukemia (CC 7) Lung, upper digestive tract, and other severe cancers (CC 8) Other major cancers (CC 9-10) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44)	discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as “Age-65” [years above 65, continuous]) Comorbidities: 3. History of Coronary Artery Bypass Graft (CABG) (ICD-9-CM V45.81, 36.10–36.16) 4. History of infection (CC 1, 3-6) 5. Septicemia/shock (CC 2) 6. Metastatic cancer or acute leukemia (CC 7) 7. Lung, upper digestive tract, and other severe cancers (CC 8) 8. Other major cancers (CC 9-10) 9. Diabetes Mellitus (DM) or DM complications (CC 15-20, 119, 120)

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	Iron deficiency or other unspecified anemias and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/psychosis (CC 51-53) Major psychiatric disorders (CC 54-56) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Cardio-respiratory failure or shock (CC 78-79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Stroke (CC 95-96) Vascular or circulatory disease (CC 104-106) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Pleural effusion/pneumothorax (CC 114) Other lung disorders (CC 115) End-stage renal disease or dialysis (CC 129-130) Renal failure (CC 131) Urinary tract infection (CC 135) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) Vertebral fractures (CC 157) Other injuries (CC 162) Respirator dependence/tracheostomy (CC 77) References:	10. Protein-calorie malnutrition (CC 21) 11. Disorders of fluid, electrolyte, acid-base (CC 22, 23) 12. Other gastrointestinal disorders (CC 36) 13. Severe hematological disorders (CC 44) 14. Iron deficiency or other unspecified anemias and blood disease (CC 47) 15. Dementia or other specified brain disorders (CC 49, 50) 16. Drug/alcohol abuse/dependence/psychosis (CC 51-53) 17. Major psychiatric disorders (CC 54-56) 18. Other psychiatric disorders (CC 60) 19. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177, 178) 20. Cardio-respiratory failure or shock (CC 78, 79) 21. Congestive heart failure (CC 80) 22. Acute coronary syndrome (CC 81, 82) 23. Coronary atherosclerosis or angina (CC 83, 84) 24. Valvular or rheumatic heart disease (CC 86) 25. Specified arrhythmias and other heart rhythm disorders (CC 92, 93) 26. Stroke (CC 95, 96) 27. Vascular or circulatory disease (CC 104-106) 28. Chronic obstructive pulmonary disease (CC 108) 29. Fibrosis of lung and other chronic lung disorders (CC 109) 30. Asthma (CC 110) 31. Pneumonia (CC 111-113) 32. Pleural effusion/pneumothorax (CC 114) 33. Other lung disorders (CC 115) 34. End-stage renal disease or dialysis (CC 129, 130) 35. Renal failure (CC 131) 36. Urinary tract infection (CC 135) 37. Other urinary tract disorders (CC 136) 38. Decubitus ulcer or chronic skin ulcer (CC 148, 149)

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b	39. Vertebral fractures (CC 157) 40. Other injuries (CC 162) 41. Respirator dependence/Tracheostomy (CC 77) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b
Stratification	N/A	Not applicable. This measure is not stratified.
Type Score	Rate/proportion better quality = lower score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score
Algorithm	The measure estimates hospital-level 30-day, all-cause, RSRRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe calculation of the predicted and expected values in the attached Appendix (Section 2.7). The measure reports, for each hospital, the difference (“excess”) between each hospital’s patients’ average days in acute care (“predicted days”), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital (“expected days”).To be consistent with the reporting of the CMS 30-day

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix; and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2008). Reference:	pneumonia readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
	Krumholz H, Normand S-LT, Keenan P, et al. Hospital 30-Day Pneumonia Readmission Measure Methodology. 2008. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1	
Submission items	5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window) 0231 : Pneumonia Mortality Rate (IQI #20) 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0279 : Bacterial Pneumonia Admission Rate (PQI 11) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day pneumonia readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden.

	0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	2882: Excess days in acute care (EDAC) after hospitalization for pneumonia
		5b.1 If competing, why superior or rationale for additive value: N/A

Comparison of NQF #2881 and NQF #0505

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services
Description	This measure assesses days spent in acute care within 30 days of discharge from an inpatient hospitalization for acute myocardial infarction (AMI) to provide a patient-centered assessment of the post-discharge period. This measure is intended to capture the quality of care transitions provided to discharged patients hospitalized with AMI by collectively measuring a set of adverse acute care outcomes that can occur post-discharge: emergency department (ED) visits, observation stays, and unplanned readmissions at any time during the 30 days post-discharge. In order to aggregate all three events, we measure each in terms of days. In 2016, CMS will begin annual reporting of the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and are hospitalized in non-federal hospitals.	The measure estimates a hospital-level 30-day risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. The target population is patients aged 18 years and older. CMS annually reports the measure for individuals who are 65 years and older and are either Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Department of Veterans Affairs (VA) facilities.
Type	Outcome	Outcome
Data Source	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient claims, Part B hospital outpatient claims, and physician carrier claims data: This data source contains claims data for FFS inpatient and outpatient services including Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. For development purposes, we obtained the Medicare Part B hospital and physician outpatient claims from the Chronic Condition Data Warehouse (CCW) 100% condition-specific datasets. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). The measure was originally developed with claims data from a 2006 sample of 100,465 cases 3,890 hospitals. We have maintained and re-evaluated the models each year since public reporting of the measure began in 2009.

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment AMI_Excess_Days_in_Acute_Care_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx	Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals. Medical Care. 1992; 30(5): 377-91. Data sources for the all-payer update For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the AMI readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 65+ and younger patients aged 18-64 years at the time of admission. No data collection instrument provided Attachment NQF_0505_S2b_Data_Dictionary_2.5.14-635821578608894914.xlsx
Level	Facility	Facility
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	The outcome of the measure is a count of the number of days the patient spends in acute care within 30 days of discharge. We define days in acute care as days spent in an ED, admitted to an observation unit, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index AMI hospitalization. Each ED treat-and-release visit is counted as one half-day (0.5 days).	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index AMI admission. If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first one is counted

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	Observation stays are recorded in terms of hours and are rounded up to the nearest half-day. Each readmission day is counted as one full day (1 day). We count all eligible outcomes occurring in the 30-day period, even if they are repeat occurrences.	as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, then no readmission is counted, regardless of whether a subsequent unplanned readmission takes place. This is because it is not clear whether such readmissions are appropriately attributed to the original index admission or the intervening planned readmission.
Numerator Details	Outcome Definition The measure counts ED treat-and-release visits, observation stays, and readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index AMI admission, excluding planned readmissions as defined below. All events which occur within the 30-day window are counted. For example, if a patient returns to the ED three times on three different days, we count each ED visit as a half-day. Similarly, if a patient has two hospitalizations within 30 days, the days spent in each are counted. Therefore, the measure may include multiple ED visits, observation stays, and/or readmissions per patient. The measure incorporates "exposure time" (the number of days each patient survives after discharge, up to 30). This exposure time is included to account for differential risk for EDAC after discharge among those patients who do not survive the full post-discharge period. If a hospitalization or observation stay extends beyond the 30-day window, only those days within the 30-day window are counted. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation);	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index AMI admission, excluding planned readmissions as defined below. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm replaced the definition of planned readmissions in the original AMI measure because the algorithm uses a more comprehensive definition. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the CMS 30-day AMI EDAC measure, CMS used the Planned Readmission Algorithm without making any changes. For development, we used the Planned Readmission Algorithm, Version 3.0. This version and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For reporting purposes, the measure will use the next version of the Planned Readmission Algorithm, Version 4.0, as will be used in the CMS 30-day AMI readmission measure. Definition of Emergency Department Visit and Observation Stay We defined ED visits and observation stays using specified billing codes or revenue center codes identified in Medicare hospital outpatient claims and physician carrier claims. The codes that define ED visits and observation stays are in the attached Data Dictionary.	algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the AMI readmission measure, CMS used the Planned Readmission Algorithm without making any changes. Analyzing Medicare FFS data from July 2009-June 2012, 2.4% of index hospitalizations after AMI were followed by a planned readmission within 30 days of discharge. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2013 Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures for Acute Myocardial Infarction, Heart Failure, and Pneumonia (Version 6.0)" posted on the web page provided in data field S.1.
Denominator Statement	The target population for this measure is Medicare FFS beneficiaries aged 65 years and older hospitalized at non-federal acute care hospitals for AMI. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of AMI (see codes below in S.9) and with continuous 12 months Medicare enrollment prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals.	The target population for this measure is patients aged 18 years and older hospitalized for AMI. The measure is currently publicly reported by CMS for those 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. The measure includes admissions for patients discharged from the hospital with a principal diagnosis of AMI and with a complete claims history for the 12 months prior to admission.

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	Additional details are provided n S.9 Denominator Details.	As noted above, this measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Having a principal discharge diagnosis of AMI 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; 4. Discharged alive from a non-federal short-term acute care hospital; and, 5. Not transferred to another acute care facility. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for the measure are: 410.00 Acute myocardial infarction of anterolateral wall, episode of care unspecified 410.01 Acute myocardial infarction of anterolateral wall, initial episode of care 410.10 Acute myocardial infarction of other anterior wall, episode of care unspecified 410.11 Acute myocardial infarction of other anterior wall, initial episode of care 410.20 Acute myocardial infarction of inferolateral wall, episode of care unspecified 410.21 Acute myocardial infarction of inferolateral wall, initial episode of care 410.30 Acute myocardial infarction of inferoposterior wall, episode of care unspecified 410.31 Acute myocardial infarction of inferoposterior wall, initial episode of care	This outcome measure does not have a traditional numerator and denominator like a core process measure (e.g., percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year); thus, we use this field to define the measure cohort. The denominator includes patients aged 18 years and older with a principal discharge diagnosis of AMI (defined by the ICD-9 or ICD-10 codes below). The measure is currently publicly reported by CMS for those 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission (this criterion does not apply to patients discharged from VA hospitals); not transferred to another acute care facility; and alive at discharge. ICD-9-CM codes that define the patient cohort: 410.00 AMI (anterolateral wall) – episode of care unspecified 410.01 AMI (anterolateral wall) – initial episode of care 410.10 AMI (other anterior wall) – episode of care unspecified 410.11 AMI (other anterior wall) – initial episode of care 410.20 AMI (inferolateral wall) – episode of care unspecified 410.21 AMI (inferolateral wall) – initial episode of care 410.30 AMI (inferoposterior wall) – episode of care unspecified 410.31 AMI (inferoposterior wall) – initial episode of care 410.40 AMI (other inferior wall) – episode of care unspecified 410.41 AMI (other inferior wall) – initial episode of care 410.50 AMI (other lateral wall) – episode of care unspecified

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	410.40 Acute myocardial infarction of other inferior wall, episode of care unspecified 410.41 Acute myocardial infarction of other inferior wall, initial episode of care 410.50 Acute myocardial infarction of other lateral wall, episode of care unspecified 410.51 Acute myocardial infarction of other lateral wall, initial episode of care 410.60 True posterior wall infarction, episode of care unspecified 410.61 True posterior wall infarction, initial episode of care 410.70 Subendocardial infarction, episode of care unspecified 410.71 Subendocardial infarction, initial episode of care 410.80 Acute myocardial infarction of other specified sites, episode of care unspecified 410.81 Acute myocardial infarction of other specified sites, initial episode of care 410.90 Acute myocardial infarction of unspecified site, episode of care unspecified 410.91 Acute myocardial infarction of unspecified site, initial episode of care An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).	410.51 AMI (other lateral wall) – initial episode of care 410.60 AMI (true posterior wall) – episode of care unspecified 410.61 AMI (true posterior wall) – initial episode of care 410.70 AMI (subendocardial) – episode of care unspecified 410.71 AMI (subendocardial) – initial episode of care 410.80 AMI (other specified site) – episode of care unspecified 410.81 AMI (other specified site) – initial episode of care 410.90 AMI (unspecified site) – episode of care unspecified 410.91 AMI (unspecified site) – initial episode of care ICD-10 Codes that define the patient cohort: I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall I2111 ST elevation (STEMI) myocardial infarction involving right coronary artery I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall I2129 ST elevation (STEMI) myocardial infarction involving other sites I214 Non-ST elevation (NSTEMI) myocardial infarction I213 ST elevation (STEMI) myocardial infarction of unspecified site An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).
Exclusions	The measure excludes index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare; 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index discharge; 4. Admitted and then discharged on the same day (because it is unlikely these are clinically significant AMIs).	For all cohorts, the measure excludes admissions for patients: -discharged against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge); -admitted and then discharged on the same day (because it is unlikely these are clinically significant AMIs); -admitted with AMI within 30 days of discharge from a qualifying index admission (Admissions within 30 days of discharge of an

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		index admission will be considered readmissions. No admission is counted as a readmission and an index admission. The next eligible admission after the 30-day time period following an index admission will be considered another index admission.) For Medicare FFS patients, the measure additionally excludes admissions for patients: -without at least 30 days post-discharge enrollment in FFS Medicare (because the 30-day readmission outcome cannot be assessed in this group).
Exclusion Details	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. 4. Index admissions for patients admitted and then discharged on the same day are identified when the admission and discharge dates are equal.	For all cohorts, the measure excludes: • Discharges against medical advice (AMA), which is identified by examining the discharge destination indicator in claims data. • Index admissions for patients admitted and then discharged on the same day are identified when the admission and discharge dates are equal. • AMI admissions within 30 days of discharge from a qualifying index admission, which are identified by comparing the discharge date from the index admission with the readmission date. For Medicare FFS patients, the measure additionally excludes: • Admissions without at least 30 days post-discharge enrollment in FFS Medicare, which is determined by examining the Medicare Enrollment Database (EDB)
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). For risk-adjustment, we used a hierarchical generalized linear model (HGLM). This model consists of two parts, a logit model and a truncated Poisson model. The two-part logit/Poisson model (often called a "hurdle" model) assumes that the outcome results from two related processes: an initial dichotomous event – that a patient has at least one acute care event – which is modeled as the logit of the probability of	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	the event, and for patients with an event (those which clear the "hurdle"), the number of days, which is modeled as a Poisson process. The outcome, number of days, is a half-integer count variable (because ED visits count as 0.5 days). Observation care is counted according to the hours spent in observation care, rounded up to the nearest half-day. For each patient, an exposure variable is defined as the number of survival days post discharge, up to 30. For the hurdle model, exposure time as an offset is included for each part of the model. There are two random effects for each hospital, one for the logit model and one for the truncated Poisson model, as well as a covariance between the two random effects. The random effects allow us to account for within-hospital correlation of the observed outcome and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. We use the existing, NQF-endorsed, CMS 30-day AMI readmission measure final risk-adjustment variables. We verified the adequacy of this risk-adjustment strategy for our new outcome by comparing the discrimination of models with a full set of all comorbidities to the more parsimonious existing risk models. We found no improvement in model discrimination with the full set, indicating that the existing risk models are adequate. The measures adjust for variables (i.e., age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have strong relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the	age, sex, and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age, sex, and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. (This was tested explicitly in our all-payer testing, as many all-payer datasets do not include outpatient claims.) The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk adjustment variables is: Demographics: Male Age (For Medicare FFS patients, the age variable is defined as "Age-65" [years above 65, continuous]. For all-payer populations,

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	index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk-adjustment variables includes the following: Demographics: 1. Male 2. Age (defined as "Age-65" [years above 65, continuous]) Comorbidities: 3. Diabetes mellitus (DM) and DM complications (CC 15-20, 119-120) 4. Iron deficiency and other anemias and blood disease (CC 47) 5. Congestive heart failure (CC 80) 6. Valvular and rheumatic heart disease (CC 86) 7. COPD (CC108) 8. End-stage renal disease or dialysis (CC130) 9. Other urinary tract disorders (CC136) 10. Arrhythmias (CC 92-93) 11. Pneumonia (CC 111-113) 12. Renal failure (CC 131) 13. Vascular or circulatory disease (CC 104-106) 14. Disorders of fluid/electrolyte/acid-base (CC 22-23) 15. Coronary atherosclerosis/other chronic ischemic heart disease (CC 84) 16. History of infection (CC 1,3-6) 17. Cerebrovascular disease (CC 97-99,103) 18. Metastatic cancer and acute leukemia (CC 7) 19. Cancer (CC 8-12) 20. Decubitus ulcer or chronic skin ulcer (CC 148-149) 21. Dementia and other specified brain disorders (senility)(CC 49-50) 22. Angina pectoris, old myocardial infarction (CC 83) 23. Stroke (CC 95-96) 24. Asthma (CC 110)	the age variable is treated as a continuous variable with values of 18 and over) Comorbidities: CC 15-20, 119-120 Diabetes mellitus (DM) and DM complications CC 47 Iron deficiency and other anemias and blood disease CC 80 Congestive heart failure CC 86 Valvular and rheumatic heart disease CC108 COPD CC130 End-stage renal disease or dialysis CC136 Other urinary tract disorders CC 92-93 Arrhythmias CC 111-113 Pneumonia CC 131 Renal failure CC 104-106 Vascular or circulatory disease CC 22-23 Disorders of fluid/electrolyte/acid-base CC 84 Coronary atherosclerosis/other chronic ischemic heart disease CC 1,3-6 History of infection CC 97-99,103 Cerebrovascular disease CC 7 Metastatic cancer and acute leukemia CC 8-12 Cancer CC 148-149 Decubitus ulcer or chronic skin ulcer CC 49-50 Dementia and other specified brain disorders (senility) CC 83 Angina pectoris, old myocardial infarction CC 95-96 Stroke CC 110 Asthma CC 81-82 Acute coronary syndrome CC 67-69,100-102,177-178 Hemiplegia, paraplegia, paralysis, functional disability CC 21 Protein-calorie malnutrition Anterior myocardial infarction (ICD-9-CM 410.00-410.19)

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	25. Acute coronary syndrome (CC 81-82) 26. Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69,100-102,177-178) 27. Protein-calorie malnutrition (CC 21) 28. Anterior myocardial infarction (ICD-9-CM 410.00-410.19) 29. Other location of myocardial infarction (ICD-9-CM 410.20-410.69) 30. History of CABG (ICD-9-CM V45.81, 36.10-36.16) 31. History of PTCA (ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b	Other location of myocardial infarction (ICD-9-CM 410.20-410.69) History of CABG (ICD-9-CM V45.81, 36.10-36.16) History of PTCA (ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07) References: Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Provided in response box S.15a
Stratification	N/A. This measure is not stratified.	Results of this measure will not be stratified.
Type Score	Other (specify): Excess days in acute care (EDAC) per 100 discharges better quality = lower score	Rate/proportion better quality = lower score
Algorithm	As described above, we used a hierarchical generalized linear model (HGLM). This consists of the two-part logit/truncated Poisson model specifications for days in acute care and includes two random effects for hospitals – one for the logit part and one for the truncated Poisson part – with a non-zero covariance between the two random effects. This model is used to estimate predicted and expected values for each patient. Predicted values are model predictions that include the hospital random effects, and expected values are model predictions that do not include the hospital random effects. We describe	The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age, sex, and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk.

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
	calculation of the predicted and expected values in the attached Appendix (Section 2.7). The measure reports, for each hospital, the difference ("excess") between each hospital's patients' average days in acute care ("predicted days"), and the number of days in acute care that they would have been expected to spend if discharged from an average performing hospital ("expected days"). To be consistent with the reporting of the CMS 30-day AMI readmission measure, we have multiplied the final score by 100 so that the reported EDAC represents EDAC per 100 discharges. Available in attached appendix at A.1	The hospital-specific intercepts are given a distribution in order to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmissions, multiplied by the national unadjusted readmission rate. For each hospital, the numerator of the ratio ("predicted") is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator ("expected") is the number of readmissions expected on the basis of the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission or better quality and a higher ratio indicates higher-than-expected readmission or worse quality. The "predicted" number of readmissions (the numerator) is calculated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated regression coefficients are then multiplied by the patient characteristics in the hospital. The results are then transformed and summed over all patients attributed to the hospital to get a value. The "expected" number of readmissions (the denominator) is obtained by regressing the risk factors and a common intercept on the readmission outcome using all hospitals in our sample. The estimated regression coefficients are then multiplied by the patient characteristics in the hospital. The results are then transformed and summed over all patients in the hospital to get a value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. Reference: Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
		of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available at measure-specific web page URL identified in S.1
Submission items	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We developed the measure in the Medicare Fee-for-Service (FFS) population and completely harmonized the cohort definition and risk-adjustment strategy with those of the existing CMS 30-day AMI readmission measure. However, while the existing measure counts readmissions as a dichotomous outcome, the proposed measure counts the number of days for all readmissions during the follow-up period, as well as the number of days of observation stays and ED visits. This difference in the outcome measure imposes differences on the statistical modeling and reporting format. There are no differences in data collection burden. 5b.1 If competing, why superior or rationale for additive value: N/A	5.1 Identified measures: 0730 : Acute Myocardial Infarction (AMI) Mortality Rate 0704 : 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1768 : Plan All-Cause Readmissions (PCR) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI) 2473 : Hospital 30-Day Risk-Standardized Acute Myocardial Infarction (AMI) Mortality eMeasure 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been

	2881: Excess days in acute care (EDAC) after hospitalization for acute myocardial infarction (AMI)	0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
		publicly reported since 2009. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

Comparison of NQF #2886 and NQF #0277

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
Steward	Centers for Medicare & Medicaid Services (CMS)	Agency for Healthcare Research and Quality
Description	Rate of risk-standardized acute, unplanned hospital admissions among Medicare Fee-for-Service (FFS) patients 65 years and older with heart failure	Admissions with a principal diagnosis of heart failure per 100,000 population, ages 18 years and older. Excludes cardiac procedure admissions, obstetric admissions, and transfers from other institutions. [NOTE: The software provides the rate per population. However, common practice reports the measure as per 100,000 population. The user must multiply the rate obtained from the software by 100,000 to report admissions per 100,000 population.]
Type	Outcome	Process
Data Source	Administrative claims Medicare administrative claims and enrollment data No data collection instrument provided Attachment Heart_Failure_ACO_Admission_Measure_NQF_Data_Dictionary_01-29-16_v1.0.xlsx	Administrative claims, Electronic Clinical Data The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions. URL Attachment PQI_08_Heart_Failure_Admission_Rate.xlsx
Level	Integrated Delivery System	Health Plan, Integrated Delivery System
Setting	Ambulatory Care : Clinician Office/Clinic, Other ACO	Ambulatory Care : Clinician Office/Clinic, Emergency Medical Services/Ambulance, Hospital/Acute Care Facility, Behavioral Health/Psychiatric : Inpatient, Behavioral Health/Psychiatric : Outpatient, Ambulatory Care : Urgent Care
Numerator Statement	The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)	Discharges, for patients ages 18 years and older, with a principal ICD-9-CM or ICD-10-CM diagnosis code for heart failure. [NOTE: By definition, discharges with a principal diagnosis of heart failure are precluded from an assignment of MDC 14 by grouper software. Thus, obstetric discharges should not be considered in the PQI rate, though the AHRQ QITM software does not explicitly exclude obstetric cases.]
Numerator Details	Note: The numerator of the measure score is the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. We use this field	ICD-10-CM Heart failure diagnosis codes: (ACSCH2D) (For discharges on or after to October 1, 2001) I0981 Rheumatic heart failure

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	to define the outcome. 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 the Centers for Medicare & Medicaid Services (CMS) Planned Readmission Algorithm Version 3.0, 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 (i.e., those where the principal discharge diagnosis is major organ transplant, obstetrical delivery, or maintenance chemotherapy) as well as those admissions with a potentially planned procedure (e.g., total hip replacement or cholecystectomy) AND a non-acute principal discharge diagnosis code. To adapt the algorithm for this measure, we removed from the potentially planned procedure list two procedures, cardiac catheterization and amputation, because the need for these procedures might reflect progression of clinical conditions that potentially could have been managed in the ambulatory setting to avoid admissions for these procedures. For full details on the planned admission algorithm as adapted for this measure, please see Appendix A of the attached technical report. Appendix A of the attached technical report contains the detailed algorithm used to identify planned admissions. Among 2,123,190 admissions in the 2012 Medicare Full Sample, 145,443 (6.9%) were planned admissions. For ACO patients, there were 102,740 admissions; of these, 7,991 (7.8%) were planned admissions. For	I501 Left ventricular failure I5020 Unspecified systolic (congestive) heart failure I5021 Acute systolic (congestive) heart failure I5022 Chronic systolic (congestive) heart failure I5023 Acute on chronic systolic (congestive) heart failure I5030 Unspecified diastolic (congestive) heart failure I5031 Acute diastolic (congestive) heart failure I5032 Chronic diastolic (congestive) heart failure I5033 Acute on chronic diastolic (congestive) heart failure I5040 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure I5041 Acute combined systolic (congestive) and diastolic (congestive) heart failure I5042 Chronic combined systolic (congestive) and diastolic (congestive) heart failure I5043 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure Exclude cases: • with any-listed ICD-9-CM or ICD-10-PCS procedure codes for cardiac procedure • transfer from a hospital (different facility) • transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) • transfer from another health care facility • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing) See Prevention Quality Indicators Appendices: • Appendix A – Admission Codes for Transfers • Appendix B – Cardiac Procedure Codes

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	non-ACO patients, there were 2,020,450 admissions; of these, 137,452 (6.8%) were planned admissions. Please see Data Dictionary, sheet "S.6 ICD9-ICD10 Planned Algorithm," for the ICD-9 to ICD-10 crosswalk for the planned admission algorithm. Outcome Attribution: The outcome is attributed to the ACO to which the patient is assigned. Patients are assigned to ACOs according to the specific ACO program assignment algorithm. For example, for the Medicare Shared Savings Program, patient assignment is done retrospectively based on the plurality of care received at that ACO during the measurement year. Information on ACO patient assignment can be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Citations: 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 Affairs. 2012 Jun 2012;31(6):1156-1166. Center for Medicare and Medicaid Services. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. 2013; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Accessed July 30, 2014. Centers for Medicare & Medicaid Services (CMS). Medicare Health Support. 2012; https://www.cms.gov/Medicare/Medicare-General-Information/CCIP/. Accessed March 27, 2014. Horwitz LI, Grady JN, Cohen DB, Lin Z, Volpe M, Ngo CK, Masica AL, Long T, Wang J, Keenan M, Montague J, Suter LG, Ross JS, Drye EE, Krumholz HM, Bernheim SM. Development and validation of an algorithm to identify planned readmissions from claims data. J Hosp Med 2015 Oct; 10(10):670-7. McCarthy D, Cohen A, Johnson MB. Gaining Ground: Care	

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	Management programs to reduce hospital admissions and readmissions among chronically ill and vulnerable patients. The Commonwealth Fund, New York. 2013.	
Denominator Statement	The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of heart failure.	Population ages 18 years and older in metropolitan area† or county. Discharges in the numerator are assigned to the denominator based on the metropolitan area or county of the patient residence, not the metropolitan area or county of the hospital where the discharge occurred. † The term "metropolitan area" (MA) was adopted by the U.S. Census in 1990 and referred collectively to metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs) and primary metropolitan statistical areas (PMSAs). In addition, "area" could refer to either 1) FIPS county, 2) modified FIPS county, 3) 1999 OMB Metropolitan Statistical Area or 4) 2003 OMB Metropolitan Statistical Area. Micropolitan Statistical Areas are not used in the QI software.
Denominator Details	Note: The denominator of the measure score is the expected admission rate for the ACO; we use this box to describe the measure cohort. The targeted patient population is Medicare FFS patients aged 65 years and older with a diagnosis of heart failure receiving ambulatory care during the measurement period. To be included in the cohort, patients must have one inpatient principal discharge diagnosis code of heart failure or two heart failure diagnosis codes in any position (inpatient and/or outpatient claims) within one or two years prior to the measurement period. We allowed for up to two years of claims to define the cohort since there is no specified optimal frequency of follow-up visits among ambulatory, stable patients (i.e., patients without a change in their symptoms may never be hospitalized and may only be seen annually). To be included in the cohort, patients must be enrolled full-time in both Part A and B during the year prior to the measurement period. Heart failure is defined using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes identified in Medicare Part A inpatient and outpatient claims	Not applicable.

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	data. Patients excluded from the cohort are identified using ICD-9-CM procedure codes in Medicare Part A inpatient and outpatient claims and the Medicare Denominator File. The ICD-9-CM codes that define the cohort and cohort exclusions are listed in the attached Excel file, sheets "S.9 Denominator Details – Cohort" and "S.11 Denominator Exclusions." An ICD-9-CM to ICD-10-CM code crosswalk is attached in data field S.2b. (Data Dictionary or Code Table).	
Exclusions	The measure excludes: 1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). 2. Patients with left ventricular assist devices (LVADs). Rationale: We exclude these patients because while they have a high risk of admission, they are low in prevalence and are clustered among a few ACOs.	Not applicable.
Exclusion Details	1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in FFS Part A using the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement period (Part A). 2. Patients with LVADs. We identify patients as having an LVAD based on ICD-9-CM procedure codes in Medicare Part A or B assigned to the patient within the two years prior to the measurement year. The ICD-9-CM codes are listed below and are also found in the attached Excel file, sheet "S.11 Denominator Exclusions." ICD-9-CM Code/Description 37.60/Implantation of heart and circulatory assist system(s) 37.62/Insertion of temporary non-implantable extracorporeal circulatory assist device 37.65/Implant of single ventricular (extracorporeal) external heart	Not applicable.

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	assist system 37.66/Insertion of implantable heart assist system 37.68/Insertion of percutaneous external heart assist device	
Risk Adjustment	Statistical risk model We use a two-level hierarchical negative binomial model to estimate risk-standardized acute, unplanned admissions per person-year at risk for admission. This approach accounts for the clustering of patients within ACOs and variation in sample size. Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" [1-2]. The risk-standardization model includes age and 22 clinical variables. We define clinical variables using condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9 diagnosis codes [3]. A map showing the assignment of ICD-9 codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 CC to ICD-9." Data Dictionary, sheet "S.15 ICD9-ICD10 Pacemaker" contains the crosswalk of ICD-9 to ICD-10 codes for the pacemaker/cardiac resynchronization therapy/implantable cardiac device variable. Model Variables The risk-adjustment variables are: 1. Age 2. Pulmonary diseases (CC 107-110, 114-115) 3. Disability/Frailty (CC 21, 67-69, 100, 116, 148-149, 157, 177-178) 4. Other advanced organ failure (CC 77, 79) 5. Arrhythmia (CC 92-93) 6. Psychiatric Illness/Substance Abuse (CC 51-60) 7. Kidney disease (CC 128, 131-132) 8. Dialysis Status (CC 130) 9. Advanced cancer (CC 7-9, 11) 10. High risk cardiovascular conditions (CC 81-82, 89, 104)	No risk adjustment or risk stratification Risk adjustment is available for the AHRQ QI ICD-9-CM v6.0 specifications. However, risk adjustment is not currently included in the ICD-10-CM/PCS v6.0 of the AHRQ QI specifications, due to the recent transition to ICD-10-CM/PCS (October 1, 2015). At least one full year of data coded in ICD-10-CM/PCS is needed in order to develop robust risk adjustment models. A full year of ICD-10-CM/PCS coded all-payer data will not be available until mid-2017. AHRQ will announce an anticipated date as soon as one is known. The AHRQ QI v6.0 software (SAS and WinQI) for use with ICD-9-CM and the AHRQ QI v6.0 software (SAS and WinQI) for use with ICD-10-CM/PCS are forthcoming. The AHRQ QI ICD-9-CM v6.0 software will produce risk-adjusted rates using risk adjustment models created using a reference population from 2013 HCUP SID data. The AHRQ QI ICD-10-CM/PCS v6.0 software will produce observed rates, which may be used to evaluate performance within hospitals. However, caution should be used when comparing observed rates across hospitals because observed rates do not account for differences in patient populations (i.e., case mix). Available in attached Excel or csv file at S.2b

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	11. Low risk cardiovascular conditions (CC 83-84, 94, 105-106) 12. Structural heart disease (CC 86-88) 13. Dementia (CC 49-50) 14. Diabetes with complications (CC 15-19, 119-120) 15. Gastrointestinal/genitourinary diseases (CC 29-31, 33-34, 133,176) 16. Hematologic diseases (CC 44, 46) 17. Infectious/immunologic diseases (CC 1, 3-5, 45, 85) 18. Liver disease (CC 25-28) 19. Neurological diseases (CC 48, 61, 65, 70-75, 95-99, 101-103,155) 20. Pacemaker/cardiac resynchronization therapy/implantable cardiac device (ICD-9-CM codes 00.50, 00.51, 00.52, 00.53, 00.54, V45.01, V53.31, V53.39, V45.02, V53.32, 37.7, 37.71, 37.72, 37.73, 37.74, 37.74, 37.76, 37.77, 37.78, 37.79 37.80, 37.81, 37.82, 37.83, 37.85, 37.86, 37.87, 37.89, 37.94, 37.95, 37.96, 37.97, 37.98, 37.99) 21. Iron deficiency anemia (CC 47) 22. Major organ transplant (CC 174) 23. Other organ transplant (CC 175) Citations: 1. Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation. 2006; 113 (3): 456-462. 2. Normand S-LT, Shahian DM. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci. 2007; 22 (2): 206-226. 3. Pope, G.C., Kautter, J., Ellis, R.P., et al.: Risk Adjustment for Medicare Capitation Payments Using the CMS-HCC Model. Health Care Financing Review. 2004; 25(4):119-141. Available in attached Excel or csv file at S.2b	
Stratification	Not applicable. This measure is not stratified.	Not applicable.

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score
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 person-year, multiplied by the national rate of admissions per person-year among all Medicare FFS patients with heart failure – i.e., all eligible Medicare FFS patients with heart failure are used in the measure score calculation, and a score is generated for each ACO. For a full description of the modeling, please see the attached technical report (Section 3.5.5 and Appendix B of attached technical report). In brief, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within ACOs and accommodates the widely varying sizes of different ACOs. The measure uses a negative binomial model since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admission is determined based on a national sample of patients with heart failure. Stated another way, since the effects that risk factors exert on the number of admissions are estimated based on data from all ACO and non-ACO patients in the nation, the 'expected' number of admissions for each ACO is based on the performance of a national group of providers. 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 ACO-specific number of "predicted" admissions per person-year. The measure score is the ratio of predicted admissions over the expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering and sample-size variation. The expected number of admissions is calculated based on the ACO's case mix and an intercept derived from a national average of	Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/PQI_download.htm

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	all patients included in the cohort. The predicted number of admissions is calculated based on the ACO's case mix and the estimated ACO-specific intercept term. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per person-years at risk for hospitalization, for ease of interpretation. To place ACOs in performance categories, for each ACO RSAAR, one can calculate a 95% interval estimate (IE), which is similar to a confidence interval, using standard bootstrapping methods (further described in the Testing Form, Section 2b5.1). Using the 95% IEs, one can assign ACOs to one of three performance categories: 'better than the national rate,' 'no different than the national rate,' and 'worse than the national rate.' The ACO is 'better than the national rate' if the 95% IE is completely below the United States (US) national rate among Medicare FFS patients with heart failure; 'no different than the national rate' if the 95% IE is included in the US national rate among Medicare FFS patients with heart failure; and 'worse than the national rate' if the 95% IE is above the US national rate among Medicare FFS patients with heart failure. Available in attached appendix at A.1	
Submission items	5.1 Identified measures: 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0277 : Heart Failure Admission Rate (PQI 8) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The measures listed above are NQF-endorsed. There are several differences between our measure and these two NQF measures. 1. The cohort populations are different. The NQF measures focus on patients aged 18-65 years and 18+ years, respectively, for the two measures; thus, the cohorts have limited overlap. 2. The risk-adjustment models are different. NQF #0709 is not risk-adjusted; NQF #0277 is risk-adjusted for age and	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: No competing measures found. Related Measures: None found.

	2886: Risk-Standardized Acute Admission Rates for Patients with Heart Failure	0277: Heart Failure Admission Rate (PQI 8)
	sex only, while our measures are fully risk-adjusted. 3. The outcomes measured (NQF 0709: potentially avoidable complications; NQF 0277: heart failure admissions) are different from our outcome of acute, all-cause admission rates. 5b.1 If competing, why superior or rationale for additive value: Not applicable.	

Comparison NQF #2887, NQF #0272, NQF #0274 and NQF #0638

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
Steward	Centers for Medicare & Medicaid Services (CMS)	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality
Description	Rate of risk-standardized acute, unplanned hospital admissions among Medicare fee-for-service (FFS) patients 65 years and older with diabetes	Admissions for a principal diagnosis of diabetes with short-term complications (ketoacidosis, hyperosmolarity, or coma) per 100,000 population, ages 18 years and older. Excludes obstetric admissions and transfers from other institutions. [NOTE: The software provides the rate per population. However, common practice reports the measure as per 100,000 population. The user must multiply the rate obtained from the software by 100,000 to report admissions per 100,000 population.]	Admissions for a principal diagnosis of diabetes with long-term complications (renal, eye, neurological, circulatory, or complications not otherwise specified) per 100,000 population, ages 18 years and older. Excludes obstetric admissions and transfers from other institutions. NOTE: The software provides the rate per population. However, common practice reports the measure as per 100,000 population. The user must multiply the rate obtained from the software by 100,000 to report admissions per 100,000 population.]	Admissions for a principal diagnosis of diabetes without mention of short-term (ketoacidosis, hyperosmolarity, or coma) or long-term (renal, eye, neurological, circulatory, or other unspecified) complications per 100,000 population, ages 18 years and older. Excludes obstetric admissions and transfers from other institutions.
Type	Outcome	Outcome	Outcome	Outcome
Data Source	Administrative claims Medicare administrative claims and enrollment data No data collection instrument provided Attachment Diabetes_ACO_Admission_Measure_NQF_Data_Dictionary_01-29-16_v1.0-635896799914719697.xlsx	Administrative claims All analyses were completed using data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2007-2011.HCUP is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality	Administrative claims All analyses were completed using data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2007-2011.HCUP is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality	Administrative claims All analyses were completed using data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2007-2011.HCUP is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
		(AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of encounter-level health care data. The HCUP SID contain the universe of the inpatient discharge abstracts in participating States, translated into a uniform format to facilitate multi-State comparisons and analyses. Together, the SID encompass about 97 percent of all U.S. community hospital discharges (in 2011, 46 states participated for a total of more than 38.5 million hospital discharges). As defined by the American Hospital Association, community hospitals are all non-Federal, short-term, general or other specialty hospitals, excluding hospital units of institutions. Veterans hospitals and other Federal facilities are excluded. Taken from the Uniform Bill-04 (UB-04), the SID data elements include ICD-9-CM coded principal and secondary diagnoses and procedures, additional detailed clinical and service information based on revenue codes, admission and discharge status, patient demographics, expected payment	(AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of encounter-level health care data. The HCUP SID contain the universe of the inpatient discharge abstracts in participating States, translated into a uniform format to facilitate multi-State comparisons and analyses. Together, the SID encompass about 97 percent of all U.S. community hospital discharges (in 2011, 46 states participated for a total of more than 38.5 million hospital discharges). As defined by the American Hospital Association, community hospitals are all non-Federal, short-term, general or other specialty hospitals, excluding hospital units of institutions. Veterans hospitals and other Federal facilities are excluded. Taken from the Uniform Bill-04 (UB-04), the SID data elements include ICD-9-CM coded principal and secondary diagnoses and procedures, additional detailed clinical and service information based on revenue codes, admission and discharge status, patient demographics, expected payment	(AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of encounter-level health care data. The HCUP SID contain the universe of the inpatient discharge abstracts in participating States, translated into a uniform format to facilitate multi-State comparisons and analyses. Together, the SID encompass about 97 percent of all U.S. community hospital discharges (in 2011, 46 states participated for a total of more than 38.5 million hospital discharges). As defined by the American Hospital Association, community hospitals are all non-Federal, short-term, general or other specialty hospitals, excluding hospital units of institutions. Veterans hospitals and other Federal facilities are excluded. Taken from the Uniform Bill-04 (UB-04), the SID data elements include ICD-9-CM coded principal and secondary diagnoses and procedures, additional detailed clinical and service information based on revenue codes, admission and discharge status, patient demographics, expected payment

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
		source (Medicare, Medicaid, private insurance as well as the uninsured), total charges and length of stay (www.hcup-us.ahrq.gov). HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2007-2011. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/sidoverview.jsp. (AHRQ QI Software Version 4.5) Available at measure-specific web page URL identified in S.1 Attachment PQI01_Technical_Specifications.xlsx	source (Medicare, Medicaid, private insurance as well as the uninsured), total charges and length of stay (www.hcup-us.ahrq.gov). HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2007-2011. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/sidoverview.jsp. (AHRQ QI Software Version 4.5) Available at measure-specific web page URL identified in S.1 Attachment PQI03_Technical_Specifications.xlsx	source (Medicare, Medicaid, private insurance as well as the uninsured), total charges and length of stay (www.hcup-us.ahrq.gov). HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2007-2011. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/sidoverview.jsp. (AHRQ QI Software Version 4.5) Available at measure-specific web page URL identified in S.1 Attachment Uncontrolled_Diabetes_Admission_Rate_PQI_14-635379109281756583.xlsx
Level	Integrated Delivery System	Population : County or City, Population : National, Population : Regional, Population : State	Population : County or City, Population : National, Population : Regional, Population : State	Population : County or City, Population : National, Population : Regional, Population : State
Setting	Ambulatory Care : Clinician Office/Clinic, Other ACO	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	The outcome measured for each patient 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. (See S.6, Numerator Details, for more information.)	Discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for diabetes short-term complications (ketoacidosis, hyperosmolarity, or coma). [NOTE: By definition, discharges with a principal diagnosis of diabetes with short-term complications are precluded from	Discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for diabetes with long-term complications (renal, eye, neurological, circulatory, or complications not otherwise specified). [NOTE: By definition, discharges with a principal diagnosis of	Discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for uncontrolled diabetes without mention of a short-term or long-term complication. [NOTE: By definition, discharges with a principal diagnosis of uncontrolled diabetes without mention of short-term or long-term

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
		an assignment of MDC 14 by grouper software. Thus, obstetric discharges should not be considered in the PQI rate, though the AHRQ QITM software does not explicitly exclude obstetric cases.]	diabetes with long-term complications are precluded from an assignment of MDC 14 by grouper software. Thus, obstetric discharges should not be considered in the PQI rate, though the AHRQ QITM software does not explicitly exclude obstetric cases.]	complications cannot have an assignment of MDC 14 (pregnancy, childbirth and the puerperium). Thus, obstetric discharges are not considered in the PQI rate.] See Prevention Quality Indicators technical specifications for additional details (available at http://www.qualityindicators.ahrq.gov/Modules/PQI_TechSpec.aspx) and in the supporting information.
Numerator Details	Note: The numerator of the measure score is the predicted number of admissions given the Accountable Care Organization's (ACO's) case mix, sample size, and actual admission rate. We use this field to define the outcome. 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	ICD-9-CM Diabetes short-term complications diagnosis codes: 25010 DM KETO T2, DM CONT 25011 DM KETO T1, DM CONT 25012 DM KETO T2, DM UNCONT 25013 DM KETO T1, DM UNCONT 25020 DM W/ HYPROSM T2, DM CONT 25021 DM W/ HYPROSM T1, DM CONT 25022 DM W/ HYPROSM T2, DM UNCNT 25023 DM W/ HYPROSM T1, DM UNCNT 25030 DM COMA NEC TYP II, DM CNT 25031 DM COMA NEC T1, DM CONT 25032 DM COMA NEC T2, DM UNCONT 25033 DM COMA NEC T1, DM UNCONT	ICD-9-CM Diabetes with long-term complications diagnosis codes: 25040 DM RENAL COMP T2 CONT 25041 DM RENAL COMP T1 CONT 25042 DM RENAL COMP T2 UNCNT 25043 DM RENAL COMP T1 UNCNT 25050 DM EYE COMP T2 CONT 25051 DM EYE COMP T1 CONT 25052 DM EYE COMP T2 UNCNT 25053 DM EYE COMP T1 UNCNT 25060 DM NEURO COMP T2 CONT 25061 DM NEURO COMP T1 CONT 25062 DM NEURO COMP T2 UNCNT 25063 DM NEURO COMP T1 UNCNT 25070 DM CIRCU DIS T2 CONT 25071 DM CIRCU DIS T1 CONT 25072 DM CIRCU DIS T2 UNCNT 25073 DM CIRCU DIS T1 UNCNT 25080 DM W COMP NEC T2 CONT	ICD-9-CM Uncontrolled diabetes without mention of a short-term or long-term complication diagnosis codes: 25002 DMII WO CMP UNCNTRLD 25003 DMI WO CMP UNCNTRLD The PQI reference population includes discharges with MDC 14 and age less than 18 years; however, the DRG and MS-DRG grouper logic precludes assignment of MDC 14 for discharge records with a PQI defining principal diagnosis. Exclude cases: • transfer from a hospital (different facility) • transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) • transfer from another health care facility • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	in planned admissions (such as for elective surgery) does not typically reflect quality differences. We based the planned admission algorithm on the Centers for Medicare & Medicaid Services (CMS) Planned Readmission Algorithm Version 3.0, 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 (i.e., those where the principal discharge diagnosis is major organ transplant, obstetrical delivery, or maintenance chemotherapy) as well as those admissions with a potentially planned procedure (e.g., total hip replacement or cholecystectomy) AND a non-acute principal discharge diagnosis code. To adapt the algorithm for this measure, we removed cardiac catheterization and amputation from the potentially planned procedure list. The need for these procedures might reflect progression of clinical conditions that potentially could have been managed in the ambulatory setting to avoid admissions for these procedures. For full details on the planned admission algorithm as adapted for this measure, please see Appendix A of the attached technical report. Appendix A of the attached technical	Exclude cases: • transfer from a hospital (different facility) • transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) • transfer from another health care facility • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing) See Prevention Quality Indicators Appendices: • Appendix A – Admission Codes for Transfers	25081 DM W COMP NEC T1 CONT 25082 DM W COMP NEC T2 UNCNT 25083 DM W COMP NEC T1 UNCNT 25090 DM W COMPL NOS T2 CONT 25091 DM W COMPL NOS T1 CONT 25092 DM W COMPL NOS T2 UNCNT 25093 DM W COMPL NOS T1 UNCNT Exclude cases: • transfer from a hospital (different facility) • transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) • transfer from another health care facility • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing) See Prevention Quality Indicators Appendices: • Appendix A – Admission Codes for Transfers	(YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing) Rationale for exclusions: PQIs, and the Ambulatory Care Sensitive Conditions (ACSCs) and Avoidable Hospital Conditions (AHCs) upon which they were based, have always focused on the non-institutionalized, community-dwelling population. Including transfers from other acute care hospitals would clearly be inappropriate, because that would lead to double-counting the same inpatient episode if the patient's condition required transfer from one hospital to another. Including transfers from long-term care facilities could be considered, but PQIs re-specified in this way would require re-validation. Conceptually, these measures were designed to assess population-level access to timely, high-quality outpatient services, for the purpose of managing a chronic disease, preventing complications of a chronic disease, or diagnosing acute illnesses before they progress to require inpatient treatment. Residents of skilled nursing facilities do not lack for access to care, because they are surrounded by care providers. If their

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	report contains the detailed algorithm used to identify planned admissions. Among 2,940,537 admissions in the 2012 Medicare Full Sample, 353,191 (12.0%) were planned admissions. For ACO patients, there were 148,708 admissions; of these, 20,000 (13.5%) were planned admissions. For non-ACO patients, there were 2,791,829 admissions; of these, 333,192 (12.0%) were planned admissions. Please see Data Dictionary, sheet "S.6 ICD9-ICD10 Planned Algorithm," for the ICD-9 to ICD-10 crosswalk for the planned admission algorithm. Outcome Attribution: The outcome is attributed to the ACO to which the patient is assigned. Patients are assigned to ACOs according to the specific ACO program assignment algorithm. For example, for the Medicare Shared Savings Program, patient assignment is done retrospectively based on the plurality of care received at that ACO during the measurement year. Information on ACO patient assignment can be found here: Information on ACO patient assignment can be found here: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-			hospitalization rates are high (after risk-adjustment), it is presumably due to problems in care coordination or care within those specific facilities, not problems in ambulatory care. See Prevention Quality Indicators Appendices: • Appendix A – Admission Codes for Transfers See Prevention Quality Indicators technical specifications and appendices for additional details (available at http://www.qualityindicators.ahrq.gov/Modules/PQI_TechSpec.aspx) and in the supporting information. • The PQI reference population includes discharges with MDC 14 and age less than 18 years; however, the DRG and MS-DRG grouper logic precludes assignment of MDC 14 for discharge records with a PQI defining principal diagnosis. Exclude cases: • transfer from a hospital (different facility) • transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) • transfer from another health care facility • with missing gender (SEX=missing), age (AGE=missing),

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	Assignment-Spec-v2.pdf.. Citations: 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 Affairs. 2012 Jun 2012;31(6):1156-1166. Center for Medicare and Medicaid Services. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. 2013; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf. Accessed July 30, 2014. Centers for Medicare & Medicaid Services (CMS). Medicare Health Support. 2012; https://www.cms.gov/Medicare/Medicare-General-Information/CCIP/. Accessed March 27, 2014. Horwitz LI, Grady JN, Cohen DB, Lin Z, Volpe M, Ngo CK, Masica AL, Long T, Wang J, Keenan M, Montague J, Suter LG, Ross JS, Drye EE, Krumholz HM, Bernheim SM. Development and validation of an algorithm to identify planned readmissions from claims data. J Hosp Med 2015 Oct;			quarter (DQTR=missing), year (YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing) See Prevention Quality Indicators Appendices: • Appendix A – Admission Codes for Transfers http://qualityindicators.ahrq.gov/Downloads/Modules/PQI/V44/TechSpecs/PQI%20Appendices.pdf

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	10(10):670-7. McCarthy D, Cohen A, Johnson MB. Gaining Ground: Care Management programs to reduce hospital admissions and readmissions among chronically ill and vulnerable patients. The Commonwealth Fund, New York. 2013.			
Denominator Statement	The target population is ambulatory Medicare FFS patients aged 65 years and older with a diagnosis of diabetes.	Population ages 18 years and older in the metropolitan area† or county. Discharges in the numerator are assigned to the denominator based on the metropolitan area or county of the patient residence, not the metropolitan area or county of the hospital where the discharge occurred.‡ May be combined with uncontrolled diabetes as a single indicator as a simple sum of the rates to form the Healthy People 2010 indicator (note that the AHRQ QITM excludes transfers to avoid double-counting cases).	Population ages 18 years and older in metropolitan area† or county. Discharges in the numerator are assigned to the denominator based on the metropolitan area or county of the patient residence, not the metropolitan area or county where the hospital discharge occurred.‡	Population ages 18 years and older in metropolitan area† or county. Discharges in the numerator are assigned to the denominator based on the metropolitan area or county of the patient residence, not the metropolitan area or county of the hospital where the discharge occurred. May be combined with diabetes short-term complications as a single indicator as a simple sum of the rates to form the Health People 2010 indicator (note that the AHRQ QI excludes transfers to avoid double counting cases).
Denominator Details	Note: The denominator of the measure score is the expected admission rate for the ACO; we use this box to describe the measure cohort. The targeted patient population is Medicare FFS patients aged 65 years and older with a diagnosis of diabetes receiving ambulatory care	† The term “metropolitan area” (MA) was adopted by the U.S. Census in 1990 and referred collectively to metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs), and primary metropolitan statistical areas (PMSAs). In addition, “area”	† The term “metropolitan area” (MA) was adopted by the U.S. Census in 1990 and referred collectively to metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs), and primary metropolitan statistical areas (PMSAs). In addition, “area”	The term “metropolitan area” (MA) was adopted by the U.S. Census in 1990 and referred collectively to metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs), and primary metropolitan statistical areas (PMSAs). In addition, “area” could refer to either 1) FIPS county,

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	during the measurement period. To be included in the cohort, patients must have one inpatient or two outpatient diabetes diagnosis codes in any position within one or two years prior to the measurement period. We allowed for up to two years of claims to define the cohort since there is no specified optimal frequency of follow-up visits among ambulatory, stable patients (i.e., patients without a change in their symptoms may never be hospitalized and may only be seen annually). To be included in the cohort, patients must be enrolled full-time in both Part A and B during the year prior to the measurement period. Diabetes is defined using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes identified in Medicare Part A and Part B inpatient and outpatient claims data. Patients excluded from the cohort are identified using ICD-9-CM procedure codes in Medicare Part A inpatient and outpatient claims and the Medicare Denominator File. The ICD-9-CM codes that define the cohort are listed in the attached Excel file, sheets "S.9 Denominator Details – Cohort." An ICD-9-CM to ICD-10-CM code	could refer to either 1) FIPS county, 2) modified FIPS county, 3) 1999 OMB Metropolitan Statistical Area, or 4) 2003 OMB Metropolitan Statistical Area. Micropolitan Statistical Areas are not used in the QI software. ‡ The denominator can be specified with the diabetic population only and calculated with the SAS QI software through the condition-specific denominator at the state-level feature.	could refer to either 1) FIPS county, 2) modified FIPS county, 3) 1999 OMB Metropolitan Statistical Area, or 4) 2003 OMB Metropolitan Statistical Area. Micropolitan Statistical Areas are not used in the QI software. ‡ The denominator can be specified with the diabetic population only and calculated with the SAS QI software through the condition-specific denominator at the state-level feature.	2) modified FIPS county, 3) 1999 OMB Metropolitan Statistical Area, or 4) 2003 OMB Metropolitan Statistical Area. Micropolitan Statistical Areas are not used in the QI software. See AHRQ QI website or supplemental information for 2013 Population File Denominator report for calculation of population estimates embedded within AHRQ QI software programs. http://www.qualityindicators.ahrq.gov/Downloads/Software/SAS/V45/AHRQ%20QI%20Population%20File%20V4.5.pdf NOTE: The denominator can be specified with the diabetic population only. The AHRQ QI SAS program has diabetes-specific denominators at the state-level. Payers have also specified annual diabetes-specific population denominators based on all-claims data for beneficiaries, restricting the denominator to those beneficiaries who have an indication of diabetes in a previous outpatient or inpatient visit. Annual diabetes-specific population denominators would need to be weighted by months of beneficiary enrollment. Reliability testing currently underway for application of the measure to other populations, such as patients in

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	crosswalk is attached in data field S.2b. (Data Dictionary or Code Table).			physician practices.
Exclusions	The measure excludes: 1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year).	Not applicable	Not applicable	Not Applicable
Exclusion Details	1. Patients without continuous enrollment in Medicare Part A for the duration of the measurement period (or until death). Rationale: We exclude these patients to ensure full data availability for outcome assessment (Part A during the measurement year). Lack of continuous enrollment in Medicare Part A is determined by patient enrollment status in FFS Part A using the Medicare Denominator File. The enrollment indicators must be appropriately marked during the measurement period (Part A).	Not applicable	Not applicable	Not Applicable
Risk Adjustment	Statistical risk model We use a two-level hierarchical negative binomial model to estimate risk-standardized acute, unplanned admissions per person-year at risk for admission. This approach accounts for the clustering of patients within	Statistical risk model The predicted value for each case is computed using a hierarchical model (logistic regression with area random effect) and covariates for gender and age (in age groups). The reference population used in the	Statistical risk model The predicted value for each case is computed using a hierarchical model (logistic regression with area random effect) and covariates for gender and age (in age groups). The reference population used in the	Statistical risk model The predicted value for each case is computed using a hierarchical model (logistic regression with area random effect) and covariates for gender and age (in 5-year age groups). The reference population

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	ACOs and variation in sample size. Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" [1, 2]. The risk-standardization model includes age and 22 clinical variables. We define clinical variables using condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9 diagnosis codes [3]. A map showing the assignment of ICD-9 codes to CCs can be found in the attached Data Dictionary Excel file, sheet "S.14 CC to ICD-9." Data Dictionary, sheet "S.15 ICD10 Crosswalk-Risk model" contains the crosswalk of ICD-9 to ICD-10 codes for the diabetes severity index variable. Model Variables The risk-adjustment variables are: 1. Age 2. High Risk cardiovascular (CV) factors (CC 81, 82, 89, 104) 3. Low risk CV factors (CC 83, 84, 94, 105, 106) 4. Arrhythmia (CC 92, 93) 5. Advanced Cancer (CC 7, 8, 9, 11) 6. Dementia (CC 49, 50)	regression is derived from discharges for 36 of 45 states that participate in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Data (SID) for the year 2012 (combined), representing approximately 30 million discharges, or 82 percent of U.S. community hospital discharges. These 36 states are those that report information about whether a diagnosis was Present on Admission (POA) and information on the timing of procedures during hospitalization. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., area). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate. The specific covariates for this measure are as follow: SEX Female 18 - 24 Males 25 - 29 Males 30 - 34 Males 35 - 39 Males 40 - 44 Males 45 - 49 Males	regression is derived from discharges for 36 of 45 states that participate in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Data (SID) for the year 2012 (combined), representing approximately 30 million discharges, or 82 percent of U.S. community hospital discharges. These 36 states are those that report information about whether a diagnosis was Present on Admission (POA) and information on the timing of procedures during hospitalization. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., area). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate. The specific covariates for this measure are as follow: SEX Female 18 - 24 Males 25 - 29 Males 30 - 34 Males 35 - 39 Males 40 - 44 Males 45 - 49 Males	used in the regression is the universe of discharges for states that participate in the HCUP State Inpatient Data (SID) for the year 2010 (combined), a database consisting of 46 states and approximately 38 million adult discharges, and the U.S. Census data by county. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., area). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate. Additional information on methodology can be found in the Empirical Methods document on the AHRQ Quality Indicator website (www.qualityindicators.ahrq.gov) and in the supplemental information. The specific covariates for this measure are as follow: SEX Female 18 - 24 Males 25 - 29 Males 30 - 34 Males 35 - 39 Males 40 - 44 Males

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	7. Heart failure (CC 80) 8. Dialysis (CC 130) 9. Disability/Frailty (CC 21, 67, 68, 100, 116, 148, 149, 157, 177, 178, 69) 10. Gastrointestinal and Genitourinary disorders (GI/GU) (CC 29, 30, 31, 33, 34, 133, 176) 11. Hematological disorders (CC 44, 46) 12. Infectious and immune disorders (CC 1, 3, 4, 5, 45, 85) 13. Kidney disease (CC 128, 131, 132) 14. Liver disease (CC 25, 26, 27, 28) 15. Neurological disorders (CC 48, 61, 65, 70, 72, 73, 74,75, 95, 96, 97, 98, 99, 101, 102, 103, 155) 16. Psychiatric Illness/Substance abuse (CC 51, 52, 53, 54, 55, 56, 57, 58, 59, 60) 17. Pulmonary disease (CC 107, 108, 109, 110, 114, 115) 18. Other advanced organ failure (CC 77, 79) 19. Diabetes severity index (number of complications associated with diabetes based on ICD-9 codes; see Testing form 2b.4.3 for details and Excel file, sheet "S.15 Diabetes Severity Index" for the list of ICD-9 codes.) 20. Iron deficiency anemia (CC 47) 21. Major organ transplant (CC 174)	50 - 54 Males 55 - 59 Males 60 - 64 Males 65 - 69 Males 70 - 74 Males 75 - 79 Males 80 - 84 Males 18 - 24 Females 25 - 29 Females 30 - 34 Females 35 - 39 Females 40 - 44 Females 45 - 49 Females 50 - 54 Females 55 - 59 Females 60 - 64 Females 65 - 69 Females 70 - 74 Females 75 - 79 Females 80 - 84 Females Parameter estimates can be found at the following link: http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V50/Parameter_Estimates_PQI_50.pdf Available in attached Excel or csv file at S.2b	50 - 54 Males 55 - 59 Males 60 - 64 Males 65 - 69 Males 70 - 74 Males 75 - 79 Males 80 - 84 Males 18 - 24 Females 25 - 29 Females 30 - 34 Females 35 - 39 Females 40 - 44 Females 45 - 49 Females 50 - 54 Females 55 - 59 Females 60 - 64 Females 65 - 69 Females 70 - 74 Females 75 - 79 Females 80 - 84 Females Parameter estimates can be found at the following link: http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V50/Parameter_Estimates_PQI_50.pdf Available in attached Excel or csv file at S.2b	45 - 49 Males 50 - 54 Males 55 - 59 Males 60 - 64 Males 65 - 69 Males 70 - 74 Males 75 - 79 Males 80 - 84 Males 18 - 24 Females 25 - 29 Females 30 - 34 Females 35 - 39 Females 40 - 44 Females 45 - 49 Females 50 - 54 Females 55 - 59 Females 60 - 64 Females 65 - 69 Females 70 - 74 Females 75 - 79 Females 80 - 84 Females The risk adjustment coefficient table can be found in the supplemental materials and at the following link: http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V45/Parameter_Estimates_PQI_45.pdf Available in attached Excel or csv file at S.2b

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	22. Other organ transplant (CC 175) 23. Hip fracture/Major fracture (CC 158, 159) Citations: 1. Krumholz HM, Brindis RG, Brush JE, et al. 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 Endorsed by the American College of Cardiology Foundation. Circulation. 2006; 113 (3): 456-462. 2. Normand S-LT, Shahian DM. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci. 2007; 22 (2): 206-226. 3. Pope, G.C., Kautter, J., Ellis, R.P., et al.: Risk Adjustment for Medicare Capitation Payments Using the CMS-HCC Model. Health Care Financing Review. 2004; 25(4):119-141. Available in attached Excel or csv file at S.2b			
Stratification	Not applicable. This measure is not stratified.	Not applicable	Not applicable	Not applicable
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
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 person-year, multiplied by the national rate of admissions among all Medicare FFS patients with diabetes – i.e., all eligible Medicare FFS patients with diabetes are used in the measure score calculation, and a score is generated for each ACO. For a full description of the modeling, please see the attached technical report (Section 3.5.5 and Appendix B of attached technical report). In brief, the measure uses a hierarchical (two-level) statistical model that accounts for the clustering of patients within ACOs and accommodates the widely varying sizes of different ACOs. The measure uses a negative binomial model since our outcome is a count of the number of admissions. The first level of the model adjusts for patient factors. The relationship between patient risk factors and the outcome of admission is determined based on a national sample of patients with diabetes. Stated another way, since the effects that risk factors exert on the number of admissions are estimated based on data from all ACO and non-ACO	The observed rate is the number of discharges flagged with the outcome of interest divided by the number of persons in the population at risk. The predicted rate is estimated for each person based on a logistic regression model. The expected rate is the average predicted rate for the unit of interest (i.e. the county of residence). The risk-adjusted rate is calculated using the indirect method as observed rate divided by expected rate multiplied by the reference population rate. The performance score is a weighted average of the risk-adjusted rate and the reference population rate, where the weight is the signal-to-noise ratio. For additional information, please see supporing information in the Quality Indicator Empirical Methods. Information is also available on the AHRQ Quality Indicator website: www.qualityindicators.ahrq.gov No diagram provided	The observed rate is the number of discharges flagged with the outcome of interest divided by the number of persons in the population at risk. The predicted rate is estimated for each person based on a logistic regression model. The expected rate is the average predicted rate for the unit of interest (i.e. the county of residence). The risk-adjusted rate is calculated using the indirect method as observed rate divided by expected rate multiplied by the reference population rate. The performance score is a weighted average of the risk-adjusted rate and the reference population rate, where the weight is the signal-to-noise ratio. For additional information, please see supporing information in the Quality Indicator Empirical Methods. Information is also available on the AHRQ Quality Indicator website: www.qualityindicators.ahrq.gov No diagram provided	The observed rate is the number of discharges flagged with the outcome of interest divided by the number of persons in the population at risk. The predicted rate is estimated for each person based on a logistic regression model. The expected rate is the average predicted rate for the unit of interest (i.e. the county of residence). The risk-adjusted rate is calculated using the indirect method as observed rate divided by expected rate multiplied by the reference population rate. The performance score is a weighted average of the risk-adjusted rate and the reference population rate, where the weight is the signal-to-noise ratio. For additional information, please see supporting information in the Quality Indicator Empirical Methods. Information is also available on the AHRQ Quality Indicator website: www.qualityindicators.ahrq.gov No diagram provided

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	patients in the nation, the 'expected' number of admissions for each ACO is based on the performance of a national group of providers. 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 ACO specific number of "predicted" admissions per person-year. The measure score is the ratio of predicted admissions over the expected admissions multiplied by the crude national rate. The predicted to expected ratio of admissions is analogous to an observed/expected ratio, but the numerator accounts for clustering and sample-size variation. The expected number of admissions is calculated based on the ACO's case mix and national average intercept. The predicted number of admissions is calculated based on the ACO's case mix and the estimated ACO-specific intercept term. We multiply the ratio for each ACO by a constant, the crude national rate of acute, unplanned admissions per			

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	person-years at risk for hospitalization, for ease of interpretation. To place ACOs in performance categories, for each ACO RSAAR, one can calculate a 95% interval estimate (IE), which is similar to a confidence interval, using standard bootstrapping methods (further described in the Testing Form, Section 2b5.1). Using the 95% IEs, one can assign ACOs to one of three performance categories: 'better than the national rate,' 'no different than the national rate,' and 'worse than the national rate.' The ACO is 'better than the national rate' if the 95% IE is completely below the United States (US) national rate among Medicare FFS patients with diabetes; 'no different than the national rate' if the 95% IE is included in the US national rate among Medicare FFS patients with diabetes; and 'worse than the national rate' if the 95% IE is above the US national rate among Medicare FFS patients with diabetes. Available in attached appendix at A.1			
Submission items	5.1 Identified measures: 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0575 : Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Control	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized,	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized,	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized,

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	(<8.0%) 0059 : Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Poor Control (>9.0%) 0063 : Comprehensive Diabetes Care: LDL-C Screening 0018 : Controlling High Blood Pressure 0272 : Diabetes Short-Term Complications Admission Rate (PQI 01) 0285 : Lower-Extremity Amputation among Patients with Diabetes Rate (PQI 16) 0274 : Diabetes Long-Term Complications Admission Rate (PQI 03) 0638 : Uncontrolled Diabetes Admission Rate (PQI 14) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The measures listed above differ in several important ways from the proposed measure: 1. The measure differs in the outcome. The NQF# 0018, 0059, 0063, and 0575 are measures of surrogate outcomes and focus on risk factor control; in contrast, the proposed measure	identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: Not applicable	identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: Not applicable	identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: Not applicable

	2887: Risk-Standardized Acute Admission Rates for Patients with Diabetes	0272: Diabetes Short-Term Complications Admission Rate (PQI 01)	0274: Diabetes Long-Term Complications Admission Rate (PQI 03)	0638: Uncontrolled Diabetes Admission Rate (PQI 14)
	directly evaluates the results of care and assesses an outcome experienced by patients. The NQF # 0709, 0272, 0274, 0638, and 0285 are measures of specific types of hospital admissions; in contrast, the proposed measure includes all-cause acute admissions to capture broad vulnerabilities of older patients with diabetes to acute exacerbations of their underlying condition as well as co-existing comorbidities. 2. The measure differs in risk adjustment. The existing measures are either not adjusted or adjusted for age and sex. In contrast, the proposed measure is fully adjusted for a broad range of clinical factors that contribute to the risk for admission, allowing for fair comparisons of ACO performance. 3. The measure differs in the target population. Existing measures include adults with ages 18 to 75 or 18 to 65 years of age. In contrast, the target population for the proposed measure are all Medicare FFS beneficiaries with a diagnosis of diabetes, who are 65 years or older. Thus, the focus is focus is on older, complex adults with diabetes. 5b.1 If competing, why superior or rationale for additive value: Not applicable.			

Appendix G: Pre-Evaluation Comments

Comments received as of June 8, 2016.

Topic	Commenter	Comment
1891: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient requests CMS to review & provide follow-up analysis on more applied/practical alternate modeling approaches to account for within & across hospital variation besides hierarchical modeling. While hierarchical modeling is a valid technique controlling for within & across hospital variation, the approach lacks a tangible, practical framework of an observed to expected ratio that hospitals need to drive patient care. The predicted to expected approach complicates the public's & provider's understanding of how the actual observed values impacts hospital performance. Through numerous member discussions, we heard repeatedly, Oh, you mean that number does really reflect my actual readmissions? How can I improve that number? Even more concerning is the focus the current measure places on improving documentation & coding rather than patient care. Currently, providers see the only direct way to improve the measure is through documentation & coding capture of co-morbidities which count toward the predicted & expected value calculations. We hope this was not the original intention of the measure & this misguided focus is simply an unintended artifact of an overly complicated modeling technique. We recommend analyzing & provide results comparing a model that uses hospital characteristics, such as teaching status or bed size to account for structural differences across hospitals & provide an observed to expected ratio which is much more meaningful for the public & providers. While in the past, CMS has commented they would not incorporate these features due to NQF restrictions; it is important to point out NQF has endorsed other risk adjustment models that incorporate these characteristics (NHSN) & consider these factors in the 30-day risk adjustment as well. Also, we would ask CMS & NQF to institute discrimination performance thresholds for the models given the importance these models bare on CMS's performance programs & public reporting. Currently, no model performs > 0.70, a standard considered fair-good practical

Topic	Commenter	Comment
		performance threshold & while the c-stat does not fully evaluate the model, it certainly should require basic performance standards. Additionally, we ask CMS to provide performance statistics, like AIC, BIC & the Somers' D, Gamma & Tau-a association of predicted probabilities & observed counts for a more comprehensive assessment. Using these standards & model diagnostics, NQF can provide CMS with recommendations for improvement. Until minimum discrimination thresholds are instituted, we recommend NQF remove endorsement of the readmission measures.
1789: Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient agrees with the minor changes to clinical cohorts due to changes in CCS procedure codes categories, specifically those for obstetrics procedures which are now in many different CCS categories. Vizient recommends CMS and NQF reviewing this criterion and provide the appropriate ICD-10 translations to address the debridement of wound; infection or burn procedure codes for ccs 169 impacting the planned procedure exclusion criteria.
1789: Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient agrees with the minor changes to clinical cohorts due to changes in CCS procedure codes categories, specifically those for obstetrics procedures which are now in many different CCS categories. Vizient recommends CMS and NQF reviewing this criterion and provide the appropriate ICD-10 translations to address the debridement of wound; infection or burn procedure codes for ccs 169 impacting the planned procedure exclusion criteria.
1891: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient reviewed the I-10 translations for respiratory failure that

Topic	Commenter	Comment
pulmonary disease (COPD) hospitalization		are currently included in the COPD definition and recommend expanding to include J9601, J9602, J9691 & J9692 for the I-9 code 51881 and J9621 and J9622 for the I-9 code 51884 respiratory failure (acute & chronic) with hypoxia and hypercapnia as per the GEMS 2015 mapping. In reviewing the algorithm for AHRQ CCS potentially planned procedure list, AHRQ CCS 169 is listed as exclusion criteria, but within ICD-10 CCS 169 does not exist. Vizient recommends CMS and NQF reviewing this criterion and provide the appropriate ICD-10 translations to address the debridement of wound; infection or burn procedure codes.
0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient agrees with CMS's additions to the denominator cohort definition to include aspiration pneumonia & sepsis w secondary dx of pneumonia and recommends CMS and NQF add the following I-10 translation codes per the 2015 GEMS, J1000, J1001, J1008, J1108 which are the I-10 equivalent to the existing ICD-9 code 4870 which exists in the measure definition. Upon review, Vizient noticed no ICD-10 translation was provided for severe sepsis ICD-9 codes 995.92 or 785.52. Vizient recommends including ICD-10 codes R6520 and R6521 as per the GEMS 2015 mapping. Within the PN readmission specifications, the planned readmission exclusion algorithm references V3.0 yet, V4.0 is currently proposed. Vizient recommends CMS provide consistent V4.0 planned readmission algorithm for all the readmission measures. In reviewing the algorithm for AHRQ CCS potentially planned procedure list, AHRQ CCS 169 is listed as exclusion criteria, but within ICD-10 CCS 169 does not exist. Vizient recommends CMS and NQF reviewing this criterion and provide the appropriate ICD-10 translations to address the debridement of wound; infection or burn procedure codes.
0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient's coding expert reviewed the I-10 translations for the additional exclusions for the HF 30-day readmission measure &

Topic	Commenter	Comment
		recommend not including I-10 code 5A02216, 5A02116 as these codes can be used as separate codes that extend beyond the LVAD patient population. For instance, these two codes can be used to capture intra-op & intra-procedure cardiac output during such procedures as valvuloplasty, angioplasty, intra-cardiac procedures & even during cardiac catheterization. These two codes can be coded when the cardiac output support is performed regardless of whether or not a ventricular device is inserted. Additionally, Vizient recommends removing the following I-10 lung transplant codes, 0BYM0Z0, 0BYMOZ1,& 0BYM0Z2 from the heart transplant I-9 code translation as these codes are specific to lung transplant in I-10 & do not involve the same I-9 combination code translations needed adequately capture heart transplantation. We reviewed the I-9 procedure codes used for the HF readmission criteria & recommend excluding 3762 as this inserted/removal occurs within the same encounter); thus, not reflective of a true bridge to heart transplant encounter which Vizient believes is the goal of this exclusion criteria. In reviewing the algorithm for AHRQ CCS potentially planned procedure list, AHRQ CCS 169 is listed as exclusion criteria, but within ICD-10 CCS 169 does not exist. Vizient recommends CMS and NQF reviewing this criterion and provide the appropriate ICD-10 translations to address the debridement of wound; infection or burn procedure codes.
1891: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. For the readmission measures considered, CMS presented patient-level & hospital specific SES factor beta coefficients & p-values, yet overall model performance were not presented. We request the actual model performance results for model evaluation. For the AHRQ SES Index variable, we request further information on how the binary classification for a measure that ranges between 0-100 was determined & the impact of transforming into a binary representation vs. actual value had on the model performance. This detail along with the overall model performance information would provide the public with the necessary information to truly assess CMS's comment 'Given these findings & the complex pathways that could explain any relationship

Topic	Commenter	Comment
		between SES or race with readmission, we did not incorporate SES variables or race into the measure.' Regarding the complex pathways associated with 30-day readmissions as stated by CMS, we strongly ask CMS to entirely re-evaluate the utility of the 30-day measures. As stated by CMS, factors influencing readmissions are blurred between providers & patients 30-days post discharge resulting in a limited insights in how providers can improve care. We believe CMS's efforts to remove the planned readmissions PR4 logic is a strong step in true opportunity identification; however, more refinement is needed. We recommend a shorter, more actionable 7 day post-discharge readmission timeframe to pinpoint opportunities providers truly can influence & thus, mitigate many of SES confounding factors. The 7-day window provides clearer opportunities for patient stabilization & post-acute discharge planning which the 30-day window doesn't reflect. We recommend CMS provide a 7-day readmission risk adjustment for review. Also, the hospital wide readmission measure evaluates all readmissions within the 30-day window post inpatient discharge & considers readmit cases to also be eligible as the index admission; however, the condition specific measures evaluate only 1 readmit within the 30-day window & cannot be eligible as an index. We ask CMS for the rationale why the different approaches for the same measure as this adds unnecessary complexity which are impractical to manage. We recommend a consistent approach across all readmission measure calculations & recommend evaluating & counting all readmits that occur within the 30-day window so providers have a clear understanding of the # readmits are truly occurring. We support considering a readmit as an index for the next 30-day cycle to again, assist organizations in tracking & improving complete patient care.
1789: Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. For the readmission measures considered, CMS presented patient-level & hospital specific SES factor beta coefficients & p-values, yet overall model performance were not presented. We request the actual model performance results for model evaluation. For the AHRQ SES Index variable, we request further information on how the binary classification

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0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to

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pneumonia hospitalization		improved patient outcomes & lower costs. For the readmission measures considered, CMS presented patient-level & hospital specific SES factor beta coefficients & p-values, yet overall model performance were not presented. We request the actual model performance results for model evaluation. For the AHRQ SES Index variable, we request further information on how the binary classification for a measure that ranges between 0-100 was determined & the impact of transforming into a binary representation vs. actual value had on the model performance. This detail along with the overall model performance information would provide the public with the necessary information to truly assess CMS's comment 'Given these findings & the complex pathways that could explain any relationship between SES or race with readmission, we did not incorporate SES variables or race into the measure.' Regarding the complex pathways associated with 30-day readmissions as stated by CMS, we strongly ask CMS to entirely re-evaluate the utility of the 30-day measures. As stated by CMS, factors influencing readmissions are blurred between providers & patients 30-days post discharge resulting in a limited insights in how providers can improve care. We believe CMS's efforts to remove the planned readmissions PR4 logic is a strong step in true opportunity identification; however, more refinement is needed. We recommend a shorter, more actionable 7 day post-discharge readmission timeframe to pinpoint opportunities providers truly can influence & thus, mitigate many of SES confounding factors. The 7-day window provides clearer opportunities for patient stabilization & post-acute discharge planning which the 30-day window doesn't reflect. We recommend CMS provide a 7-day readmission risk adjustment for review. Also, the hospital wide readmission measure evaluates all readmissions within the 30-day window post inpatient discharge & considers readmit cases to also be eligible as the index admission; however, the condition specific measures evaluate only 1 readmit within the 30-day window & cannot be eligible as an index. We ask CMS for the rationale why the different approaches for the same measure as this adds unnecessary complexity which are impractical to manage. We recommend a consistent approach across all readmission measure calculations & recommend evaluating & counting all readmits that occur within the 30-day window so providers have a clear understanding of the # readmits are truly occurring. We support considering a readmit as an

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0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. For the readmission measures considered, CMS presented patient-level & hospital specific SES factor beta coefficients & p-values, yet overall model performance were not presented. We request the actual model performance results for model evaluation. For the AHRQ SES Index variable, we request further information on how the binary classification for a measure that ranges between 0-100 was determined & the impact of transforming into a binary representation vs. actual value had on the model performance. This detail along with the overall model performance information would provide the public with the necessary information to truly assess CMS's comment 'Given these findings & the complex pathways that could explain any relationship between SES or race with readmission, we did not incorporate SES variables or race into the measure.' Regarding the complex pathways associated with 30-day readmissions as stated by CMS, we strongly ask CMS to entirely re-evaluate the utility of the 30-day measures. As stated by CMS, factors influencing readmissions are blurred between providers & patients 30-days post discharge resulting in a limited insights in how providers can improve care. We believe CMS's efforts to remove the planned readmissions PR4 logic is a strong step in true opportunity identification; however, more refinement is needed. We recommend a shorter, more actionable 7 day post-discharge readmission timeframe to pinpoint opportunities providers truly can influence & thus, mitigate many of SES confounding factors. The 7-day window provides clearer opportunities for patient stabilization & post-acute discharge planning which the 30-day window doesn't reflect. We recommend CMS provide a 7-day readmission risk adjustment for review. Also, the hospital wide readmission measure evaluates all readmissions within the 30-day window post inpatient discharge & considers readmit cases to also be eligible as the index admission; however, the condition specific measures evaluate only 1 readmit within the 30-day window & cannot be eligible as an index. We ask CMS for the rationale why the different

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1789: Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient requests CMS to review & provide follow-up analysis on more applied/practical alternate modeling approaches to account for within & across hospital variation besides hierarchical modeling. While hierarchical modeling is a valid technique controlling for within & across hospital variation, the approach lacks a tangible, practical framework of an observed to expected ratio that hospitals need to drive patient care. The predicted to expected approach complicates the public's & provider's understanding of how the actual observed values impacts hospital performance. Through numerous member discussions, we heard repeatedly, Oh, you mean that number does really reflect my actual readmissions? How can I improve that number? Even more concerning is the focus the current measure places on improving documentation & coding rather than patient care. Currently, providers see the only direct way to improve the measure is through documentation & coding capture of co-morbidities which count toward the predicted & expected value calculations. We hope this was not the original intention of the measure & this misguided focus is simply an unintended artifact of an overly complicated modeling technique. We recommend analyzing & provide results comparing a model that uses hospital characteristics, such as teaching status or bed size to account for structural differences across hospitals & provide an observed to expected ratio which is much more meaningful for the public & providers. While in the past, CMS has commented they would not incorporate these features due to NQF restrictions; it is important to point out NQF has endorsed other risk adjustment models that incorporate these characteristics (NHSN) & consider these

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		factors in the 30-day risk adjustment as well. Also, we would ask CMS & NQF to institute discrimination performance thresholds for the models given the importance these models bare on CMS's performance programs & public reporting. Currently, no model performs > 0.70, a standard considered fair-good practical performance threshold & while the c-stat does not fully evaluate the model, it certainly should require basic performance standards. Additionally, we ask CMS to provide performance statistics, like AIC, BIC & the Somers' D, Gamma & Tau-a association of predicted probabilities & observed counts for a more comprehensive assessment. Using these standards & model diagnostics, NQF can provide CMS with recommendations for improvement. Until minimum discrimination thresholds are instituted, we recommend NQF remove endorsement of the readmission measures.
0506: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient requests CMS to review & provide follow-up analysis on more applied/practical alternate modeling approaches to account for within & across hospital variation besides hierarchical modeling. While hierarchical modeling is a valid technique controlling for within & across hospital variation, the approach lacks a tangible, practical framework of an observed to expected ratio that hospitals need to drive patient care. The predicted to expected approach complicates the public's & provider's understanding of how the actual observed values impacts hospital performance. Through numerous member discussions, we heard repeatedly, Oh, you mean that number does really reflect my actual readmissions? How can I improve that number? Even more concerning is the focus the current measure places on improving documentation & coding rather than patient care. Currently, providers see the only direct way to improve the measure is through documentation & coding capture of co-morbidities which count toward the predicted & expected value calculations. We hope this was not the original intention of the measure & this misguided focus is simply an unintended artifact of an overly complicated modeling technique. We recommend analyzing & provide results comparing a model that uses

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		hospital characteristics, such as teaching status or bed size to account for structural differences across hospitals & provide an observed to expected ratio which is much more meaningful for the public & providers. While in the past, CMS has commented they would not incorporate these features due to NQF restrictions; it is important to point out NQF has endorsed other risk adjustment models that incorporate these characteristics (NHSN) & consider these factors in the 30-day risk adjustment as well. Also, we would ask CMS & NQF to institute discrimination performance thresholds for the models given the importance these models bare on CMS's performance programs & public reporting. Currently, no model performs > 0.70, a standard considered fair-good practical performance threshold & while the c-stat does not fully evaluate the model, it certainly should require basic performance standards. Additionally, we ask CMS to provide performance statistics, like AIC, BIC & the Somers' D, Gamma & Tau-a association of predicted probabilities & observed counts for a more comprehensive assessment. Using these standards & model diagnostics, NQF can provide CMS with recommendations for improvement. Until minimum discrimination thresholds are instituted, we recommend NQF remove endorsement of the readmission measures.
0330: Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	Submitted by Ms. Elizabeth Godsey	Vizient, Inc., the largest member-owned health care company in the country, is dedicated to serving members & customers through innovative data-driven solutions, expertise & collaborative opportunities that lead to improved patient outcomes & lower costs. Vizient requests CMS to review & provide follow-up analysis on more applied/practical alternate modeling approaches to account for within & across hospital variation besides hierarchical modeling. While hierarchical modeling is a valid technique controlling for within & across hospital variation, the approach lacks a tangible, practical framework of an observed to expected ratio that hospitals need to drive patient care. The predicted to expected approach complicates the public's & provider's understanding of how the actual observed values impacts hospital performance. Through numerous member discussions, we heard repeatedly, Oh, you mean that number does really reflect my actual readmissions? How can I improve that number? Even more concerning is the focus the current measure places on improving documentation & coding rather than

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		patient care. Currently, providers see the only direct way to improve the measure is through documentation & coding capture of co-morbidities which count toward the predicted & expected value calculations. We hope this was not the original intention of the measure & this misguided focus is simply an unintended artifact of an overly complicated modeling technique. We recommend analyzing & provide results comparing a model that uses hospital characteristics, such as teaching status or bed size to account for structural differences across hospitals & provide an observed to expected ratio which is much more meaningful for the public & providers. While in the past, CMS has commented they would not incorporate these features due to NQF restrictions; it is important to point out NQF has endorsed other risk adjustment models that incorporate these characteristics (NHSN) & consider these factors in the 30-day risk adjustment as well. Also, we would ask CMS & NQF to institute discrimination performance thresholds for the models given the importance these models bare on CMS's performance programs & public reporting. Currently, no model performs > 0.70, a standard considered fair-good practical performance threshold & while the c-stat does not fully evaluate the model, it certainly should require basic performance standards. Additionally, we ask CMS to provide performance statistics, like AIC, BIC & the Somers' D, Gamma & Tau-a association of predicted probabilities & observed counts for a more comprehensive assessment. Using these standards & model diagnostics, NQF can provide CMS with recommendations for improvement. Until minimum discrimination thresholds are instituted, we recommend NQF remove endorsement of the readmission measures.

Appendix H: Review of Previously Endorsed Measures for Risk Adjustment for Sociodemographic Factors

In April 2015, NQF began a two year trial period during which sociodemographic status (SDS) factors should be considered as potential factors in the risk-adjustment approach of measures submitted to NQF if there is a conceptual reason for doing so. Prior to this, NQF criteria and policy prohibited the inclusion of such factors in the risk adjustment approach and only allowed for inclusion of a patient's clinical factors present at the start of care.

Because the previous All-Cause Admissions and Readmissions project began and ended prior to the start of the trial period, the Standing Committee did not consider SDS factors as part of the risk-adjustment approach during their initial evaluation. When the NQF Board of Directors (BoD) Executive Committee ratified the CSAC's approval to endorse the measures, it did so with the condition that these measures enter the SDS trial period because of the potential impact of SDS on readmissions and the impending start of the SDS trial period.

To meet this condition for endorsement, the Admissions and Readmissions Standing Committee reviewed the conceptual and empirical relationship between sociodemographic factors and the outcome of the measures. The measure developers were asked to submitted additional analysis in a multi-phased approach:

- Webinar #1: Examine the conceptual relationship between SDS factors and the outcome
- Webinar # 2: Review the SDS factors developers plan to test
- Webinar #3 and #4: Examine the empirical relationship between SDS factors and the outcome

During the first webinar, the Standing Committee reviewed the conceptual analysis of selected SDS variables and determined that further empirical analysis was warranted for 16 of the 17 measures endorsed with conditions.

During the second webinar, the Standing Committee reviewed the SDS factors that developed planned to test in their empirical analyses. The Standing Committee highly encouraged developers to consider age and gender, along with some measure of poverty, such as dual eligibility status, as variables for sociodemographic adjustment. When patient level data is not available or not sufficiently robust, the Standing Committee highly recommended that developers test community level variables and any decision not to include such factors should be justified. The Standing Committee noted that geographic proxy data should represent the actual SDS characteristics of the patient as accurately as possible and at this time attributes of the nine digit ZIP-code may be the closet data available as five digit ZIP-code or county is too heterogeneous. The Standing Committee recognized that while this may not be a good proxy for individual SDS in some areas because of inequality and diversity even within a nine digit ZIP-code, getting smaller than this (neighborhood or census tract) requires geocoding which may not feasible by all measure developers in this trial period.

During the third and fourth webinars, the Standing Committee reviewed the empirical analyses provided by the developers in terms of the validity criterion. The Standing Committee reviewed the developer's

decision to include or not include SDS adjustment in the risk adjustment model based on the empirical analysis provided. Ultimately the Standing Committee voted to continue endorsement of the measures without inclusion of SDS factors in the risk-adjustment approach. The table below summarizes the Standing Committee's findings.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
0505	Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization	The developer noted four potential conceptual relationship 1) Relationship of SES factors or race to health at admission. Patients who have lower income, lower education, lower literacy, or unstable housing may have a worse general health status and may present for their hospitalizatio	Medicare claims, enrollment database: • Age and Gender • Race (black/non-black) • Medicaid dual-eligible status Enrollment database and Census data (American Community Survey): • Neighborhood SES factors as proxies for patient-level SES using the validated AHRQ SES index	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. The variables represent the underlying conceptual construct well.	• Dual Eligible Status • African-American Race • AHRQ-validated SES index (composite of 7 different variables found in census data: percentage of people in the labor force who are unemployed, percentage of	<u>Univariate analysis:</u> • Patient-level AMI readmission rate is higher for dual eligible patients, 21.05% compared with 16.43%. • Readmission rate for African-American patients was higher at 21.24% compared with 16.61%. • Readmission rate for patients with an AHRQ SES index score below 45.9 was 18.05% compared with 16.62% for patients with an AHRQ SES Index score above 45.9. <u>Incremental Effect in Multivariable Model:</u> • Developer claims a	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		n or procedure with a greater severity of underlying illness that is not captured by claims data. 2) Use of low-quality hospitals. Patients of lower income, lower education, or unstable housing have been shown not to have equitable access to high quality facilities. 3) Differential care within a hospital.			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	modest effect size when included in a multivariate model that includes the claims based variables. • C-statistic is unchanged with addition of any of these variables. • Developer notes that the addition of these variables into the model has little to no effect on hospital performance. The developer notes that the patient-level and hospital-level dual eligible, race, and low AHRQ SES index effects are significantly associated with AMI readmission in the decomposition analysis. However, the	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		Patients may not receive equivalent care within a facility. 4) Influence of SDS on readmission risk outside of hospital quality and health status. Lower income patients may have competing economic priorities or lack of access to care outside the hospital.			people ≥25 years of age completing ≥4 years of college, and percentage of households that average ≥1 people per room)	developer notes that using these variables to account for patient-level differences could adjust for some of the differences in outcomes between hospitals and potentially obscure a signal of hospital quality. The developer ultimately decided not to include SDS or race variables into the measure.	
0695	Hospital 30-Day Risk-Standardized Readmissio	The developer notes limited literature that links SDS factors to hospital-level	CathPCI Registry dataset and Medicare Provider and Analysis Review (MEDPAR)	Standing Committee (SC) reviewed and was generally in agreement with	Available: • Gender • Race • Hispanic ethnicity	<u>Race:</u> The developer used the Medicare Provider Analysis and Review (MEDPAR) file for 2010	Age and gender are included in the model as clinical variables. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
	n Rates following Percutaneous Coronary Intervention (PCI)	RSRRs. The developers state that the data suggests that hospital-related factors, specifically detailed discharge planning and post discharge follow up, exert a stronger influence on readmission rates.	file: • Gender • Race • Hispanic ethnicity • Age • Zip code • Insurance status (from CathPCI)	the variables provided by the developer. These represent the underlying conceptual construct well. Going forward, they are discouraged from using the five digit zip code as SDS variable as it is a heterogeneous construct that may not necessarily represent specific patient-level attributes.	• Age • Zip code • For patients with dual eligibility status, CMS data provides income quintiles. Tested: • Race • Dual eligibility	to calculate the percentage of African-American (AA) patients treated at each hospital, using all pts admitted to the hospital. The developers examined RSRRs across hospitals grouped by quintile of the proportion of AA patients. According to the developer there were modest differences by quintile. The median RSRR was 12.4 % for hospitals with the highest proportion of AA patients compared to 11.2% for hospitals with the lowest proportion. Registry average was 11.8% <u>Dual eligibility:</u> The developers performed a similar	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						analysis for dual eligible patients. The developers found no differences in RSRRs across quintiles. The median RSRR for hospitals in the top quintile of dual eligible patients was 12.3% compared with 11.6% for hospitals in the bottom quintile of dual eligible patients. In comparison to the registry average of 11.8%, hospitals that treat a high percentage of dual eligible patients have moderately higher 30-day RSRRs. The developer found that the analyses conducted using the MEDPAR file indicated that distributions for RSRRs by proportion of AA and dual eligible	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						patients overlapped and that many hospitals caring for the highest percentages of these patients performed well on the measure.	
2393	Pediatric All-Condition Readmission Measure	SDS can affect health directly as well as indirectly by having an impact on self-management, adherence to recommendations, and access to care. <u>Findings in literature in relationship between pediatric readmission risks</u>	A. Data used for the current measure: 2008 Medicaid Analytic eXtract (MAX) data for 26 states, which include Medicaid claims from children's and non-children's hospitals Case-mix adjustment model variables: • Age group • Gender • Chronic	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well. They recommend additional variables for the developers to test: • Health and	• Patient insurance (primary payer): Medicaid, Medicare, Private Insurance, Self-pay, Other • Median income within patient's	Insurance: • Analyzed as a 5-level primary payer variable, • Statistically significant association in both bivariate and multivariate analysis with p-value <0.001. • Medicaid as primary payer was associated with higher odds of readmission in both bivariate and	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		and insurance : Public insurance is associated with higher pediatric readmission rates. One analysis on HCUP data found 3.1% for Medicaid compared to 2.0% for private insurance. In an analysis of all-condition readmissions at 72 freestanding and non-freestanding children's hospitals, the unadjusted readmission rate was highest for publicly insured patients (6.9%), followed by those who had other insurance (6.2%),	Condition Indicators by 17 body systems* *(*1. Infectious and parasitic disease 2. Neoplasms 3. Endocrine, nutritional, and metabolic diseases and immunity disorders 4. Diseases of blood and blood-forming organs 5. Mental disorders 6. Diseases of the nervous system and sense organs 7. Diseases of the circulatory system 8. Diseases of the respiratory system 9. Diseases of the digestive system 10. Diseases of the genitourinary system*	functional status such as mental illness or disability, if available	zip code • Distribution of education level within patient's zip code: Less than High School, High School Graduate, Some College/ Associate Degree, and Bachelor's Degree or Above *Note: Chronic Mental disorders (Chronic Condition*	multivariate models. • In multivariate analysis, adjusting for income; education; and the core case-mix variables of age, gender, and chronic conditions, patients with Private Insurance, Self-pay, and Other insurance had 0.8 lower odds of readmission than those with Medicaid, while the difference in readmission risk for those with Medicare was no longer significant. Income: • Median income within a patient's zip code used as a proxy for family	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		private insurance (5.9%), and no insurance (4.5%) (p < .001). Public (versus private) insurance was a significant risk factor for readmission in multivariate analysis (OR 1.12, 95% CI 1.09-1.15).	*11. Complications of pregnancy, childbirth, and the puerperium – The Chronic Condition Indicator for this body system is not included in the measure.* *12. Diseases of the skin and subcutaneous tissue* *13. Diseases of the musculoskeletal system* *14. Congenital anomalies* *15. Certain conditions originating in the perinatal period* *16. Symptoms, signs, and ill-defined conditions* *17. Injury and poisoning* *18. Factors*		*Indicator 5) is one of the core-case mix variables.*	income. • Income was categorized into quartiles. • Relationship was no longer significant after adjusting for insurance, education, and core case-mix variables. Education • The developer used four continuous variables that indicated the percentage of residents in a patient's zip code who had attained education levels of less than HS, HS graduate, Some College/AD, Bachelor's and above. • The developers	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			influencing health status and contact with health services) B. Data used to examine the relationship between readmission risk and SDS (race/ethnicity and insurance status) along with the current measure : 2005-2009 AHRQ Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases with Revisit Data for New York and Nebraska. Variables that were examined: • Race/Ethnicit			used the proportion of bachelor's and above as the reference. • The relationship between education and readmission risk was not significant after adjusting for insurance, income, and core case-mix variables. The developer found that the addition of patient insurance to the core case-mix adjustment model improved the overall model slightly (c-statistic increased from 0.708 to 0.710). However, the developers decided not to include this factor in the final case-mix	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			y Insurance Status C. Data used to examine the relationship between readmission risk and SDS (insurance status, education and income) for SDS Trial Period: New York State 2013 all-payer data. Variables that were examined: • Insurance • Education • Income Note: For details, please look at the column of *SDS Variables Tested*.			model at this time because the effect was small and testing was in only one state.	
2414	Pediatric Lower Respiratory Infection Readmissio	SDS can affect health directly as well as indirectly by having an impact on self-	A. Data used for the current measure: 2008 Medicaid Analytic eXtract (MAX) data	Standing Committee (SC) reviewed and was generally in agreement with	• Patient insuranc e (primary payer):	Insurance: • Categorized as a 4-level primary payer variable: Medicaid, Private Insurance,	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
	n Measure	management, adherence to recommendations, and access to care. <u>Findings in literature in relationship between pediatric readmission risks and insurance</u> : Public insurance is associated with higher pediatric readmission rates. One analysis on HCUP data found 3.1% for Medicaid compared to 2.0% for private insurance. In an analysis of all-condition readmissions at 72 freestanding	for 26 states, which include Medicaid claims from children's and non-children's hospitals Case-mix adjustment model variables: • Age group • Gender • Chronic Condition Indicators by 17 body systems* *(*1. Infectious and parasitic disease* *2. Neoplasms* *3. Endocrine, nutritional, and metabolic diseases and immunity disorders* *4. Diseases of blood and blood-forming organs* *5. Mental disorders* *6. Diseases of the*	the variables provided by the developer. These variables represent the underlying conceptual construct well. They recommend additional variables for the developers to test: • Health and functional status such as mental illness or disability, if available	Medicaid, Medicare, Private Insurance, Self-pay, Other • Median income within patient's zip code • Distribution of education level within patient's zip code: Less than High School, High School Graduate, Some College/	Self-pay, and Other. ○ No LRI readmissions with Medicare • In bivariate analysis, compared with patients with Medicaid, those with Private Insurance had significantly lower odds of readmission (OR 0.67 [95%CI 0.55, 0.82). Income: • Median income within a patient's zip code used as a proxy for family income. • Income was categorized into quartiles. • Since income was	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		and non-freestanding children's hospitals, the unadjusted readmission rate was highest for publicly insured patients (6.9%), followed by those who had other insurance (6.2%), private insurance (5.9%), and no insurance (4.5%) ($p < .001$). Public (versus private) insurance was a significant risk factor for readmission in multivariate analysis (OR 1.12, 95% CI 1.09-1.15).	*nervous system and sense organs* *7. Diseases of the circulatory system* *8. Diseases of the respiratory system* *9. Diseases of the digestive system* *10. Diseases of the genitourinary system* *11. Complications of pregnancy, childbirth, and the puerperium – The Chronic Condition Indicator for this body system is not included in the measure.* *12. Diseases of the skin and subcutaneous tissue* *13. Diseases of the musculoskeletal system* *14. Congenital*		Associate Degree, and Bachelor's Degree or Above *Note: Chronic Mental disorders (Chronic Condition Indicator 5) is one of the core-case mix variables.*	not significantly associated with the odds of readmission in the bivariate analysis the developers did not test for associations in multivariate analysis. Education: • The developer used four continuous variables that indicated the percentage of residents in a patient's zip code who had attained education levels of less than HS, HS graduate, Some College/AD, Bachelor's and above. • The developers used the	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			anomalies *15. Certain conditions originating in the perinatal period* *16. Symptoms, signs, and ill-defined conditions* *17. Injury and poisoning* *18. Factors influencing health status and contact with health services)* B. Data used to examine the relationship between readmission risk and SDS (race/ethnicity and insurance status) along with the current measure : 2005-2009 AHRQ Healthcare Cost and			proportion of bachelor's and above as the reference. • In bivariate analysis, all three education variable did not show significant associations with 30 day readmission rates. • Since education was not significantly associated with the odds of readmission in the bivariate analysis the developers did not test for associations in multivariate analysis. Since insurance was the only SDS variable that was significant in	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			Utilization Project (HCUP) State Inpatient Databases with Revisit Data for New York and Nebraska. Variables that were examined: • Race/Ethnicity Insurance Status C. Data used to examine the relationship between readmission risk and SDS (insurance status, education and income) for SDS Trial Period: New York State 2013 all-payer data. Variables that were examined: • Insurance • Education			bivariate analysis, it was the only potential SDS variable to include in the multivariate model. The multivariate model with core case-mix variables and insurance had a higher c-statistic that the core case-mix mode. (0.701 vs. 0.699). However, the developers note that because they effect was small and that testing was in only one state, they did not include patient insurance in the case-mix model at this time.	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			• Income Note: For details, please look at the column of *SDS Variables Tested*.				
2514	Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate		STS Adult Cardiac Surgery Database: • Age • Gender • Dual-eligible indicator	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well. The Standing Committee recommended testing an additional variable: • Insurance status	• Race/ ethnicity • Payor Race/Ethnicity defined as: 1. Black/African American (including Hispanic Black/African American and multiracial patients with Black/African American as one of races that they checked) 2. Hispanic	The developer notes that the results of the measure with and without SDS adjustment are highly correlated. Overall, the Pearson correlation and Spearman's rank correlation between the two sets of RSRRs (with and without SDS adjustment) were 0.995 and 0.995, respectively.	Age and gender are included in the original model. Additional SDS variables were not included in the original model. The developer proposes to present measure results in 2 different ways 1. Results stratified by race and payor using the original model, and 2. Risk-adjusted results using a model that includes the SDS factors mentioned previously.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					(including all patients of Hispanic ethnicity who did not identify as Black/African American) 3. Asian 4. American Indian/Alaskan Native 5. Native Hawaiian/Pacific Islander 6. White 7. Other Payor defined as: 1. Medicare and Medicaid 2. Medicare and commercial insurance without Medicaid		

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					3. Other (including mostly of patients with Medicare as the sole payor)		
2515	Hospital 30-day, all-cause, unplanned, risk-standardized readmission rate (RSRR) following coronary artery bypass graft (CABG) surgery	Four potential conceptual relationship 1) Relationship of SDS factors or race to health at admission. Patients who have lower income, lower education, lower literacy, or unstable housing may have a worse general health status and may	Medicare claims, enrollment database: • Age • Gender • Race (black/non-black) • Medicaid dual-eligible status Enrollment database and Census data (American Community Survey): • Neighborhood SES factors as proxies for patient-level	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. The SC recommended testing race, but expressed caution that this underlying construct for how race influences the outcome should be justified.	Dual eligible status (meaning enrolled in both Medicare and Medicaid) • African-American race • Agency for Healthcare Research and Quality (AHRQ)-validated SES Index score (composite of 7 different variables	<u>Univariate Analysis:</u> The patient-level observed CABG readmission rate is higher for dual eligible patients, 19.53%, compared with 14.53% for all other patients. The readmission rate for African-American patients was also higher at 17.93% compared with 14.78% for patients of all other races. Similarly the readmission rate for patients with an AHRQ SES Index score equal to or below 46.0 was 16.10% compared with 14.57% for patients	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		present for their hospitalization or procedure with a greater severity of underlying illness that is not captured by claims data. 2) Use of low-quality hospitals. Patients of lower income, lower education, or unstable housing have been shown not to have equitable access to high quality facilities.	SES using validated AHRQ SES index		found in census data: 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	with an AHRQ SES Index score above 46.0. <u>Multivariate analysis:</u> C-statistic is unchanged (0.633) Both the patient-level and hospital-level dual eligible effects were significantly associated with CABG readmission in the decomposition analysis.	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		3) Differential care within a hospital. Patients may not receive equivalent care within a facility. 4) Influence of SDS on readmission risk outside of hospital quality and health status. Lower income patients may have competing economic priorities or lack of access to care outside the hospital.			≥25 years of age completing ≥4 years of college, and percentage of households that average ≥1 people per room)		
NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Committee Feedback on	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
				conceptual relationship and variables			
2375	PointRight ® Pro 30™	The developers note limited literature on SNF readmissions. SDS risk factors such as ethnicity, English language proficiency or marital status may have a relationship with a SNF admission being sent back to a hospital. These may impact the communication with healthcare team about one's condition as well as decisions about the preferences of rehospitalization or not. While	Person characteristics from MDS (Minimum Data Set): • Race • Age (already included in RA model) • Gender (already included in RA model) • Marital status (possibly crossed with age and Gender) • Language • Gender • Dual eligibility/state buy-in	Given the long list of variables the developers have indicated they would be looking at, the SC suggested narrowing down the list to the most impactful variables, especially regarding facility and regional characteristics (disparities). The Standing Committee was in agreement that looking at county-level data can provide a picture of the relationship between the community and	• Marital status (married or single) • Race (black or non-black) • Medicaid enrollment (via the patient having a non-missing Medicaid identifier)	• The risk model for the currently-endorsed measure used an ordinary logistic regression, predicting the probability of rehospitalization at the stay level. • The developer noted that because race and Medicaid enrollment correlate with lower quality facilities it is important to decompose the effect of SDS factors into between-facility and within facility components. The between-facility part of the effect	• Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		there appears to be differences in rehospitalization rates by ethnicity in the literature, these differences appear to be related to differences in the quality of SNFs and the clustering of different ethnicities with poor quality SNFs. Thus, risk adjusting for ethnicity may have the unintended effect of adjusting for poor quality providers. However, this finding has not been extensively tested.	Facility characteristics: • Percent of patients by race • Percent of patients by age category • Percent of patients by Gender • Percent of patients by gender • Percent of patients by marital status • Percent of patients by language • Percent of patients by state buy-in indicator • Percent of the facility's census that is receiving	healthcare facilities or providers and how this affects patient's health status, especially for this setting.		correlates with facility quality and should not be controlled for in the measure; the within-facility part of the effect may represent differences outside the facility's control. • To model this, the developer used a two-stage logistic mode. First the developer fit a logistic regression including all clinical adjustors as well as race and Medicaid enrollment, with facility fixed effects. Second, the developer fit a second logistic regression (this time without fixed effects) including	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			post-acute care (i.e., admitted from a hospital in the prior 30 days) • Percent of the facility's census that is covered by Medicare FFS • Percent of facility's residents with Medicaid benefits interacted with three levels of liberality of Medicaid eligibility, and three levels of liberality of per diem Medicaid SNF reimbursement			all clinical adjustors plus marital status, and included race and Medicaid with the coefficients set as those in the first regression. • The developers exploratory data analysis used MDS data from 2,790 SNFs that consistently submitted data to PointRight and had more than 30 admission from the hospital in 2014. This resulted in a total of 745,832 admissions from acute care hospitals. The 30-day rehospitalization rate for this group was 18.3% • The developers	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			• The number of beds in the facility • The ownership of the facility (nonprofit, for profit individual, for profit chain, public) Regional characteristics (County or CBSA of SNF): • Median household income • Percent of households >= 133% of Federal poverty level • Percent of adults eligible for Medicaid (according to			used a two-level fixed effects framework to apportion the impact of SDS factors between the facility level and the individual patient level. • First the developers tested the variation of the standardized risk ratios (SRRs) across facilities by a) the proportion of Medicaid patients, and b) the proportion of black patients. The developers found that at the facility level a higher proportion of black patients and/or a higher proportion of Medicaid patients are	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			state standards) • Percent of persons >= 65 with private insurance • Percent of persons >= 65 with Medicaid • Percent of persons >= 65 with Medicare FFS • Percent of persons >= 65 with Medicare Advantage • Percent of persons in the labor force >= 25 who are unemployed • Percent of persons >= 18 who are homeless • Percent of			associated with higher risk-adjusted rehospitalization rates. • Next the developers examined the effect of adding SDS factors on the variance explained by the ordinary logistic risk adjustment model. ○ All three variables had significant effects but there was no improvement in the model'	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			persons aged >= 30 with a graduate degree; percent of persons aged >= 25 with a college degree • Percent of persons >= 30 who live in rented dwellings • Percent of people in the geographical region and the same demographic category who are poor			s c-statistic. ○ The c-statistic of the current model is 0.676. The c-statistic after adding the SDS factors was also 0.676 • The developers concluded that all of the variance in rehospitalization explainable by the current variables could be accounted for without the use	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						of the SDS variables. • To study the extent to which health care disparities between different • socio-economic groups are the result of differential care within the nursing home or are due to differences resulting from unequal quality of care across nursing homes the developers compared the Pro-30 model with a conditional fixed-effects logistic regression model, then used the SDS factor coefficients as the first state of a two-stage logistic regression	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						approach. • The developers analyzed the structural caused of SDS effects on the risk model. • Finally, the developers measured the effect on classification of facility performance of applying the revised model with SDS factors. In only one of 2760 cases did a facility's decide rank change by more than one between the old and new risk adjustment models. • The developers ultimately chose not to include the SDS factors in the	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						risk adjustment model.	
2380	Rehospitalization during the First 30 days of Home Health	Findings from the literature support a linkage between proposed SDS factors and ED use and hospital readmission. Individuals with lower social economic status (SES) are more likely to use EDs for primary health care services. In the home health setting, the 30-day period for re-hospitalization occurs while the patient is living in their own home, increasing the likelihood that non-medical	Medicare Claims Data: • Prior Care Setting • Age and gender interactions • Health Status (from Medicare claims) • Medicare Enrollment Status • Additional interactions between Hierarchical Condition Categories (HCCs) and Medicare Enrollment Status	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well. In addition to looking at neighborhood characteristics, the Committee highlights the importance of looking at rural location, as stated in the developer's future analysis plan.	• Medicaid Status – included in the CMS Enrollment Database (EDB) • Rural Location – determined from beneficiary address, as captured in EDB • SES Index Score – determined from beneficia	• A single multinomial logit model was used to predict the Rehospitalization During the First 30 Days of Home Health measure. • Of the 1,669,802 qualifying home health stays beginning from July 1, 2010 to June 30, 2013, a random 80 percent sample without replacement was chosen to calibrate the multinomial logit model and to estimate marginal effects for model development purposes. The remaining 20 percent of the	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		factors, including geographic location and economic resources, will have an impact on acute care use. More specific findings regarding the documented relationship between socio-demographic factors, readmission and ED use are described below. • A recent study of 30-day hospital readmission of elderly patients with initial discharge destination of HH care found race to be a significant predictor of	(income and employment) Identified additional SDS factors to be tested from Medicare Enrollment Database (EDB) and Survey data: • Race/Ethnicity (EDB) • Medicaid Status (EDB) • Rural location (EDB) • Neighborhood characteristics (survey)		ry address linked to American Community Survey (ACS) data. The index is a composite of seven ACS variables: o Percentage of people in the labor force who are unemployed o Percentage of persons	stays were used to cross-validate the model. • To determine which risk factors should be included in the risk adjustment model, a Wald test of joint restrictions was applied to each variable in each of 1,150 bootstrap samples created using simple random sampling, with replacement, of 80 percent of all home health stays. The Wald test determined the likelihood that the change in either or both outcomes associated with each covariate was statistically different from	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		readmission. • One study of 1375 patients examining differential use of EDs by various racial and ethnic groups found confounding impact by other SDS variables and concluded that programs to reduce inappropriate ED use must be sensitive to an array of complex socioeconomic issues and may necessitate a substantial paradigm shift in how acute care is provided in low SES communities. Research has also shown that ED			below US poverty line o Median household income o Median value of owner-occupied homes o Percentage of persons aged ≥ 25 years with less than a 12th-grade education o Percentage of persons aged ≥	zero. The current risk adjustment model includes only covariates that were significant at a level of 0.05 for either outcome in at least 80 percent of bootstrap samples. • To evaluate the impact of each risk factor, the marginal effects were calculated. The marginal effect represents the relative impact of each risk factor on the outcome. • Goodness of fit statistics were then calculated for the calibrated model and the 20 percent sample was used for cross-	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		wait time is also linked to factors related to race/ethnicity, with black patients having longer wait times than nonblack patients. • Even after adjustment for potential confounding factors, lower income is a positive predictor of readmission risk of patients for heart failure. • A study of community-dwelling elders with Medicare coverage discharged to home found that living			25 years with at least 4 years of college o Percentage of households containing one or more person per room	validation. • Once the significant risk factors were identified in the development stage, the model was then calibrated using 100 percent of home health stays. • To determine the impact of SDS factors on the risk adjustment model the developer performed a number of analyses: ○ Prevalence of each SDS factor across home health agencies (HHA); ○ Distributio	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		alone and lower levels of education were significant predictors of readmission. • Significant disparities have been found in visits to the ED for conditions sensitive to ambulatory care by race/ethnicity, insurance status, age group, and socioeconomic status.				n of risk adjusted rates for all HHAs by proportion of stays for beneficiaries with low/high SDS for each factor to determine if there is variation in HHA performance across populations with low/high proportions of each SDS factor; ○ Univariate associations between the SDS	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						characteristics and the outcome; ○ C-statistic for the original model and the original model with each factor to assess whether the addition of SDS characteristics leads to improvement in the model's ability to differentiate between outcomes; ○ and HHA categorizations before	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						and after the adjustment of each SDS factor to determine how many agencies are impacted by SDS adjustment. • The median percentage of stays for beneficiaries with dual Medicaid eligibility is 17.7% (IQR: 8.4% to 40%). The median percentage of stays for beneficiaries who live rural locations is 2.4% (IQR: 0% to 30%). The median percentage of stays for beneficiaries	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						with high and low SES Index Scores is 25.3% (IQR: 10.7% to 46.2%) and 6.9% (IQR: 0% to 24.1%), respectively. • The developer found that in a univariate association HHAs that provide care to dual-Medicaid beneficiaries or beneficiaries classified with low SES Index score have higher unadjusted performance rates (i.e., higher readmission rates). • The c-statistic scores are similar across all variations of the risk adjustment models. The effect sizes for the SDS	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						characteristics are modest and their inclusion in the risk adjustment model has a negligible impact on the parameter estimates of the clinical characteristics. ○ The c-statistic for the original model is 0.7119. The c-statistic for the original model plus all SDS variables in 0.7120. • The developers found that of the 11,580 HHAs, 21 (0.18%) HHAs shift categorizations by adjusting for	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						Medicaid Status, 5 (0.04%) HHAs shift categorizations by adjusting for rural status, and 39 (0.34%) HHAs shift categorizations by adjusting for the SDS Index. Of the 11,580 HHAs, 45 (0.39%) HHAs shift categorizations by adjusting for all SDS variables.	
2496	Standardized Readmission Ratio (SRR) for dialysis facilities	There has been increasing interest in exploring the relation of hospital readmissions for dialysis patients with patient characteristics such as income, education, insurance status, race and	National ESRD patient database and Medicare Claims Standard Analysis Files: • Unemployment status six months prior to onset of ESRD • Dual eligibility	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well. With the measures focus on dialysis	• Patient level (Data obtained from Medicare claims and administrative data) oEmployment status 6	• The measure's risk adjustment is based on a two-stage logistic model. Adjustment is made for patient age, sex, diabetes, duration of ESRD, BMI at ESRD incidence, prior-year comorbidities, length of hospital stay and presence of a high-risk	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		employment status. However, many existing studies of this set of relationships were conducted in other health care situations, such as in nursing homes and hospitals. In addition, much of the work on socio-demographic (SDS) factors and readmissions has been done at the geographic level, as opposed to the individual patient level. ○ Philbin et al. (2001) found substantially higher risks of readmission	status at index discharge (low-income) • Medicare as secondary insurance coverage at index discharge (higher income) • Race • Age	setting, the Standing Committee recommended testing several additional variables: • Regional characteristics (county-level variables) • Partial versus full dual or disability status (in addition to status at index discharge)	months prior to ESRD onset o Race o Ethnicity o Medicare coverage at index hospital discharge • ZIP code level Area Deprivation Index (ADI) derived from Census data (Source: Singh, GK. Area deprivation and	diagnosis at discharge. In the first stage of this model, both dialysis facilities and hospitals are represented as random effects, and regression adjustments are made for the set of patient-level characteristics listed above. From this stage, the developers obtain the estimated standard deviation of the random effects of hospitals. • The second stage of the model is a mixed-effects model, in which facilities are fixed effects and hospitals are modeled as	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		for persons residing in low income ZIP codes. ○ Foster et al. (2014) applied the Community Need Index (CNI) developed by Truven Health Analytics to analyze variation in all-cause hospital readmission, with and without adjustment for socioeconomic (SES) characteristics and race. The results			widening inequalities in US mortality, 1969–1998. Am J Public Health. 2003;93(7):1137–1143)	random effects, with the standard deviation specified as equal to its estimate from the first stage. The expected number of readmissions for each facility is estimated as the summation of the probabilities of readmission for the discharges of all patients in this facility, assuming the national average or norm for facility effect. This model accounts for a given facility's case mix using the same set of patient-level characteristics as those in the first stage. • The developer	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		show that standardizing for SES characteristics and race reduces the variation in readmission across hospitals, potentially resulting in a fairer comparison of readmission rates. ○ Singh has developed the Area Deprivation Index (ADI) with colleagues at the University of Wisconsin. Like the CNI, the ADI reflects a full				notes that all risk factors included in the model have face validity, and all but four- age 60-75 years, being underweight, being respirator-dependent or experiencing a hip fracture/dislocation at some point in the year leading up to hospitalization—are also significantly predictive of readmission in the original SRR model. • The c-statistic for the original model is 0.6265. • Using hierarchical binary logistic regression the developers fit three additional models for readmissions to	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		set of SES and demographic characteristics, measured at the ZIP code level. He found area differences in mortality associated with low SDS. All the aforementioned studies have provided evidence that, at least at a conceptual level, patient SDS characteristics may affect the likelihood of hospital readmission among dialysis patients. The developer also conducted				• 2014 hospitalization data (Medicare claims), including covariates from the original SRR model and adding several SES indicators as well as patients' race/ethnicity. • Several patient-level factors are significantly predictive of readmissions (being unemployed, being dually eligible for Medicare and Medicaid, race and Hispanic ethnicity). • After adding these covariates, the SRRs remain highly correlated with the original SRR model (correlation coefficient >.99 for	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		preliminary analyses of the relationship between SDS and the SRR for dialysis facilities. The developers found some indication that patients who come from the ZIP codes with higher incomes have somewhat lower readmission rates, though the effect is fairly modest. The developers found that within the same facilities, black patients have an odds ratio of 0.9993 for				all models) and outlier facilities are flagged at a nearly identical rate (kappa statistic >.96 for all models). • The developers note that results show that facility profiling changes very little with the addition of these selected patient- or area-level SDS/SES factors. This empirical finding demonstrating very minimal differences, coupled with the risk of reducing patients' access to high quality care supports their recommendation to not adjust for SDS factors.	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		readmission compared to the non-black patients. Similarly, within the facilities, Hispanic patients have an odds ratio of 0.98 for readmission compared to those who are identified as non-Hispanic. Both results suggest that race and ethnicity not have strong impact on readmission within the same facility. On the other hand, there is an obvious upward trend in the SRR among facilities with increasing proportions					

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		of black patients. This indicates that, even having accounted for the within-facility differences in readmissions between black and non-black patients, facilities with higher proportions of black patients have higher readmission rates than those with lower proportion of black patients.					
2502	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitati	The potential relationship between SDS risk factors and the outcome of readmissions post discharge from Inpatient Rehabilitation Facilities (IRFs) is Long-Term Care	Medicare claims data: • Age • Gender • Race • Dual Eligibility Indicator	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying	• Race • Dual status • Poverty • Education • Housing • Employment • Commun	• This measure uses a hierarchical logistic regression model developed to harmonize with NQF #1789. • The equation is hierarchical in that both individual patient	Age, gender, and original reason for entitlement are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
	on Facilities (IRFs)	plausible; however, the literature on such relationships specific to this setting is limited. The literature suggests that race and socio-economic status are possible patient-level risk factors that should be tested.	Hospital (LTCH) Continuity Assessment Record & Evaluation (CARE) Data Set: • Marital status at time of admission • Preferred language County-level variables, (possible sources) U.S. Census data, the Health Professional Shortage Area designation database: • Median household income • Employment rate • Degree of urbanizatio	conceptual construct well.	ity characteristic including: median household income, percent of residents with qualification for Supplemental Nutrition Assistance Program (SNAP), median home value, and levels of poverty (such as	characteristics are accounted for as well as the clustering of patients into IRFs. • The statistical model estimates both the average predictive effect of the patient characteristics across all IRFs and the degree to which each facility has an effect on readmissions that differs from that of the average facility. • The sum of the probabilities of readmission of all • patients in the facility measure, including both the effects of patient characteristics and the IRF, is the "predicted	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
			n • Median education level • Availability of primary care providers		the percent of residents below several poverty threshold s), disability, employm ent, non-English speakers, and levels of educatio nal attainme nt. • provider supply and access in communi ties using the Health	number" of readmissions after adjusting for case mix. The same equation is used without the IRF effect to compute the "expected number" of readmissions for the same patients at the average IRF. The ratio of the predicted-to-expected number of readmissions evaluates the degree to which the readmissions are higher or lower than what would otherwise be expected. This SRR is then multiplied by the mean readmission rate for all IRF stays to get the risk-	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					Professional Shortage Area (HPSA) indicators specific to degrees of shortage of primary care and mental health providers, and measures of primary care, specialist, and physical therapist providers per	standardized readmission rate (RSRR) for each facility. • To test SDS factors for this measure, the developers performed a number of analyses including: assessing variation in prevalence of the factor across measured entities, evaluating facility performance as stratified by proportion of patients with certain SDS factors, examining the association of SDS factors with the outcome, and looking at the incremental effect of SDS variables in the original risk	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					capita.	adjustment model, including analyzing how the addition of the group of selected SDS variables affected the performance of the model. • The developer created a hierarchical logistic regression model that added patient- and county level SDS variables to the risk adjustment mode. • In order to evaluate models with all SDS variables added, the developer performed stepwise versions of logistic regression, a method that allows	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						for the evaluation of the separate predictive contribution of each variable to the model. • The developer then evaluated the c-statistic for each model. • The stepwise regression models for the model with all patient- and county-level variables included had a c-statistic of 0.70. The original model had a c-statistic of 0.70, so no improvement was observed with the addition of SDS-related predictors. • The developer also analyzed the change in facility-	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						level RSRRs after adjusting for these variables. The median change in facility RSRRs when adding the SDS variables selected through stepwise selection was approximately 0.01 percentage points • The performance of 0.3 percent of facilities improved by between one half and 1 percentage point, and 1.3 percent of facilities' scores worsened by between one half and 1 percentage point after adjusting for the refined set of SDS adjusters (from the stepwise model). Results from both	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						analyses suggest that performance for the majority of facilities declined as a result of the additional SDS adjustment. • The developer examined the correlations of the original and SDS adjusted RSRRs. The developer notes that the high degree of correlation between the RSRRs (>0.97 for all three SDS-adjusted models that are the focus of this work) suggests that for most facilities, the base and SDS-adjusted models are not significantly different. • The developer	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						chose not to include SDS variables in the final risk adjustment model.	
2503 2504	Hospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries. 30-day Rehospitalizations per 1000 Medicare fee-for-service (FFS) Beneficiaries	The readmissions/1000 measure describes the readmission experience of a population of fee-for-service (FFS) Medicare beneficiaries; members of the population are defined by the geography of where they live. The measure is intended to track change in readmissions over time for a geographic region, and the SDS composition	Medicare Part A Claims and Denominator File • Gender • Race/ethnicity (not viewed as reliable enough) • Age Group •	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer, and suggested that developers look at all 3 variables. These variables represent the underlying conceptual construct well. The Standing Committee recommended testing additional variables: • Neighborhood	• Population age distribution • Population gender distribution • Race	• This measure does not have a statistical risk model. • The developers recommend that the measure be stratified or adjusted by age category: Younger than 65, 65-69, 70-74, 75-79, 80-84, and 85 years and older. • Analysis of Medicare claims for change in hospitalization and rehospitalization rates between 2011 and 2014 shows the gender adjusted rates to	• Population age distribution

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		of a region's population are unlikely to change quickly, therefore we are using this measure without adjusting for the SDS of individual members. The readmissions/1000 measure probably reflects the influence of neighborhood contextual factors however, many of which are likely to be strongly correlated with socio-demographic (SD) determinants, or with personal SD factors that are often grouped into		characteristics (area deprivation index – build on similar testing developer stated as having conducted in the past) • Housing status • Dual eligibility status • Facility characteristics		be no different than crude rates, and rates calculated using adjustment for age and gender categories to be no difference than adjustment for the age category only. • On average, communities showed a reduction in admission rates between 2011 and 2012 that was 3/1000 greater using the unadjusted rate as compared to the age adjusted rate. Several communities experienced unadjusted improvement rates more than 6/1000	

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		neighborhoods. What is unclear, and should be tested further, is whether or not neighborhoods of concentrated deprivation have more or less capacity to change, as many improvement initiatives focus efforts on such neighborhoods.				better using the unadjusted rate. For readmission, communities showed a reduction in rates on average between 2011 and 2012 that was 0.56/1000 greater using the unadjusted rate as compared to the age adjusted rate.	
2505	Emergency Department (ED) Use without Hospital Readmission during the First 30 Days of Home Health	Findings from the literature support a linkage between proposed SDS factors and ED use and hospital readmission. Individuals with lower social economic status (SES) are more likely to use EDs	Medicare Claims Data: • Prior Care Setting • Age and gender interactions • Health Status (from Medicare claims)	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well. In addition to looking	• Medicaid Status – included in the CMS Enrollment Database (EDB) • Rural Location –	• A single multinomial logit model was used to predict the ED Use without Hospital Readmission During the First 30 Days of Home Health measure. • Of the 1,669,802 qualifying home health stays beginning from July	Age and gender are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		for primary health care services. In the home health setting, the 30-day period for re-hospitalization occurs while the patient is living in their own home, increasing the likelihood that non-medical factors, including geographic location and economic resources, will have an impact on acute care use. More specific findings regarding the documented relationship between socio-demographic factors,	• Medicare Enrollment Status • Additional interactions between Hierarchical Condition Categories (HCCs) and Medicare Enrollment Status (income and employment) Identified additional SDS factors to be tested from Medicare Enrollment Database (EDB) and Survey data: • Race/Ethnicity (EDB) • Medicaid	at neighborhood characteristics, the Committee highlights the importance of looking at rural location, as stated in the developer's future analysis plan.	determined from beneficiary address, as captured in EDB • SES Index Score – determined from beneficiary address linked to American Community Survey (ACS) data. The index is a composite of seven ACS variables:	1, 2010 to June 30, 2013, a random 80 percent sample without replacement was chosen to calibrate the multinomial logit model and to estimate marginal effects for model development purposes. The remaining 20 percent of the stays were used to cross-validate the model. • To determine which risk factors should be included in the risk adjustment model, a Wald test of joint restrictions was applied to each variable in each of 1,150 bootstrap samples created	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		readmission and ED use are described below. • A recent study of 30-day hospital readmission of elderly patients with initial discharge destination of HH care found race to be a significant predictor of readmission. • One study of 1375 patients examining differential use of EDs by various racial and ethnic groups found confounding impact by other SDS variables and concluded that programs to reduce inappropriate ED	Status (EDB) • Rural location (EDB) • Neighborhood characteristics (survey)		o Percentage of people in the labor force who are unemployed o Percentage of persons below US poverty line o Median household income o Median value of owner-occupied homes o Percentage of persons	using simple random sampling, with replacement, of 80 percent of all home health stays. The Wald test determined the likelihood that the change in either or both outcomes associated with each covariate was statistically different from zero. The current risk adjustment model includes only covariates that were significant at a level of 0.05 for either outcome in at least 80 percent of bootstrap samples. • To evaluate the impact of each risk factor, the	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		use must be sensitive to an array of complex socioeconomic issues and may necessitate a substantial paradigm shift in how acute care is provided in low SES communities. Research has also shown that ED wait time is also linked to factors related to race/ethnicity, with black patients having longer wait times than nonblack patients. • Even after adjustment for potential confounding factors, lower income is a			aged ≥ 25 years with less than a 12th-grade education o Percentage of persons aged ≥ 25 years with at least 4 years of college o Percentage of households containing one or more person per room	marginal effects were calculated. The marginal effect represents the relative impact of each risk factor on the outcome. • Goodness of fit statistics were then calculated for the calibrated model and the 20 percent sample was used for cross-validation. • Once the significant risk factors were identified in the development stage, the model was then calibrated using 100 percent of home health stays. • To determine the impact of SDS factors on the risk	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		positive predictor of readmission risk of patients for heart failure. • A study of community-dwelling elders with Medicare coverage discharged to home found that living alone and lower levels of education were significant predictors of readmission. • Significant disparities have been found in visits to the ED for conditions sensitive to ambulatory care by race/ethnicity, insurance status,				adjustment model the developer performed a number of analyses: ○ Prevalence of each SDS factor across home health agencies (HHA); ○ Distribution of risk adjusted rates for all HHAs by proportion of stays for beneficiaries with low/high SDS for each factor to determine if there is	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		age group, and socioeconomic status.				variation in HHA performance across populations with low/high proportions of each SDS factor; ○ Univariate associations between the SDS characteristics and the outcome; ○ C-statistic for the original model and the original model with each factor to assess whether the addition of	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						SDS characteristics leads to improvement in the model's ability to differentiate between outcomes; ○ and HHA categorizations before and after the adjustment of each SDS factor to determine how many agencies are impacted by SDS adjustment. • The median	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						percentage of stays for beneficiaries with dual Medicaid eligibility is 17.7% (IQR: 8.4% to 40%). The median percentage of stays for beneficiaries who live rural locations is 2.4% (IQR: 0% to 30%). The median percentage of stays for beneficiaries with high and low SES Index Scores is 25.3% (IQR: 10.7% to 46.2%) and 6.9% (IQR: 0% to 24.1%), respectively. • The developer found that in a univariate association HHAs that provide care to dual-Medicaid beneficiaries or beneficiaries	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						classified with low SES Index score have higher unadjusted performance rates (i.e., higher readmission rates). • The c-statistic scores are similar across all variations of the risk adjustment models. The effect sizes for the SDS characteristics are modest and their inclusion in the risk adjustment model has a negligible impact on the parameter estimates of the clinical characteristics. ○ The c-statistic for the original model is	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						0.6429. The c-statistic for the original model plus all SDS variables in 0.6475. • The developers found that of the 11,580 HHAs, 72 (0.62%) HHAs shift categorizations by adjusting for Medicaid Status, 240 (2.07%) HHAs shift categorizations by adjusting for rural status, and 112 (0.97%) HHAs shift categorizations by adjusting for the SDS Index. Of the 11,580 HHAs, 244 (2.11%) HHAs shift categorizations by adjusting for all	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						SDS variables.	
2510	Skilled Nursing Facility 30-Day All-Cause Readmission Measure (SNFRM)	The potential relationship between SDS risk factors and the outcome of hospital readmissions for Skilled Nursing Facility (SNF) patients is plausible; however, the literature on such relationships specific to this setting is not extensive. Research has	Medicare claims data: • Age • Gender • Race • Dual Eligibility Indicator Long-Term Care Hospital (LTCH) Continuity Assessment Record & Evaluation (CARE) Data Set: • Marital status at time of	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These represent the underlying conceptual construct well. Here are additional variables that they would recommend: • County-level variables	• Race • Dual status • Poverty • Education • Housing • Employment • Community characteristic including: median household income,	• This measure uses a hierarchical logistic regression model developed to harmonize with NQF #1789. • The equation is hierarchical in that both individual patient characteristics are accounted for as well as the clustering of patients into SNFs. • The statistical model estimates both the average	Age, gender, and original reason for entitlement are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		found that racial and socio-demographic disparities exist both in the quality of nursing facilities as well as in hospital readmission rates. The literature suggests that race and socio-economic status are possible patient-level risk factors that should be tested.	admission • Preferred language County-level variables: (possible sources) U.S. Census data, the Health Professional Shortage Area designation database: • Median household income • Employment rate • Degree of urbanization • Median education level • Availability of primary care providers	(zip code), with particular focus on frequency of updates depending on data source (annual survey or census data every 10 years) based on census data	percent of residents with qualification for Supplemental Nutrition Assistance Program (SNAP), median home value, and levels of poverty (such as the percent of residents below several poverty threshold	predictive effect of the patient characteristics across all SNFs and the degree to which each facility has an effect on readmissions that differs from that of the average facility. • The sum of the probabilities of readmission of all • patients in the facility measure, including both the effects of patient characteristics and the SNF, is the "predicted number" of readmissions after adjusting for case mix. The same equation is used without the SNF effect to compute the "expected	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					s), disability, employment, non-English speakers, and levels of educational attainment. • provider supply and access in communities using the Health Professional Shortage Area (HPSA) indicators specific to	number" of readmissions for the same patients at the average SNF. The ratio of the predicted-to-expected number of readmissions evaluates the degree to which the readmissions are higher or lower than what would otherwise be expected. This SRR is then multiplied by the mean readmission rate for all SNF stays to get the risk-standardized readmission rate (RSRR) for each facility. • To test SDS factors for this measure, the developers performed a	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					degrees of shortage of primary care and mental health providers, and measures of primary care, specialist, and physical therapist providers per capita.	number of analyses including: assessing variation in prevalence of the factor across measured entities, evaluating facility performance as stratified by proportion of patients with certain SDS factors, examining the association of SDS factors with the outcome, and looking at the incremental effect of SDS variables in the original risk adjustment model, including analyzing how the addition of the group of selected SDS variables affected the performance of the model.	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						• The developer created a hierarchical logistic regression model that added patient- and county level SDS variables to the risk adjustment mode. • In order to evaluate models with all SDS variables added, the developer performed stepwise versions of logistic regression, a method that allows for the evaluation of the separate predictive contribution of each variable to the model. • The developer then evaluated the c-	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						statistic for each model. • The stepwise regression models for the model with all patient- and county-level variables included had a c-statistic of 0.671. The original model had a c-statistic of 0.670. • The developer also analyzed the change in facility-level RSRRs after adjusting for these variables. The median change in facility RSRRs when adding the SDS variables selected through stepwise selection was approximately -0.1 percentage points • The developers found that the	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						impact of adjusting for dual eligibility only was small: no facilities' performance improved or declined by more than 1 percentage point. However, slightly more facilities improved (53% versus 47%). • The developers noted more change in performance after adjusting for the refined set of SDS factors. • Specifically, the performance of 5 percent of facilities improved greater than 1 percentage point, and 1 percent of facilities' scores worsened by greater than 1	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						percentage point after adjusting for the refined set of SDS adjusters (from the stepwise model). • Finally the developer examined the correlations of the original and SDS adjusted RSRRs across facilities. The developer notes that the high degree of correlation between the RSRRs (>0.96 for all three SDS-adjusted models that are the focus of this work) suggests that for most facilities, the base and SDS-adjusted models are not significantly different.	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						• The developer chose not to include SDS variables in the final risk adjustment model.	
2512	All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Long-Term Care Hospitals (LTCHs)	The potential relationship between SDS risk factors and the outcome of readmissions post discharge from Long-Term Care Hospitals (LTCHs) is plausible; however, there is a lack of literature on this topic specific to this setting. Evidence from readmission rates	Medicare claims data: • Age • Gender • Race • Dual eligibility indicator Long-Term Care Hospital (LTCH) Continuity Assessment Record & Evaluation (CARE) Data Set: • Marital status at time of	Standing Committee (SC) reviewed and was generally in agreement with the variables provided by the developer. These variables represent the underlying conceptual construct well.	• Race • Dual status • Poverty • Education • Housing • Employment • Community characteristic including: median household income,	• This measure uses a hierarchical logistic regression model developed to harmonize with NQF #1789. • The equation is hierarchical in that both individual patient characteristics are accounted for as well as the clustering of patients into LTCHs. • The statistical model estimates	Age, gender, and original reason for entitlement are included in the original model. Additional SDS variables were not included.

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
		following acute care discharge have shown disparities by race with Black beneficiaries having the highest 30-day readmission rates for acute myocardial infarction, heart failure, and pneumonia (Joynt, Orav, and Jha, 2011). Though this evidence is not specific to LTCHs, it suggests that race is one possible patient-level risk factor relevant to post-discharge readmissions that should be tested.	admission • Preferred language County-level variables: (possible sources) U.S. Census data, the Health Professional Shortage Area designation database: • Median household income • Employment rate • Degree of urbanization • Median education level • Availability of primary care providers		percent of residents with qualification for Supplemental Nutrition Assistance Program (SNAP), median home value, and levels of poverty (such as the percent of residents below several poverty threshold	both the average predictive effect of the patient characteristics across all SNFs and the degree to which each facility has an effect on readmissions that differs from that of the average facility. • The sum of the probabilities of readmission of all • patients in the facility measure, including both the effects of patient characteristics and the LTCH, is the "predicted number" of readmissions after adjusting for case mix. The same equation is used without the LTCH effect to compute	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					s), disability, employment, non-English speakers, and levels of educational attainment. • provider supply and access in communities using the Health Professional Shortage Area (HPSA) indicators specific to	the "expected number" of readmissions for the same patients at the average LTCH. The ratio of the predicted-to-expected number of readmissions evaluates the degree to which the readmissions are higher or lower than what would otherwise be expected. This SRR is then multiplied by the mean readmission rate for all LTCH stays to get the risk-standardized readmission rate (RSRR) for each facility. • To test SDS factors for this measure, the developers	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
					degrees of shortage of primary care and mental health providers, and measures of primary care, specialist, and physical therapist providers per capita.	performed a number of analyses including: assessing variation in prevalence of the factor across measured entities, evaluating facility performance as stratified by proportion of patients with certain SDS factors, examining the association of SDS factors with the outcome, and looking at the incremental effect of SDS variables in the original risk adjustment model, including analyzing how the addition of the group of selected SDS variables affected the performance of	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						the model. • The developer created a hierarchical logistic regression model that added patient- and county level SDS variables to the risk adjustment mode. • In order to evaluate models with all SDS variables added, the developer performed stepwise versions of logistic regression, a method that allows for the evaluation of the separate predictive contribution of each variable to the model. • The developer then	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						evaluated the c-statistic for each model. • The stepwise regression models for the model with all patient- and county-level variables included had a c-statistic of 0.648. The original model had a c-statistic of 0.646. • The developer also analyzed the change in facility-level RSRRs after adjusting for these variables. The median change in facility RSRRs when adding the SDS variables selected through stepwise selection was 0.00092 percentage points • The developers	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						found that the impact of adjusting for dual eligibility only was small: no facilities' performance improved or declined by more than 1 percentage point. However, the majority of facilities had worse performance after adjusting for dual eligibility (61% versus 39%). • The developers noted more change in performance after adjusting for the refined set of SDS factors. • Specifically, the performance of 5 percent of facilities improved greater than 1 percentage point, and less than	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						1 percent of facilities' scores worsened by greater than 1 percentage point after adjusting for the refined set of SDS adjusters (from the stepwise model). The performance for the majority of facilities appears to have declined as a result of the additional SDS adjustment. • Finally the developer examined the correlations of the original and SDS adjusted RSRRs across facilities. The developer notes that the high degree of correlation	

NQF #	Measure Title	Conceptual Relationship	Data Sources and Variables	Standing Committee Feedback on conceptual relationship and variables	SDS Variables Tested	Empirical Relationship	SDS Variables Included in the Final Model
						between the RSRRs (>0.97 for all three SDS-adjusted models that are the focus of this work) suggests that for most facilities, the base and SDS-adjusted models are not significantly different. • The developer chose not to include SDS variables in the final risk adjustment model.	

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