# Pulmonary and Critical Care Consensus Standards Endorsement Maintenance

ADDENDUM DRAFT TECHNICAL REPORT FOR VOTE

December 19, 2012

NATIONAL QUALITY FORUM

## Contents

# Pulmonary and Critical Care Consensus Standards Endorsement Maintenance

ADDENDUM DRAFT TECHNICAL REPORT

## Introduction

In the draft report, National Voluntary Consensus Standards: Pulmonary and Critical Care Endorsement Maintenance, three measures received comments prompting actions that required additional information from the developers and consideration by the Steering Committee. To accommodate these issues, primarily addressing harmonization and exclusions for planned readmissions, the Committee has reviewed the additional information and completed its evaluation of the measures. The final evaluations and recommendations are included in this addendum report.

## Measure Evaluation Summary

### Measures recommended



### Measure not recommended



**NOTE**: The measure submission form can be accessed by clicking on the NQF measure number in the table below.

## Measures Recommended

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

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

**Status:** Maintenance, Original Endorsement: Oct 28, 2008

**Description:** The measure estimates a hospital-level risk-standardized readmission rate (RSRR) defined as readmission for any cause within 30 days of the discharge date for the index hospitalization for patients discharged from the hospital with a principal diagnosis of pneumonia. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older and are either enrolled in fee-for-service (FFS) Medicare and hospitalized in non-federal hospitals or are hospitalized in Veterans Health Administration (VA) facilities.

Since NQF-endorsement, the measure has been tested and shown to perform well in an all-payer population aged 18 and older and has been re-specified for this broader age group. The full details of the all-payer analysis and testing are attached.

**Numerator Statement:** The outcome for this measure is 30 day all-cause readmission. We define all-cause readmission as an inpatient admission for any cause within 30 days from the date of discharge from the index pneumonia admission. If a patient has one or more admissions (for any reason) within 30 days of the date of discharge of the index admission, only one was counted as a readmission. For the detailed definition of planned readmissions, please refer to the attached report, Respecifying the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm.

The numerator of the risk-adjusted ratio is the predicted number of readmissions within 30 days given the hospital's performance with its observed case mix. The term "predicted" describes the numerator result, which is calculated using the hospital-specific intercept term. (See details below in the 2a1.13 Statistical risk model and variables.)

**Denominator Statement:** The cohort includes admissions for patients 18 and over hospitalized for pneumonia. The measure is currently publicly reported by CMS for patients 65 years and older who are either enrolled in Medicare FFS and admitted to non-federal hospitals, or admitted to VA hospitals.
The measure includes admissions for patients discharged from the hospital with a principal diagnosis of pneumonia and with a complete claims history for the 12 months prior to admission.

**Exclusions:** The measure excludes admissions for patients:

For all cohorts, the measure excludes admissions for patients:

- with an in-hospital death (because they are not eligible for readmission);
- transferred to another acute care hospital (because the readmission is attributed to the hospital that discharges the patient to a non-acute setting);
- discharged against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge);
- admitted with pneumonia within 30 days of discharge from a qualifying index admission (Admissions within 30 days of discharge of an 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).

**Adjustment/Stratification:** 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 proposed 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, each model adjusts the log-odds of readmission within 30-days of discharge for age 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, after accounting for patient risk. See section 2a1.20. Calculation Algorithm/Measure Logic for more detail.

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 Medicare claims 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. A file which contains a list of the ICD-9-CM codes and their groupings into CCs is available at http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979. 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 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
Age-65 (years above 65, continuous)
Male
Comorbidities
History of coronary artery bypass graft (CABG) surgery
History of infection (CC 1, 3-6)
Septicemia/shock (CC 2)
Metastatic cancer and acute leukemia (CC7)
Lung, upper digestive tract, and other severe cancers (CC8)
Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors (CC 9-10)
Diabetes mellitus (DM) and DM complications (CC 15-20, 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 and other/unspecified anemias and blood disease (CC 47)
Dementia and senility (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 (CC67-69, 100-102, 177-178)
Cardio-respiratory failure and shock (CC 79)
Congestive heart failure (CC 80)
Acute coronary syndrome (CC 81-82)
Chronic atherosclerosis (CC 83-84)
Valvular and rheumatic heart disease (CC 86)
Arrhythmias (CC 92-93)
Stroke (CC 95-96)
Vascular or circulatory disease (CC 104-106)
Chronic obstructive pulmonary disease (CC 108)
Fibrosis N/A

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

**Level of Analysis:** Facility

**Type of Measure:** Outcome

**Data Source:** Administrative claims

**Measure Steward:** Centers for Medicare & Medicaid Services **Other organizations:** MPR: Mathematica Policy Research; RTI-Research Triangle Institute

**IMPLEMENTATION COMMENTS**

- None of the ACCP QIC members use this measure at their institution and have never seen any data related to this measure. The QIC questions whether or not this measure sees widespread use.

**Steering Committee Evaluations**

**Importance to Measure and Report** (***based on decision logic***)**: Passed all three subcriteria**

**1a. Impact: H-19; M-0; L-0; I-0**; **1b. Performance Gap: H-13; M-5; L-0; I-1**

**Rationale:**

- Clear measure of quaity and companion to measure 0458 30-day mortality rate - both are needed.
- Current readmission rate is 18.2% for Medicare patients.

**1c. Evidence** (*based on decision logic*): **Y-19; N-0; I-0**

**Rationale:**

- Need with 0458 for optimal quality assessment.
- This is an outcome measure.

**2. Scientific Acceptability of Measure Properties** (***based on decision logic***)**: Passed reliability and validity.**

**2a. Reliability: H-14; M-5; L-0; I-0; 2b. Validity: H-11; M-7; L-0; I-1**

**Rationale:**

- Extensive risk-adjustment with 12 month look-back for risk factors.
- Newly tested risk model to include all payer data is appropriate, reliable, and valid for use for all patients admitted with pneumonia.
- Standardization of the age to 18 years and older aligns with most other adult measures.
- For younger patients a readmission is less likely to be related to the pneumonia admission, except for cystic fibrosis patients, but the numbers will be rare and random.
    - The developer noted that the measure performs better in the younger age group perhaps due to fewer comorbidities.
- CMS is now tracking patients who go in to observation and are not formally admitted to see if this impacts the measure. Data will be provided when made publicly available.

**3. Usability: H-9; M-6; L-3; I-2**

(*Meaningful, understandable, and useful to the intended audiences for 3a. Public Reporting and 3b. Quality Improvement)*

**Rationale:**

- This measure is publicly reported on Hospital Compare.

**4. Feasibility: H-17; M-2; L-1; I-0**

*(4a. Clinical data generated during care process; 4b. Electronic data; 4c.Susceptibility to inaccuracies/ unintended consequences identified 4d. Data collection strategy can be implemented)*

**Rationale:**

- Uses administrative data.

**Steering Committee Assessment of Criteria Met/Suitable for Endorsement: Y-18; N-2**

**Rationale:**

- Publicly reported outcome measure that has been in use for several years.

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- The measure has been expanded beyond the Medicare population.

**Public & Member Comment**

**Comments included:**

- Concerns that the claims-based definition of pneumonia lacks sufficient validity and requests that the definition be updated to reflect coding trends, noting that this measure does not include patients with a primary diagnosis of sepsis or respiratory failure and a secondary diagnosis of pneumonia. A recent published study shows that hospital admissions with a primary diagnosis of pneumonia are declining over time, while at the same time admissions with a primary diagnosis of sepsis or respiratory failure and a secondary diagnosis of pneumonia are on the rise possibly due to the performance measure.

  **Developer response:** The recent paper by Dr. Lindenauer is useful and informative. CMS has an annual process to maintain and re-evaluate the measures and this process incorporates any important recent literature. The analyses in Dr. Lindenauer's paper suggest some additional cohort codes that could be incorporated into the measure in the future. Because the pneumonia mortality measure has been successfully used in public reporting for four years now and changes to the cohort will have an impact on hospitals and stakeholders, any potential changes must be undertaken with careful consideration. Dr. Lindenauer's paper was a patient-level analysis and our maintenance evaluation will need to take into account the implications for hospital results as well as the potential benefits and risks of changing the cohort definition.

- Request for data on the performance of the risk adjustment model for this measure. It is not clear how readmissions unrelated to the index admission are mitigated in this measure.

  **Developer resposne:** The NQF application includes substantial data on the performance of the risk-model. As to the question of "unrelated" readmissions, CMS recently developed the algorithm for identifying planned readmissions that is used in the hospital-wide readmission measure. CMS plans to adapt the algorithm for use in the COPD and pneumonia readmission measures. We will bring the updated algorithm and measure results back to the subsequent Steering Committee meeting.

- AHA submitted a letter which is posted on the NQF project page outlining concerns with the following issues:
  - Failure to adjust for factors beyond the hospital's control such as patient characteristics, extreme circumstances, patient compliance and quality of post-acute care.
  - Reliability – A recent CMS study required by the Accountable Care Act "shows the claims-based measures are unreliable." Additional reliability analyses are provided by KNG showing similar results.
  - Harmonization with the recently endorsed measure 1789: Hospital-wide all-cause readmission measure to exclude planned readmissions; harmonization of exclusions in the COPD measures compared to the pneumonia measures that include exclusions for discharged alive on day 0 or 1.
  - Exclusions for all Medicare patients in Hospice rather than just FFS Medicare patients enrolled in hospice.

  **Developer response**: Detailed responses to the AHA comments from the developer are posted on the NQF project page. CMS will provide additional information on including exclusions for planned readmissions by July 11 for the Committee to consider.

**Steering Commitee Response:**

- The Committee reviewed the extensive responses provided by the developer. The Committee indicated that the responses adequately addressed the issues raised by AHA.
- The Committee supports the plan of Yale/CMS to include the algorithm for planned readmissions in

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measures 0506 and 1891 and looks forward to reviewing the additional data in the next few weeks.

- In response to the comment, CMS/Yale requested additional time to work on harmonization of exclusions using a new algorithm for planned readmission for the all readmission measures, including pneumonia and COPD.

**Steering Committee Review – October 16, 2012**

- The Committee reviewed the additional information on the algorithm for planned readmissions submitted by Yale CORE.
- The Committee agreed that the list of planned readmission exclusions were reasonable and noted the change in raw readmission rate was less than 1% and the minimal impact on the risk model.
- The Committee unanimously maintained their recommendation for endorsement.

**Steering Committee Reassessment of Criteria Met/Suitable for Endorsement: Y-14; N-0**

**RECOMMEND FOR ENDORSEMENT**

**Additional Public & Member Comment**

- A commenter commended the NQF, the Steering Committee and the measure developer (Yale/CMS) for their consideration of the concerns voiced by the AHA and other stakeholders during the initial project comment period in June 2012.
- Commenters identified various concerns with the revised measure including: excluding patients with medical conditions or comorbidities that often require multiple episodes of care; concerns about reliability and potential unintended consequenses.
  **Developer response:** The measures address clinical differences in hospitals' case-mix through risk adjustment rather than through excluding patients from the measure as suggested by the commenter. The goal in developing outcomes measures is to create a clinically cohesive cohort that includes as many patients as possible admitted with the given condition. Greatly expanding our list of exclusions would result in a measure that was less useful and meaningful, because it would reflect the care of fewer patients and diverse clinical conditions. To fairly profile hospitals' performance, it is critical to place hospitals on a level playing field and account for their differences in the patients that present for care. This is accomplished through adequate risk-adjustment for patients' clinical presentation rather than exclusion of patients. In addition, the expanded planned readmission definitions for the measures will identify as planned and not count in the outcome readmissions for procedures for procedures, such as wound debridement, that represent routine care for patients with chronic conditions.
  We appreciate the points AHA raises about reliability. In a June 19, 2012 memo to NQF we responded to the KNH Health Consulting work in detail. We note that CMS uses 3 years of data to calculate the measure results for the Inpatient Quality Reporting and Hospital Readmission Reduction programs to increase the measures' reliability.

- Additional comments were received noting concerns including: distinguishing between related and unrelated admissions; accounting for socioeconomic factors; and use of hierarchical modeling in the risk adjustment methodology. A commenter suggested that there is an opportunity to use the field experience going forward to determine whether additional changes are warranted and request that the developer provide an assessment at the annual update.
  **Developer response:** We agree that the field experience with the measures can be informed by the planned readmission algorithm. We made several revisions to the algorithm based on input from the national dry run of CMS's hospital-wide readmission measure. We will continue to evaluate potential additional changes identified by hospitals as the measures are tested and used in CMS programs.

- A commenter recommended that the exclusion/inclusion selection criteria methodology be improved with frequent reviews and revisions. Unplanned readmissions that are not related to the index admission

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should be excluded from this measure and the measure be controlled for socioeconomic status, nonreversible comorbidities, and circumstances outside of the control of the provider.
**Developer Response:** The pneumonia readmission measure was developed to be an all-cause measure for several reasons. There are several reasons for using all cause readmission as the outcome. First, from the patient perspective, readmission from any cause is an adverse event. Second, although we would expect few hospitals to use gaming strategies, measures should not create incentives for them to do so. Limiting the measures to readmissions for pneumonia related admissions only may make it susceptible to gaming by coding readmissions with a different diagnosis. Third, it is often hard to exclude quality issues and accountability based on the documented cause of readmission.
The measure does not adjust for patient characteristics such as socioeconomic status (SES). The association between SES and health outcomes can be due, in part, to the differences in the quality of health care. Risk-adjusting for patient characteristics such as SES would suggest that hospitals with high proportions of such patients are held to different standards for the risk of readmission than hospitals treating higher-SES patient populations. For example, if patients of low socioeconomic status have higher readmission rates, then adjusting for SES in the model will lower the risk-standardized rates for hospitals with a higher proportion of these patients relative to other hospitals with clinically similar patients and similar outcomes. CMS does not want to hold hospitals with different SES mixes to different standards. Adjusting for SES would also obscure differences that are important to identify if we want to reduce disparities where they do exist. Thus, the choice was to adjust only for clinical differences in the populations among hospitals. This is consistent with guidance from the National Quality Forum recommending against adjusting for patient characteristics such as socioeconomic status in outcomes measures.

- A commenter requested a formal evaluation of the qualifying readmissions in the first year of the Readmission Reduction Program to determine if there should be further modifications to the planned readmission methodology.
  **Developer response:** We appreciate the AAMC's request for a "formal review" of the planned readmission algorithm in the first year of the Readmission Reduction Program. We note that the algorithm has undergone four rounds of public comment, as well as structured input from surgical subspecialists, technical expert panels, NQF committees, and hospitals participating in a national dry run of the hospital-wide and hip and knee arthroplasty readmission measures. The developer and CMS welcome continued comments and suggestions on the components of the algorithm as the revised measures are used.

**Steering Committee Response:** The Committee reviewed the comments and responses from developers and made no changes to their recommendation for endorsement.

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

**Status:** New Submission

**Description:** The measure estimates a hospital-level risk-standardized readmission rate (RSRR), defined as readmission for any cause within 30 days after the date of discharge of the index admission, for patients 40 and older discharged from the hospital with either a principal diagnosis of COPD or a principal diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD.

**Deleted:** 18

**Numerator Statement:** The outcome for this measure is 30-day all-cause readmission. We define all-cause readmission as an inpatient admissions for any cause within 30 days after the date of discharge from the index admission.for patients 40 and older discharged from the hospital with either a principal diagnosis of COPD or a

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

principal diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. If a patient has one or more admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. For the detailed definition of planned readmissions, please refer to the attached report, Respecifying the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm.

**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 diagnosis of COPD (see codes below) OR a principal 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.

**Exclusions:** An index admission is any eligible admission to an acute care hospital assessed in the measure for the outcome (readmitted within 30 days of the date of discharge from the initial admission).

The measure excludes admissions for patients:

• with an in hospital death (because they are not eligible for readmission).

• transferred to another acute care facility (We assign the outcome for the acute episode of care to the hospital that discharges the patient to the non-acute care setting because the discharging hospital initiates the discharge and the transition to the outpatient setting. Therefore, the last admission in the acute care setting for the episode of care is eligible to be an index admission in the measure. The prior admissions in the same acute episode are excluded from the measure.)

• who were discharged alive and against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge).

• without at least 30 days post-discharge claims data (because the 30-day readmission outcome cannot be assessed in this group).

Additionally, admissions that occur within 30 days of the discharge date of an earlier index admission are not themselves considered to be index admissions. Any COPD admission can only be an index admission or a readmission, but not both.

Of note, a patient may satisfy multiple exclusion criteria.

**Adjustment/Stratification:** 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"1.
The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. This approach to modeling appropriately accounts for the structure of the data (patients clustered within hospitals), the underlying risk due to patients' comorbidities, and sample size at a given hospital when estimating hospital readmission rates. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals.2 At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. The second level models hospital-specific intercepts as arising from a normal distribution. The hospital-specific intercepts represent the hospital contribution to the risk of readmission, after accounting for patient risk and sample size, and can be inferred as a measure of quality. 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 hospital outcome (the numerator) is the sum of predicted probabilities of readmission for all patients at a particular hospital. The predicted probability of each patient in that hospital is calculated using the hospital-specific intercept and patient risk factors. The expected number of readmissions (the denominator) is the sum of expected probabilities of readmission for all patients at a hospital. The expected probability of each patient in a hospital is calculated using a common intercept and patient risk factors.

Candidate and Final Risk-adjustment Variables: The measure was developed using Medicare FFS claims data. 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 Medicare claims 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 used condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes, and combinations of CCs as candidate variables. A file which contains a list of the ICD-9-CM codes and their groupings into CCs is available on www.qualitynet.org (http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979). We did not risk-adjust for CCs that were possible adverse events of care and that were only recorded in the index admission. Only comorbidities that conveyed information about the patient at that time or in the 12 months prior, and not complications that arose during the course of the hospitalization were included in the risk-adjustment.

References:

1. 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.

2. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.

Frequencies and odds ratios for the model development sample (2008 Medicare FFS patients aged 65 and older; n=170,480 admissions) are presented below.

Table 1: Final set of risk-adjustment variables:

Variable//Frequency (%)//Odds Ratio (95% confidence interval)

Demographic

• Age-65 (years above 65, continuous) for 65 and over cohorts/Frequency = -/OR (95% CI)=1.00 (1.00-1.00); (this variable is Age (years, continuous) for 18 and over cohorts)

Cardiovascular/Respiratory

• Sleep Apnea (ICD-9 CM diagnosis codes: 327.20, 327.21, 327.23, 327.27, 327.29, 780.51, 780.53, 780.57) / Frequency=10.46% / OR (95% CI)=1.00 (0.96-1.03)

• History of mechanical ventilation (ICD-9 procedure codes: 93.90, 96.70, 96.71, 96.72)/ Frequency=7.33/ OR (95% CI)=1.13 (1.08-1.18)

• Respirator dependence/respiratory failure (CC 77-78)/ Frequency=1.38/ OR (95% CI)=1.12 (1.03-1.23)

• Cardio-respiratory failure and shock (CC 79)/ Frequency=29.84/ OR (95% CI)=1.21 (1.18-1.24)

• Congestive heart failure (CC 80)/ Frequency=43.86/ OR (95% CI)=1.21 (1.18-1.24)

• Chronic atherosclerosis (CC 83-84)/ Frequency=51.57/ OR (95% CI)=1.11 (1.08-1.13)

• Arrhythmias (CC 92-93)/ Frequency=37.2/ OR (95% CI)=1.17 (1.12-1.22)

• Vascular or circulatory disease (CC 104-106)/ Frequency=38.2/ OR (95% CI)=1.09 (1.05-1.14)

• Arrhythmias (CC 92-93)/ Frequency=38.48/ OR (95% CI)=1.14 (1.11-1.17)

• Other and Unspecified Heart Disease (CC 94)/ Frequency=19.45/ OR (95% CI)=1.08 (1.05-1.11)

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• Vascular or Circulatory Disease (CC 104-106)/ Frequency=39.42/ OR (95% CI)=1.09 (1.06-1.11)
• Fibrosis of lung and other chronic lung disorder (CC 109)/ Frequency=18.12/ OR (95% CI)=1.09 (1.06-1.12)
• Pneumonia (CC 111-113)/ Frequency=51.51/ OR (95% CI)=1.10 (1.07-1.13)
Other Comorbid Conditions
• History of Infection (CC 1, 3-6)/ Frequency=32.16/ OR (95% CI)=1.08 (1.05-1.11)
• Metastatic cancer and acute leukemia (CC 7)/ Frequency=2.64/ OR (95% CI)=1.24 (1.15-1.33)
• Lung, upper digestive tract, and other severe cancers (CC 8)/ Frequency=5.91/ OR (95% CI)=1.19 (1.13-1.25)
• Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors; other respiratory and heart neoplasms (CC 9-11)/ Frequency=13.88/ OR (95% CI)=1.04 (1.01-1.08)
• Other digestive and urinary neoplasms (CC 12)/ Frequency=7.06/ OR (95% CI)=0.96 (0.92-1.01)
• Diabetes and DM complications (CC 15-20, 119-120)/ Frequency=39.15/ OR (95% CI)=1.08 (1.05-1.11)
• Protein-calorie malnutrition (CC 21)/ Frequency=7.57/ OR (95% CI)=1.14 (1.09-1.19)
• Disorders of Fluid/Electrolyte/Acid-Base (CC 22-23)/ Frequency=34.57/ OR (95% CI)=1.17 (1.14-1.20)
• Other Endocrine/Metabolic/Nutritional Disorders (CC 24)/ Frequency=68.61/ OR (95% CI)=0.91 (0.89-0.94)
• Pancreatic Disease (CC 32)/ Frequency=4.85/ OR (95% CI)=1.12 (1.06-1.17)
• Peptic Ulcer, Hemorrhage, Other Specified Gastrointestinal Disorders (CC 34)/ Frequency=12.58/ OR (95% CI)=1.07 (1.03-1.11)
• Other Gastrointestinal Disorders (CC 36)/ Frequency=58.29/ OR (95% CI)=1.04 (1.02-1.07)
• Severe Hematological Disorders (CC44)/ Frequency=2.07 /OR (95% CI)=1.12 (1.04-1.20)
• Iron Deficiency and Other/Unspecified Anemias and Blood Disease (CC 47)/ Frequency=42.09/ OR (95% CI)=1.13 (1.10-1.16)
• Dementia and senility (CC 49-50)/ Frequency=17.07 /OR (95% CI)=1.00 (0.97-1.04)
• Drug/Alcohol Induced Dependence/Psychosis (CC 51-52)/ Frequency=3.67/ OR (95% CI)=1.15 (1.09-1.22)
• Major Psych Disorders (CC 54-56)/ Frequency=10.79/ OR (95% CI)=1.08 (1.04-1.12)
• Depression (CC 58)/ Frequency=19.63/ OR (95% CI)=1.06 (1.03-1.09)
• Anxiety Disorders (CC 59)/ Frequency=3.27/ OR (95% CI)=1.15 (1.08-1.22)
• Other Psychiatric Disorders (CC 60)/ Frequency=18.37/ OR (95% CI)=1.11 (1.08-1.15)
• Quadriplegia, paraplegia, functional disability (CC 67-69, 100-102, 177-178)/ Frequency=5.02/ OR (95% CI)=1.08 (1.02-1.13)
• Polyneuropathy (CC 71)/ Frequency=7.91/ OR (95% CI)=1.11 (1.06-1.16)
• Acute Coronary Syndrome (CC 81-82)/ Frequency=9.54/ OR (95% CI)=1.08 (1.04-1.12)
• Hypertensive Heart and Renal Disease or Encephalopathy (CC 89)/ Frequency=13.20/ OR (95% CI)=1.13 (1.09-1.17)
• Stroke (CC 95-96)/ Frequency=6.84/ OR (95% CI)=1.04 (1.00-1.09)
• Renal Failure (CC 131)/ Frequency=18.61/ OR (95% CI)=1.10 (1.06-1.14)
• Decubitus ulcer or chronic skin ulcer (CC 148-149)/ Frequency=7.43/ OR (95% CI)=1.03 (0.99-1.08)
• Cellulitis, Local Skin Infection (CC 152)/ Frequency=12.50/ OR (95% CI)=1.07 (1.03-1.11)
• Vertebral Fractures (CC 157)/ Frequency=5.24/ OR (95% CI)=1.14 (1.08 -1.19)
ICD-10-CM codes for model variables (for those variables defined by ICD-9 CM codes rather than CCs)
Mechanical Ventilation
• 5A09357 Assistance with Respiratory Ventilation, Less than 24 Consecutive Hours, Continuous Positive Airway Pressure
• 5A09457 Assistance with Respiratory Ventilation, 24-96 Consecutive Hours, Continuous Positive Airway Pressure
• 5A09557 Assistance with Respiratory Ventilation, Greater than 96 Consecutive Hours, Continuous Positive Airway Pressure
• 5A1935Z Respiratory Ventilation, Less than 24 Consecutive Hours
• 5A1945Z Respiratory Ventilation, 24-96 Consecutive Hours
•5A1955Z Respiratory Ventilation, Greater than 96 Consecutive Hours
Sleep Apnea
• G4730 Sleep apnea, unspecified

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• G4731 Primary central sleep apnea
• G4733 Obstructive sleep apnea (adult) (pediatric)
• G4737 Central sleep apnea in conditions classified elsewhere
• G4739 Other sleep apnea Results of this measure will not be stratified.

**Level of Analysis:** Facility

**Type of Measure:** Outcome

**Data Source:** Administrative claims

**Measure Steward:** Centers for Medicare & Medicaid Services (CMS) **Other organizations:** MPR: Mathematica Policy Research; RTI: Research Triangle Institute

**Steering Committee Evaluations**

**Importance to Measure and Report** (***based on decision logic***)**: PASSED all three sub-criteria**

**1a. Impact: H-17; M-1; L-0; I-0**; **1b. Performance Gap: H-15; M-3; L-0; I-0**

**Rationale:**

- COPD is a leading cause of readmissions to the hospital.
- 1a: The developer presented data demonstrating significant poor outcomes (readmissions) and high cost.
- 1b: The submission describes the 30-day readmission rate among patients hospitalized for COPD is 22.6%, accounting for 4% of all 30-day readmissions. Analysis of Medicare FFS patients, crude readmission rates of a national sample of 176,481 patients across 4,547 hospitals demonstrates that hospital readmission rates for COPD patients are generally high, at a mean of 21.8%, and that there is a large amount of variation in outcomes, with the rates ranging from 10.8-32.6% (5th and 95th percentiles respectively).

**1c. Evidence** (*based on decision logic*): **Y-18; N-1; I-0**

**Rationale:**

- This is an outcome measure.
- Strong evidence base exists for interventions to improve outcomes such as readmission rates.

**2. Scientific Acceptability of Measure Properties** (***based on decision logic***)**: PASSED reliability and validity**

**2a. Reliability: H-15; M-4; L-0; I-0; 2b. Validity: H-3; M-10; L-5; I-1**

**Rationale:**

- 2a: Measure specifications are clear and consistent and can be reliably measured.
    - 30 days begins at discharge from acute care regardless of whether patient goes to a LTAC, SNF or rehabilitation facility.
- 2b: Risk adjustment methodology is robust.
    - Individual risk factors should include rate of previous exacerbations and active smoking status if available. Institutional risk "factors" should include regional long term particle pollution levels and if individual active smoking rates are not available, regional smoking rates. All are known to contribute to exacrbations of COPD.
    - Concerns about risk adjustment for patients who had exacerbations and were ventilated but not for patients with previous admissions with exacerbations.
    - The numbers of patients with COPD diagnosis between 18-40 years is very small.
    - Multiple readmissions within the 30-day window only count once.
    - A patient may be counted more than once if they have multiple admissions during the year.

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**3. Usability: H-7; M-11; L-1; I-0**

(*Meaningful, understandable, and useful to the intended audiences for 3a. Public Reporting and 3b. Quality Improvement)*

**Rationale:**

- 3a-3b: Similar measures have been used for other clinical conditions (e.g., AMI, HF, PN) and have been demonstrated to support both public reporting and quality improvement
- Measure was recently tested and expanded to include those beyond the Medicare population (18 years and above).
- CMS is monitoring observation stays to assess whether use of the readmission measure would incentivize hospitals potentially to increase their use of observation stays in lieu of admitting patients who come back to the hospital within the 30-day time frame.
- The measure publicly reported by CMS rolls up 3 years of data so the results are not timely which hampers quality improvement activities.

**4. Feasibility: H-14; M-5; L-0; I-0**

*(4a. Clinical data generated during care process; 4b. Electronic data; 4c.Susceptibility to inaccuracies/ unintended consequences identified 4d. Data collection strategy can be implemented)*

**Rationale:**

- The measure is based on adminstrative data.

**Steering Committee Assessment of Criteria Met/Suitable for Endorsement: Y-17; N-2**

**Rationale:**

- Outcome measure.
- Variation in outcomes demonstrate opportunity for improvement.
- Unknown impact of local air quality should be explored for possible impact on the measure results.

**Additional Comments/Questions:**

- The Committee requested a commitment from CMS to explore the possible effect of differences in air quality at hospital locations on the results of the measures for 30-day Mortality and 30-day Readmissions for COPD.
- The Committee requested additional information about the 18-40 year population.

**Measure Developer Response:**

CMS appreciates the Committee members' suggestion that we consider adjusting the COPD measures for ambient particulate levels using monitoring data available from the US Environmental Protection Agency (EPA). We asked the measure developer, YNHHSC/CORE, to conduct a brief literature review and consult with 2-3 experts to explore this suggestion. YNHHSC/CORE found that, as noted by the Committee, the literature suggests that ambient levels of particulate matter affect short-term mortality and admission rates for COPD (and for other cardiovascular and respiratory conditions). EPA considered these effects in its most recent revision to its health-

based national ambient air quality standard for particulates. Although important from a public health standpoint, these increases are relatively small. YNHHSC/CORE did not find any studies of the effect of ambient particulates on mortality and readmission rates among hospitalized patients for COPD.

The purpose of risk adjustment is to account for differences across hospitals in factors unrelated to quality, such as patient comorbidities, that may affect the outcome of mortality and readmission. It is important to risk adjust for factors that could bias the measure results (e.g. could favor hospitals in low pollution areas). Adjusting for particulates would make sense if it were technically feasible and if it would improve the model by reducing or eliminating a potential bias.

Based on its review, YNHHSC/CORE does not recommend adding a PM variable as it is unlikely to affect hospital-level risk-standardized rates. The studies to date focus on the general non-hospitalized population, and it is not clear how they apply to the patients in our models – that is, patients hospitalized with an acute exacerbation of COPD. YNHHSC/CORE reported that the experts felt the effect of adjusting for PM would likely be small or negligible given that the model applies to patients already hospitalized for COPD. Second, there are feasibility issues. Modeling the effect appropriately would be complex. YNHHSC/CORE's preliminary review of the issues suggests it would be inappropriate to use ambient air quality levels as a risk adjuster without also adjusting for other factors that affect the strength and direction of the potential association between particulate levels and the outcomes, including temperature, humidity, seasonal variation, and city-level factors such as smoking and air conditioning use rates. Given these challenges, and our expectation that building particulate levels into the model is not likely to significantly improve the models' performance even with the best methods, CMS does not plan to pursue adding air pollution variables to the models at this time.

**Public & Member Comment**

**Comments included:**

- Concerns about the reliably and validly of the ICD-9-CM coding used to identify the intended target population.

  **Developer response:** In the development of the COPD measures we followed a careful process aimed at selecting a cohort that is both clinically coherent and comprehensive. The cohort codes were informed by a thorough literature review and a review of codes used for other COPD measures. They have also been reviewed by both a working group of experts knowledgeable about ICD-9 coding for the COPD population and a national Technical Expert Panel. This group, for example, made the decision to include patients with primary discharge diagnosis codes of respiratory failure and secondary codes for COPD in order to increase the sensitivity of case selection. Finally, a study by Brian Stein et al, published in Chest 2012 suggests that a set of ICD-9 codes similar to the ones we used to define the cohort has high positive predictive value. The commenter also refers to the medical record validation process used in prior CMS measures (e.g. pneumonia mortality and readmission). Previously, CMS has undergone medical record validation to confirm the adequacy of administrative codes for risk-adjustment but not to assess cohort selection. The selection of the appropriate codes for identifying the cohort is based on face validity and review of experts with knowledge of coding practices. CMS has a process for yearly maintenance of the measures, at which time the cohort codes will be reassessed to evaluate any need for changes or updates.
- Suggest measure 1891 only be reported as a paired measure along with 1893 in order to more accurately reflect both outcomes of interest, the overall quality of care provided, and to enhance usability.

  **Developer response:** CMS agrees that they are complementary and that reporting both measures provides a fuller picture of care; however, CMS has submitted the measures to NQF as independent measures. CMS will consider this preference in its approach to implementation.
- AHA submitted a letter which is posted on the NQF project page outlining concerns with the

| 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| following issues:<br>○ Failure to adjust for factors beyond the hospital's control such as patient characteristics, extreme circumstances, patient compliance and quality of post-acute care.<br>○ Reliability – A recent CMS study required by the Accountable Care Act "shows the claims-based measures are unreliable." Additional reliability analyses are provided by KNG showing similar results.<br>○ Harmonization with the recently endorsed measure 1789: Hospital-wide all-cause readmission measure to exclude planned readmissions; harmonization of exclusions in the COPD measures compared to the pneumonia measures that include exclusions for discharged alive on day 0 or 1.<br>○ Exclusions for all Medicare patients in Hospice rather than just FFS Medicare patients enrolled in hospice.<br>**Developer response**: Detailed responses to the AHA comments from the developer are posted on the NQF project page addressing all four issues. CMS will provide additional information on including exclusions for planned readmissions by July 11 for the Committee to consider.<br>• CMS/Yale advised the Committee that, in response by a recommendation from this Committee, the age range for measures 1891 and 1893 was changed to 40 years and above. The developers note that COPD is rare in the less than 40 age group (1.5% of patients in our 2006 California all payer dataset), and a diagnosis at younger ages is likely to represent the misclassification of patients with asthma or other pulmonary conditions. This approach is commonly used in the research literature.<br>**Steering Commitee response:**<br>• The Committee agrees with the change in age to 40 and above for measures 1891 and 1893.<br>• The Committee reviewed the extensive responses provided by the developer. The Committee indicated that the responses adequately addressed the issues raised by AHA.<br>• The Committee supports the plan of Yale/CMS to include the algorithm for planned readmissions in measures 0506 and 1891 and looks forward to reviewing the additional data in the next few weeks.<br>• In response to the comment, CMS/Yale requested additional time to work on harmonization of exclusions using a new algorithm for planned readmission for the all readmission measures, including pneumonia and COPD.<br>**Additional Steering Committee Review – October 16, 2012**<br>• The Committee reviewed the additional information on the algorithm for planned readmissions provided by Yale CORE.<br>• The Committee agreed that the list of planned readmission exclusions were reasonable and noted the change in raw readmission rate was less than 1% and the minimal impact on the risk model.<br>• The Committee unanimously maintained their recommendation for endorsement.<br>**Steering Committee Reassessment of Criteria Met/Suitable for Endorsement: Y-14; N-0** |
| **RECOMMEND FOR ENDORSEMENT** |
| **Additional Public and Member Comment:**<br>• A commenter recommended that measure description be corrected to state patients 40 years of age and older.<br>**NQF response**: Previously, this measure was modified by the developer at the request of the Steering Committee to include ages 40 years and older. NQF staff will review all documents to ensure the change |

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in included.

- Commenters identified various concerns including: excluding patients with medical conditions or comorbidities that often require multiple episodes of care; concerns about reliability and potential unintended consequenses.
  **Developer response:** The measures address clinical differences in hospitals' case-mix through risk adjustment rather than through excluding patients from the measure as suggested by the commenter. The goal in developing outcomes measures is to create a clinically cohesive cohort that includes as many patients as possible admitted with the given condition. Greatly expanding our list of exclusions would result in a measure that was less useful and meaningful, because it would reflect the care of fewer patients and diverse clinical conditions. To fairly profile hospitals' performance, it is critical to place hospitals on a level playing field and account for their differences in the patients that present for care. This is accomplished through adequate risk-adjustment for patients' clinical presentation rather than exclusion of patients. In addition, the expanded planned readmission definitions for the measures will identify as planned and not count in the outcome readmissions for procedures for procedures, such as wound debridement, that represent routine care for patients with chronic conditions.
  We appreciate the points AHA raises about reliability. In a June 19, 2012 memo to NQF we responded to the KNH Health Consulting work in detail. We note that CMS uses 3 years of data to calculate the measure results for the Inpatient Quality Reporting and Hospital Readmission Reduction programs to increase the measures' reliability.

- A commenter noted concern over the use of the hierarchical risk adjustment model in this and other, similar readmission measures. This method of risk adjustment drives the data toward the mean, and does not result in meaningful display of the variation in performance and/or quality.
  **NQF response:** The issue of hierarchical modeling has been discussed numerous times by Steering Committees, CSAC and Board. Last year, a white paper on statistical modeling for performance measures prepared by the Committee of Presidents of Statistical Societies (COPSS) addressed these issues for CMS.

- Additional comments were received voicing concerns incuding: distinguishing between related and unrelated admissions; accounting for socioeconomic factors; and use of hierarchical modeling in the risk adjustment methodology. The commenter suggest that there is an opportunity to use the field experience going forward to determine whether additional changes are warranted and request that the developer provide an assessment at the annual update.
  **Developer response:** We agree that the field experience with the measures can be informed by the planned readmission algorithm. We made several revisions to the algorithm based on input from the national dry run of CMS's hospital-wide readmission measure. We will continue to evaluate potential additional changes identified by hospitals as the measures are tested and used in CMS programs.

- A commenter recommended that the exclusion/inclusion selection criteria methodology be improved with frequent reviews and revisions. Unplanned readmissions that are not related to the index admission should be excluded from this measure and the measure be controlled for socioeconomic status, nonreversible comorbidities, and circumstances outside of the control of the provider.
  **Developer response:** The readmission measure was developed to be an all-cause measure for several reasons. There are several reasons for using all cause readmission as the outcome. First, from the patient perspective, readmission from any cause is an adverse event. Second, although we would expect few hospitals to use gaming strategies, measures should not create incentives for them to do so.
  Third, it is often hard to exclude quality issues and accountability based on the documented cause of readmission. The measure does not adjust for patient characteristics such as socioeconomic status (SES). The association between SES and health outcomes can be due, in part, to the differences in the quality of health care. Risk-adjusting for patient characteristics such as SES would suggest that hospitals with high

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proportions of such patients are held to different standards for the risk of readmission than hospitals treating higher-SES patient populations. For example, if patients of low socioeconomic status have higher readmission rates, then adjusting for SES in the model will lower the risk-standardized rates for hospitals with a higher proportion of these patients relative to other hospitals with clinically similar patients and similar outcomes. CMS does not want to hold hospitals with different SES mixes to different standards. Adjusting for SES would also obscure differences that are important to identify if we want to reduce disparities where they do exist. Thus, the choice was to adjust only for clinical differences in the populations among hospitals. This is consistent with guidance from the National Quality Forum recommending against adjusting for patient characteristics such as socioeconomic status in outcomes measures.

- A commenter requested a formal evaluation of the qualifying readmissions in the first year of the Readmission Reduction Program to determine if there should be further modifications to the planned readmission methodology.
  **Developer response:** We appreciate the AAMC's request for a "formal review" of the planned readmission algorithm in the first year of the Readmission Reduction Program. We note that the algorithm has undergone four rounds of public comment, as well as structured input from surgical subspecialists, technical expert panels, NQF committees, and hospitals participating in a national dry run of the hospital-wide and hip and knee arthroplasty readmission measures. The developer and CMS welcome continued comments and suggestions on the components of the algorithm as the revised measures are used.

**Steering Committee Response:** The Committee reviewed the comments and responses from developers and made no changes to their recommendations.

## Measure Not Recommended

**0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival**

**Status:** Maintenance, Original Endorsement: May 15, 2008

**Description:** Percent of pneumonia patients, age 18 years or older, transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital.

**Numerator Statement:** Number of pneumonia patients transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital

**Denominator Statement:** Patients, age 18 years or older, discharged with: ICD-9-CM principal diagnosis code of pneumonia OR ICD-9-CM principal diagnosis code of septicemia or respiratory failure (acute or chronic) AND an ICD-9-CM Other diagnosis code of pneumonia

Table 3.1 Pneumonia (PN)

ICD-9 Code Shortened Description

481 PNEUMOCOCCAL PNEUMONIA
482.0 K. PNEUMONIAE PNEUMONIA
482.1 PSEUDOMONAL PNEUMONIA
482.2 H.INFLUENZAE PNEUMONIA
482.30 STREPTOCOCCAL PNEUMN NOS
482.31 PNEUMONIA STRPTOCOCCUS A
482.32 PNEUMONIA STRPTOCOCCUS B
482.39 PNEUMONIA OTH STREP
482.40 STAPHYLOCOCCAL PNEU NOS
482.41 METH SUS PNEUM D/T STAPH
482.42 METH RES PNEU D/T STAPH
482.49 STAPH PNEUMONIA NEC
482.82 PNEUMONIA E COLI
482.83 PNEUMO OTH GRM-NEG BACT
482.84 LEGIONNAIRES´ DISEASE
482.89 PNEUMONIA OTH SPCF BACT
482.9 BACTERIAL PNEUMONIA NOS
483.0 PNEU MYCPLSM PNEUMONIAE
483.1 PNEUMONIA D/T CHLAMYDIA
483.8 PNEUMON OTH SPEC ORGNSM
485 BRONCHOPNEUMONIA ORG NOS
486 PNEUMONIA, ORGANISM NOS

Table 3.2 Septicemia

ICD-9 Code Shortened Description

038.0 STREPTOCOCCAL SEPTICEMIA
038.10 STAPHYLCOCC SEPTICEM NOS
038.11 METH SUSC STAPH AUR SEPT
038.12 MRSA SEPTICEMIA
038.19 STAPHYLCOCC SEPTICEM NEC
038.2 PNEUMOCOCCAL SEPTICEMIA
038.3 ANAEROBIC SEPTICEMIA
038.40 GRAM-NEG SEPTICEMIA NOS
038.41 H. INFLUENAE SEPTICEMIA
038.42 E COLI SEPTICEMIA
038.43 PSEUDOMONAS SEPTICEMIA
038.44 SERRATIA SEPTICEMIA

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| 038.49 GRAM-NEG SEPTICEMIA NEC |
| 038.8 SEPTICEMIA NEC |
| 038.9 SEPTICEMIA NOS |
| 995.91 SEPSIS |
| 995.92 SEVERE SEPSIS |
| Table 3.3 Respiratory Failure |
| ICD-9 Code Shortened Description |
| 518.81 ACUTE RESPIRATRY FAILURE |
| 518.84 ACUTE & CHRONC RESP FAIL |
| Table 3.1 Pneumonia (PN) |
| ICD-10 Code Shortened Description |
| J 13 Pneumonia due to Streptococcus pneumoniae |
| J 18.1 Lobar pneumonia, unspecified organism |
| J 15.0 Pneumonia due to Klebsiella pneumoniae |
| J 15.1 Pneumonia due to Pseudomonas |
| J 14 Pneumonia due to Hemophilus influenzae |
| J 15.4 Pneumonia due to other streptococci |
| J 15.3 Pneumonia due to streptococcus, group B |
| J 15.20 Pneumonia due to staphylococcus, unspecified |
| J 15.21 Pneumonia due to staphylococcus aureus |
| Z 16 Infection and drug resistant microorganisms |
| J 15.29 Pneumonia due to other staphylococcus |
| J 15.5 Pneumonia due to Escherichia coli |
| J 15.6 Pneumonia due to other aerobic Gram-negative bacteria |
| A 48.1 Legionnaires' disease |
| J 15.8 Pneumonia due to other specified bacteria |
| J 15.9 Unspecified bacterial pneumonia |
| J 15.7 Pneumonia due to Mycoplasma pneumoniae |
| J 16.0 Chlamydial pneumonia |
| J 16.8 Pneumonia due to other specified infectious organisms |
| J 18.0 Bronchopneumonia, unspecified organism |
| J 18.8 Other pneumonia, unspecified organism |
| J 18.9 Pneumonia, unspecified organism |
| J 17 Pneumonia in diseases classified elsewhere |
| J 18.2 Hypostatic pneumonia, unspecified organism |
| J 85.1 Abscess of lung with pneumonia |
| Table 3.2 Septicemia |
| ICD-10 Code Shortened Description |
| A 40.0 Sepsis due to streptococcus, group A |
| A 40.1 Sepsis due to streptococcus, group B |
| A 40.3 Sepsis due to Streptococcus pneumoniae |
| A 40.8 Other streptococcal sepsis |
| A 40.9 Streptococcal sepsis, unspecified |
| A 41.9 Sepsis unspecified |
| A 41.2 Sepsis due to other unspecified specified staphylococcus |
| A 41.0 Sepsis due to Staphylococcus aureus |
| A 41.0 AND U80.1 Sepsis due to Staphylococcus aureus AND Methicillin-resistant staph aureus infection |
| A 41.1 Sepsis due to other specified staphylococcus |
| A 41.89 Other specified sepsis |
| A 41.4 Sepsis due to anaerobes |

| 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|
| A 41.50 Gram-negative sepsis, unspecified<br>A 41.3 Sepsis due to Hemophilus influenzae<br>A 41.51 Sepsis due to Escherichia coli ( E coli)<br>A 41.52 Sepsis due to pseudomonas<br>A 41.53 Sepsis due to Serratia<br>A 41.59 Other Gram-negative sepsis<br>A 41.81 Sepsis due to Enterococcus<br>A 42.7 Actinomycotic sepsis<br>A 41.9 Sepsis, unspecified<br>R65.20 Severe sepsis without septic shock<br>R65.21 Severe sepsis with septic shock<br>Table 3.3 Respiratory Failure<br>ICD-10 Code Shortened Description<br>J 96.0 Acute respiratory failure<br>J 96.9 Respiratory failure, unspecified<br>J 96.2 Acute and chronic respiratory failure<br>J 96.1 Chronic respiratory failure<br>J 80 Acute respiratory syndrome<br>J 22 Unspecified acute lower respiratory infection<br>J 98.8 Other specified respiratory disorders<br>**Exclusions:** Patients less than 18 years of age,<br>Patients with a length of stay greater than 120 days,<br>Patients with Cystic Fibrosis,<br>Patients who had not chest x-ray or CT scan that indicated abnormal findings within 24 hours prior to hospital arrival or anytime during this hospitalization,<br>Patients with Comfort Measures Only,<br>Patients enrolled in clinical trial,<br>Patients received as a transfer from emergency/observation department of another hospital,<br>Patients received as a transfer from an inpatient or outpatient department of another hospital,<br>Patients received as a transfer from an ambulatory surgery center,<br>Patients who had no diagnosis of pneumonia either as an ED final diagnosis/impression or direct admission diagnosis/impression and<br>Patients who have a duration of stay less than or equal to one day<br>**Adjustment/Stratification:** No risk adjustment or risk stratification N/A This measure is not stratified.<br>**Level of Analysis:** Facility, Population : National, Population : Regional, Population : State<br>**Type of Measure:** Process<br>**Data Source:** Administrative claims, Paper Records<br>**Measure Steward:** Centers for Medicare & Medicaid Services **Other organizations:** The Joint Commission, Centers for Disease Control and Prevention, Infectious Diseases Society of America, American Thoracic Society, Johns Hopkins University, Northeastern Ohio Univ. College of Medicine, Pneumonia Patient Outcomes Team, New Jersey Medical |
| **IMPLEMENTATION COMMENTS**<br>• APIC does not approve measure 0356. As outlined with our comment on measure 0148, we recommend NQF engage IDSA/ATS and other societies that represent intensivists on the value of use of this measure to assess and compare provider performance in relationship to timing. We agree that samples of blood |

**0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival**

and sputum for culture and urinary antigen testing are clear-cut for those with severe CAP who need critical care. We're not as sure of use of the timing of such testing for performance measurement.

  - Developer response: The performance measure simply asks whether a blood culture was obtained within 24 hours of hospital arrival for those patients who are admitted to the ICU within 24 hours of hospital arrival. This is consistent with recommendations from the IDSA/ATS 2007 guidelines for management of community-acquired pneumonia (see Table 5) that recommend routine blood cultures in ICU-admitted pneumonia patients. There are representatives of both the IDSA and ATS that participate on the technical expert panel that developed this performance measure.

- None of the ACCP QIC members use this measure at their institution and have never seen any data related to this measure. The QIC questions whether or not this measure sees widespread use.
  - Developer response: First Quarter of 2011, 3,152 hospitals reported this measure. The quarterly national rates and benchmarks for PN-3a are publicly available as a downloadable Excel of PDF files at the bottom of this CMS webpage: http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1228768205297

**Steering Committee Evaluations**

**Importance to Measure and Report** (***based on decision logic***)**: Passed all three subcriteria**

**1a. Impact: H-16; M-3; L-0; I-0**; **1b. Performance Gap: H-8; M-10; L-1; I-0**

**Rationale:**

- The impact and need for improvement in compliance is well documented in the Hospital Inpatient Quality Reporting Program.
- The performance indicates that a blood culture is performed 96.9% of the time on ICU patients.
- Data on disparities indicate variation across all demographic groups that could be reduced. The Steering Committee discussed the potential of the measure being topped out, but noted that if CMS determines a measure is topped out they do not include it in the Value Based Purchasing Program.

**1c. Evidence** (*based on decision logic*): **Y-18; N-1; I-0**

**Rationale:**

The joint guidelines by the Infectious Disease Society of America (IDSA) and American Thoracic Society (ATS) state "Pretreatment blood samples for culture and an expectorated sputum sample for stain and culture should be obtained from hospitalized patients with clinical indications listed on Table 5 (ICU is listed) but are optimal for patients without these conditions." Additionally, the quantity and quality of evidence is recent and reported in large datasets, consistent across reported outcomes. Taken together, the metric reflects scientific evidence and the opinion within the field.

**2. Scientific Acceptability of Measure Properties** (***based on decision logic***)**: Passed both subcriteria**

**2a. Reliability: H-15; M-4; L-0; I-0; 2b. Validity: H-17; M-1; L-0; I-1**

**Rationale:**

- The measure is precisely specified and targeted to a high risk population of patients transfered into the ICU for pneumonia.
- Challenges will always exist with administrative data but routine use for many years has likely decreased the variation in collection of the data.

**0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival**

**3. Usability: H-16; M-3; L-0; I-0**

(*Meaningful, understandable, and useful to the intended audiences for 3a. Public Reporting and 3b. Quality Improvement)*

**Rationale:**

- The measure has been nationally reported as part of the CMS performance measure set for the Hospital Inpatient Quality Reporting Program since 2002; however, it is not publicly reported.
- The national rate of this measure has been reported on a quarterly basis.
- It is also used by The Joint Commission for acceditation.

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

*(4a. Clinical data generated during care process; 4b. Electronic data; 4c.Susceptibility to inaccuracies/ unintended consequences identified 4d. Data collection strategy can be implemented)*

**Rationale:**

- The specificatins are modified every 6 months according to feedback from hosptial staff and clinicians.

**Steering Committee Assessment of Criteria Met/Suitable for Endorsement: Y-19; N-0**

**Rationale:**

- This measure has been widely reported and is in use by several sources.
- It has been proven to have a direct impact on patient care and is consistent with IDSA/ATS guidelines

**Additional Comments/Questions**:

- The Steering Committee requested that the title be further specified to state that it focuses on "pneumonia patients".

**Public & Member Comment**

**Comments included:**

- Lack of support for this measure from ACIP, SCCM and ACEP. Comments included the lack of high level evidence that this process measure is directly linked to improved patient outcomes for pneumonia patients; concerns the measure does not state that blood cultures should be obtained before the initiation of treatment; and the measure may create an unnecessary distraction from the delivery of more important care that needs to be delivered in the ED or ICU settings for not supporting this measure.

**Developer response:**

- Patients who are admitted to the ICU because of pneumonia are more likely to have positive blood cultures that reflect true pathogens. The performance measure does not require that all emergency department patients with pneumonia have a blood culture performed. But, if the patient is sick enough to require admission to the ICU and the reason for transfer to the ICU is pneumonia (both requirements for the denominator of this measure), a blood culture is more likely to provide information that will support pathogen-directed therapy. The IDSA/ATS guidelines for community-acquired pneumonia do recommend the performance of blood cultures for all patients who require admission to the ICU. Many of these patients are initially treated in the emergency department and subsequently require transfer to the ICU for their pneumonia because of clinical deterioration and these patients are included in the denominator of the performance measure to do blood cultures on ICU-admitted pneumonia patients.

**Steering Commitee response:**

- After reviewing the comments received on this measure, particularly the lack of support from APIC, SCCM and ACEP, the Committee changed their recommendation of this measure to "do not recommend" ( Yes-5; No-10) due to not meeting the evidence criterion. In response to the second

| 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
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| vote, the developer offered additional justification for this measure that was not previously presented to the Committee pertaining to antibiotic stewardship and that the measure focuses on a small group of critically ill patients admitted to the ICU. Additionally, staff has requested input from the guideline developer, IDSA, as well as offered the three organizations that commented against the measure to expand on their rationale for not supporting the measure.<br><br>**Additional Steering Committee Review – October 16, 2012:**<br>• The Committee reviewed the additional information submitted by the developer addressing issues of antibiotic stewardship and the focus of this measure on the highest risk patients.<br>• The Committee reviewed the comments submitted by the three organizations that did not support the measure and again considered the evidence for blood cultures in patients with pneumonia. Committee members concluded that the arguments from the three organization on lack of evidence have merit and agreed that the evidence is not sufficient to meet the importance criterion. The Committee also agreed not to make an exception to the evidence criteria.<br><br>**Steering Committee Reassessment of Importance Criteria Met/Suitable for Endorsement: Y-4; N-10** |
| **DO NOT RECOMMEND FOR ENDORSEMENT** |
| **Additional Public and Member Comment:**<br>• A question about how the retirement of this measure will be harmonized with the Surviving Sepsis Campaign recommendations for blood cultures among patients with sepsis due to pneumonia.<br><br>**NQF response:** The sepsis rescucitation bundle refers to the sub-set of pneumonia patients with sepsis. The sepsis rescucitation bundle has been associated with reducation in mortality for patients with sepsis. |

## Appendix A: Measure Specifications



| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
|---|---|
| Status | Maintenance, Original Endorsement: Oct 28, 2008, Most Recent Endorsement: Oct 28, 2008 Time-limited |
| Steward | Centers for Medicare and Medicaid Services Other organizations: MPR: Mathematica Policy Research; RTI-Research Triangle Institute |
| Description | The measure estimates a hospital-level risk-standardized readmission rate (RSRR) defined as unplanned readmissions for any cause within 30 days of the discharge date for the index hospitalization for patients discharged from the hospital with a principal diagnosis of pneumonia. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older and are either enrolled in fee-for-service (FFS) Medicare and hospitalized in non-federal hospitals or are hospitalized in Veterans Health Administration (VA) facilities.<br>Since NQF-endorsement, the measure has been tested and shown to perform well in an all-payer population aged 18 and older and has been re-specified for this broader age group. The full details of the all-payer analysis and testing are attached. |
| Type | Outcome |
| Data Source | Administrative claims Data sources for the FFS measure:<br>1. Medicare Part A inpatient and Part B outpatient claims: This database 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 claims for the 12 months prior to an index admission.<br>2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This dataset 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 Fisher et al., 1992).<br>The measure was originally developed with claims data from a 2006 sample of 226,545 cases from 4,675 hospitals. We have maintained and re-evaluated the models each year since public reporting of the measure began in 2009.<br>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.<br>Data sources for the all-payer update<br>For our analyses, 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. |

| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
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| | 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).<br>Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the publicly reported measures 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.<br>Attachment 508 compliant pneumonia ICD-10 map-634623950487720270.pdf URL Condition Category/ICD-9 Code Map available at: (http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979) See attached ICD-9 to ICD-10 crosswalk |
| Level | Facility |
| Setting | Hospital/Acute Care Facility |
| Numerator Statement | The outcome for this measure is 30 day all-cause readmission. We define all-cause readmission as an inpatient admission for any cause, with the exception of planned readmissions, within 30 days from the date of discharge from the index pneumonia admission. If a patient has one or more admissions (for any reason) within 30 days of the date of discharge of the index admission, only one was counted as a readmission. For the detailed definition of planned readmissions, please refer to the attached report, Respecifying the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm.<br>The numerator of the risk-adjusted ratio is the predicted number of readmissions within 30 days given the hospital's performance with its observed case mix. The term "predicted" describes the numerator result, which is calculated using the hospital-specific intercept term. (See details below in the 2a1.13 Statistical risk model and variables.) |
| Numerator Details | Time Window: We define this as readmission for any cause within 30 days from the date of discharge of the index pneumonia hospitalization.<br><br>Note: 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 outcome.<br>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.<br>Planned admissions not counted as readmissions<br>Unplanned readmissions are acute clinical events experienced by a patient that require urgent hospitalizations. Higher than expected unplanned readmission rates suggest lower quality of hospital and post-discharge care and are the focus of hospital quality measurement as part of quality improvement efforts. In contrast, planned readmissions are generally not a signal of quality of care. Furthermore, there is concern that including planned readmissions in a readmission measure could create a disincentive to provide appropriate care to patients who are scheduled for elective or necessary procedures, unrelated to the quality of the prior admission, within 30 days of discharge. We have, therefore, developed an algorithm for using claims data to identify "planned readmissions" that will not count as outcomes in the readmission measure.<br>In Medicare FFS data from the July 2008 to June 2011, 0.6% of index hospitalizations for pneumonia were followed by a planned readmission within 30 days of discharge. After accounting for planned readmissions, the crude 30-day measure readmission rate decreased from 18.5% to 17.8%.<br>The detailed algorithm for identifying planned readmissions is in the attached report, Respecifying |

| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
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| | the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm. |
| Denominator Statement | The cohort includes admissions for patients 18 and over hospitalized for pneumonia. The measure is currently publicly reported by CMS for patients 65 years and older who are either enrolled in Medicare FFS and admitted to non-federal hospitals, or admitted to VA hospitals.<br>The measure includes admissions for patients discharged from the hospital with a principal diagnosis of pneumonia and with a complete claims history for the 12 months prior to admission. |
| Denominator Details | Time Window: This measure was developed with 12 months of data. Currently the measure is publicly-reported with three years of index hospitalizations.<br><br>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.<br>The denominator includes patients 18 and over hospitalized for pneumonia. The measure is currently publicly reported by CMS for patients 65 years and older who are either enrolled in Medicare FFS and admitted to non-federal hospitals, or admitted to a VA hospital. To be included in the Medicare FFS cohort the patients must have been continuously enrolled in Medicare FFS Parts A and B for the 12 months prior to the index hospitalization.<br>The denominator includes admissions for patients discharged from the hospital with a principal diagnosis of pneumonia (ICD-9-CM codes 480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 482.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0, and 488.11; ICD-10-CM codes J120, J121, J122, J1281, J1289, J129, J13, J181, J150, J151, J14, J154, J154, J153, J154, J1520, J1521, J1521, Z16, J1529, J158, J155, J156, A481, J158, J159, J157, J160, J168, J180, J189, J1100, J129, J09119). |
| Exclusions | The measure excludes admissions for patients:<br>For all cohorts, the measure excludes admissions for patients:<br>• with an in-hospital death (because they are not eligible for readmission);<br>• transferred to another acute care hospital (because the readmission is attributed to the hospital that discharges the patient to a non-acute setting);<br>• discharged against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge);<br>• admitted with pneumonia within 30 days of discharge from a qualifying index admission (Admissions within 30 days of discharge of an 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.)<br>For Medicare FFS patients, the measure additionally excludes admissions for patients:<br>• 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 | Measure exclusions are determined as follows<br>For all cohorts, the measure excludes admissions for patients:<br>• Admissions with an in-hospital death are identified in the discharge disposition indicator in claims data.<br>• Admissions for patients who were transferred to another acute care hospital or VA hospital are identified in the claims when a patient with a qualifying admission is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day; |

| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
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| | • Discharges against medical advice (AMA) are identified by examining the discharge destination indicator in claims data;<br>• Pneumonia admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with the readmission date<br>For Medicare FFS patients, the measure additionally excludes admissions for patients who:<br>• Admissions without at least 30 days post-discharge enrollment in FFS Medicare is obtained by examining the Medicare Enrollment Database (EDB) |
| Risk Adjustment | Statistical risk model<br>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).<br>The proposed 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, each model adjusts the log-odds of readmission within 30-days of discharge for age 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, after accounting for patient risk. See section 2a1.20. Calculation Algorithm/Measure Logic for more detail.<br>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 Medicare claims 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. A file which contains a list of the ICD-9-CM codes and their groupings into CCs is available at http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979. 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 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.<br>The final set of risk-adjustment variables is:<br>Demographics<br>Age-65 (years above 65, continuous)<br>Male<br>Comorbidities<br>History of coronary artery bypass graft (CABG) surgery<br>History of infection (CC 1, 3-6)<br>Septicemia/shock (CC 2)<br>Metastatic cancer and acute leukemia (CC7)<br>Lung, upper digestive tract, and other severe cancers (CC8)<br>Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors (CC 9-10)<br>Diabetes mellitus (DM) and DM complications (CC 15-20, 119-120)<br>Protein-calorie malnutrition (CC 21)<br>Disorders of fluid/electrolyte/acid-base (CC 22-23) |

| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
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| | Other gastrointestinal disorders (CC 36)<br>Severe hematological disorders (CC 44)<br>Iron deficiency and other/unspecified anemias and blood disease (CC 47)<br>Dementia and senility (CC 49-50)<br>Drug/alcohol abuse/dependence/psychosis (CC 51-53)<br>Major psychiatric disorders (CC 54-56)<br>Other psychiatric disorders (CC 60)<br>Hemiplegia, paraplegia, paralysis, functional disability (CC67-69, 100-102, 177-178)<br>Cardio-respiratory failure and shock (CC 79)<br>Congestive heart failure (CC 80)<br>Acute coronary syndrome (CC 81-82)<br>Chronic atherosclerosis (CC 83-84)<br>Valvular and rheumatic heart disease (CC 86)<br>Arrhythmias (CC 92-93)<br>Stroke (CC 95-96)<br>Vascular or circulatory disease (CC 104-106)<br>Chronic obstructive pulmonary disease (CC 108)<br>Fibrosis of lung and other chronic lung disorders (CC 109)<br>Asthma (CC 110)<br>Pneumonia (CC 111-113)<br>Pleural effusion/pneumothorax (CC 114)<br>Other lung disorders (CC 115)<br>End-stage renal disease or dialysis (CC 129-130)<br>Renal failure (CC 131)<br>Urinary tract infection (CC 135)<br>Other urinary tract disorders (CC 136)<br>Decubitus ulcer or chronic skin ulcer (CC 148-149)<br>Vertebral fractures (CC 157)<br>Other injuries (CC 162)<br>References:<br>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.<br>Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.<br>URL<br>http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1219069855841 N/A |
| Stratification | N/A |
| Type Score | Rate/proportion better quality = lower score |
| Algorithm | The proposed 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 |

| | 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization |
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| | account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, each model adjusts the log-odds of readmission within 30-days of discharge for age 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, after accounting for patient risk. 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.<br>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.<br>The predicted hospital outcome (the numerator) is the sum of predicted probabilities of readmissions for all patients at a particular hospital. The predicted probability of each patient in that hospital is calculated using the hospital-specific intercept and patient risk factors. The expected number of readmissions (the denominator) is the sum of expected probabilities of readmission for all patients at a hospital. The expected probability of each patient in a hospital is calculated using a common intercept and patient risk factors.<br>References:<br>Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. URL http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1219069855841 |
| Copyright/ Disclaimer | N/A |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
|---|---|
| Status | New Submission Time-limited |
| Steward | Centers for Medicare and Medicaid Services Other organizations: MPR: Mathematica Policy Research; RTI: Research Triangle Institute |
| Description | The measure estimates a hospital-level risk-standardized readmission rate (RSRR), defined as unplanned readmissions for any cause within 30 days after the date of discharge of the index admission, for patients 40 and older discharged from the hospital with either a principal diagnosis of COPD or a principal diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. |
| Type | Outcome |
| Data Source | Administrative claims Administrative Claims<br>To apply the measure to Medicare FFS patients, Medicare Part A inpatient and outpatient and Part B outpatient claims are used. To apply the measure to a non-Medicare population, inpatient claims data are used. |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
|---|---|
| | The Medicare data sources used to create the measure were:<br>1. Medicare Part A Inpatient and Outpatient and Part B outpatient claims from the Standard Analytic File, including inpatient and outpatient claims for the 12 months prior to an index admission.<br>2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This dataset was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission.<br>The measure was subsequently tested in 2006 California Patient Discharge Data, a large, linked all-payer database of patient hospital admissions. Records are linked by a unique patient identification number allowing us to determine patient history from previous hospitalizations as well as whether the patient was readmitted to any hospital within 30 days.<br>Attachment COPD ICD 9 to ICD10_Diag + Proc.pdf |
| Level | Facility |
| Setting | Hospital/Acute Care Facility |
| Numerator Statement | The outcome for this measure is 30-day all-cause readmission. We define all-cause readmission as an inpatient admissions for any cause, with the exception of planned readmissions, within 30 days after the date of discharge from the index admission for patients 40 and older discharged from the hospital with either a principal diagnosis of COPD or a principal diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. If a patient has one or more admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. For the detailed definition of planned readmissions, please refer to the attached report, Respecifying the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm. |
| Numerator Details | Time Window: Patients who are readmitted for any cause within 30 days from the date of discharge of the index COPD admission.<br><br>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 are using this field to define the outcome.<br>Measure includes readmissions to any acute care hospital for any cause within 30 days from the date of discharge of the index admission.<br>Planned admissions not counted as readmissions<br>Unplanned readmissions are acute clinical events experienced by a patient that require urgent hospitalizations. Higher than expected unplanned readmission rates suggest lower quality of hospital and post-discharge care and are the focus of hospital quality measurement as part of quality improvement efforts. In contrast, planned readmissions are generally not a signal of quality of care. Furthermore, there is concern that including planned readmissions in a readmission measure could create a disincentive to provide appropriate care to patients who are scheduled for elective or necessary procedures, unrelated to the quality of the prior admission, within 30 days of discharge. We have, therefore, developed an algorithm for using claims data to identify “planned readmissions” that will not count as outcomes in the readmission measure.<br>In Medicare FFS data from the 2008 calendar year, 0.6% of index hospitalizations for COPD were followed by a planned readmission within 30 days of discharge. After accounting for planned readmissions, the crude 30-day measure readmission rate decreased from 21.9% to 21.3%.<br>The detailed algorithm for identifying planned readmissions is in the attached report, Respecifying the Hospital 30-Day Pneumonia and 30-Day Chronic Obstructive Pulmonary Disease Readmission Measures by adding a Planned Readmission Algorithm. |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| 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.<br>The cohort includes admissions for patients discharged from the hospital with either a principal diagnosis of COPD (see codes below) OR a principal 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. |
| Denominator Details | Time Window: This measure was developed with 12 months of data.<br><br>Note: 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). We therefore use this field to define the measure cohort.<br>The denominator includes patients 40 and over hospitalized for COPD. The measure was developed in a cohort of patients 65 years and older who were enrolled in Medicare FFS and admitted to non-federal hospitals. To be included in the Medicare FFS cohort the inclusion criteria required that the patient be continuously enrolled in Medicare FFS Parts A and B for the 12 months prior to the index hospitalization.<br>Primary COPD and respiratory failure with a secondary diagnosis of acute exacerbation of COPD are defined by the following ICD-9-CM and ICD-10-CM codes:<br>ICD-9-CM codes used to define COPD:<br>491.21 Obstructive chronic bronchitis; with (acute) exacerbation; acute exacerbation of COPD, decompensated COPD, decompensated COPD with exacerbation.<br>491.22 Obstructive chronic bronchitis; with acute bronchitis<br>491.8 Other chronic bronchitis. Chronic: tracheitis, tracheobronchitis.<br>491.9 Unspecified chronic bronchitis<br>492.8 Other emphysema; emphysema (lung or pulmonary): Not otherwise specified, centriacinar, centrilobular, obstructive, panacinar, panlobular, unilateral, vesicular. MacLeod's syndrome; Swyer-James syndrome; unilateral hyperlucent lung<br>493.20 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, unspecified<br>493.21 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with status asthmaticus<br>493.22 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with (acute) exacerbation<br>496 Chronic: nonspecific lung disease, obstructive lung disease, obstructive pulmonary disease (COPD) NOS.<br>ICD-10-CM codes used to define COPD:<br>J441 Chronic obstructive pulmonary disease with (acute) exacerbation<br>J418 Mixed simple and mucopurulent chronic bronchitis<br>J42 Unspecified chronic bronchitis<br>J439 Emphysema, unspecified<br>J449 Chronic obstructive pulmonary disease, unspecified<br>J440 Chronic obstructive pulmonary disease with acute lower respiratory infection<br>ICD-9-CM codes used to define respiratory failure:<br>518.81 Other diseases of lung; acute respiratory failure; respiratory failure NOS<br>518.82 Other diseases of lung; acute respiratory failure; other pulmonary insufficiency, acute respiratory distress |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
|---|---|
| | 518.84 Other diseases of lung; acute respiratory failure; acute and chronic respiratory failure<br>799.1 Other ill-defined and unknown causes of morbidity and mortality; respiratory arrest, cardiorespiratory failure<br>ICD-9-CM codes used to define acute exacerbation of COPD:<br>491.21 Obstructive chronic bronchitis; with (acute) exacerbation; acute exacerbation of COPD, decompensated COPD, decompensated COPD with exacerbation.<br>491.22 Obstructive chronic bronchitis; with acute bronchitis<br>493.21 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with status asthmaticus<br>493.22 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with (acute) exacerbation<br>ICD-10-CM codes used to define respiratory failure:<br>J9600 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia<br>J9690 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia<br>J80 Acute Respiratory distress syndrome<br>J9620 Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia<br>R092 Respiratory arrest<br>ICD-10-CM codes used to define acute exacerbation of COPD:<br>J441 Chronic obstructive pulmonary disease with (acute) exacerbation<br>J440 Chronic obstructive pulmonary disease with acute low respiratory infection |
| Exclusions | An index admission is any eligible admission to an acute care hospital assessed in the measure for the outcome (readmitted within 30 days of the date of discharge from the initial admission).<br>The measure excludes admissions for patients:<br>• with an in hospital death (because they are not eligible for readmission).<br>• transferred to another acute care facility (We assign the outcome for the acute episode of care to the hospital that discharges the patient to the non-acute care setting because the discharging hospital initiates the discharge and the transition to the outpatient setting. Therefore, the last admission in the acute care setting for the episode of care is eligible to be an index admission in the measure. The prior admissions in the same acute episode are excluded from the measure.)<br>• who were discharged alive and against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge).<br>• without at least 30 days post-discharge claims data (because the 30-day readmission outcome cannot be assessed in this group).<br>Additionally, admissions that occur within 30 days of the discharge date of an earlier index admission are not themselves considered to be index admissions. Any COPD admission can only be an index admission or a readmission, but not both.<br>Of note, a patient may satisfy multiple exclusion criteria. |
| Exclusion Details | We provide denominator exclusions details for the Medicare data. The specific fields used in "all-payer" data will vary.<br>In-hospital deaths are identified using the discharge disposition vital status indicator.<br>Transfers to other acute care facilities are defined when a patient with an inpatient hospital admission (with at least one qualifying COPD admission) is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day.<br>Discharges Against Medical Advice (AMA) are identified using the discharge disposition indicator.<br>Lack of claims data for 30 days post-discharge is identified by patient enrollment status in the CMS' Enrollment Database (EDB) (for Medicare FFS patients only). |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| Risk Adjustment | Statistical risk model<br>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.<br>The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. This approach to modeling appropriately accounts for the structure of the data (patients clustered within hospitals), the underlying risk due to patients' comorbidities, and sample size at a given hospital when estimating hospital readmission rates. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals.2 At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. The second level models hospital-specific intercepts as arising from a normal distribution. The hospital-specific intercepts represent the hospital contribution to the risk of readmission, after accounting for patient risk and sample size, and can be inferred as a measure of quality. 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.<br>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.<br>The predicted hospital outcome (the numerator) is the sum of predicted probabilities of readmission for all patients at a particular hospital. The predicted probability of each patient in that hospital is calculated using the hospital-specific intercept and patient risk factors. The expected number of readmissions (the denominator) is the sum of expected probabilities of readmission for all patients at a hospital. The expected probability of each patient in a hospital is calculated using a common intercept and patient risk factors.<br>Candidate and Final Risk-adjustment Variables: The measure was developed using Medicare FFS claims data. 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 Medicare claims 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 used condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes, and combinations of CCs as candidate variables. A file which contains a list of the ICD-9-CM codes and their groupings into CCs is available on www.qualitynet.org (http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979). We did not risk-adjust for CCs that were possible adverse events of care and that were only recorded in the index admission. Only comorbidities that conveyed information about the patient at that time or in the 12 months prior, and not complications that arose during the course of the hospitalization were included in the risk-adjustment.<br>References: |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| | 1. 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.<br>2. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.<br>Frequencies and odds ratios for the model development sample (2008 Medicare FFS patients aged 65 and older; n=170,480 admissions) are presented below.<br>Table 1: Final set of risk-adjustment variables:<br>Variable//Frequency (%)//Odds Ratio (95% confidence interval)<br>Demographic<br>• Age-65 (years above 65, continuous) for 65 and over cohorts/Frequency = -/OR (95% CI)=1.00 (1.00-1.00);<br>(this variable is Age (years, continuous) for 18 and over cohorts)<br>Cardiovascular/Respiratory<br>• Sleep Apnea (ICD-9 CM diagnosis codes: 327.20, 327.21, 327.23, 327.27, 327.29, 780.51, 780.53, 780.57) / Frequency=10.46% / OR (95% CI)=1.00 (0.96-1.03)<br>• History of mechanical ventilation (ICD-9 procedure codes: 93.90, 96.70, 96.71, 96.72)/ Frequency=7.33/ OR (95% CI)=1.13 (1.08-1.18)<br>• Respirator dependence/respiratory failure (CC 77-78)/ Frequency=1.38/ OR (95% CI)=1.12 (1.03-1.23)<br>• Cardio-respiratory failure and shock (CC 79)/ Frequency=29.84/ OR (95% CI)=1.21 (1.18-1.24)<br>• Congestive heart failure (CC 80)/ Frequency=43.86/ OR (95% CI)=1.21 (1.18-1.24)<br>• Chronic atherosclerosis (CC 83-84)/ Frequency=51.57/ OR (95% CI)=1.11 (1.08-1.13)<br>• Arrhythmias (CC 92-93)/ Frequency=37.2/ OR (95% CI)=1.17 (1.12-1.22)<br>• Vascular or circulatory disease (CC 104-106)/ Frequency=38.2/ OR (95% CI)=1.09 (1.05-1.14)<br>• Arrhythmias (CC 92-93)/ Frequency=38.48/ OR (95% CI)=1.14 (1.11-1.17)<br>• Other and Unspecified Heart Disease (CC 94)/ Frequency=19.45/ OR (95% CI)=1.08 (1.05-1.11)<br>• Vascular or Circulatory Disease (CC 104-106)/ Frequency=39.42/ OR (95% CI)=1.09 (1.06-1.11)<br>• Fibrosis of lung and other chronic lung disorder (CC 109)/ Frequency=18.12/ OR (95% CI)=1.09 (1.06-1.12)<br>• Pneumonia (CC 111-113)/ Frequency=51.51/ OR (95% CI)=1.10 (1.07-1.13)<br>Other Comorbid Conditions<br>• History of Infection (CC 1, 3-6)/ Frequency=32.16/ OR (95% CI)=1.08 (1.05-1.11)<br>• Metastatic cancer and acute leukemia (CC 7)/ Frequency=2.64/ OR (95% CI)=1.24 (1.15-1.33)<br>• Lung, upper digestive tract, and other severe cancers (CC 8)/ Frequency=5.91/ OR (95% CI)=1.19 (1.13-1.25)<br>• Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors; other respiratory and heart neoplasms (CC 9-11)/ Frequency=13.88/ OR (95% CI)=1.04 (1.01-1.08)<br>• Other digestive and urinary neoplasms (CC 12)/ Frequency=7.06/ OR (95% CI)=0.96 (0.92-1.01)<br>• Diabetes and DM complications (CC 15-20, 119-120)/ Frequency=39.15/ OR (95% CI)=1.08 (1.05-1.11)<br>• Protein-calorie malnutrition (CC 21)/ Frequency=7.57/ OR (95% CI)=1.14 (1.09-1.19)<br>• Disorders of Fluid/Electrolyte/Acid-Base (CC 22-23)/ Frequency=34.57/ OR (95% CI)=1.17 (1.14- |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| | 1.20)<br>• Other Endocrine/Metabolic/Nutritional Disorders (CC 24)/ Frequency=68.61/ OR (95% CI)=0.91 (0.89-0.94)<br>• Pancreatic Disease (CC 32)/ Frequency=4.85/ OR (95% CI)=1.12 (1.06-1.17)<br>• Peptic Ulcer, Hemorrhage, Other Specified Gastrointestinal Disorders (CC 34)/ Frequency=12.58/ OR (95% CI)=1.07 (1.03-1.11)<br>• Other Gastrointestinal Disorders (CC 36)/ Frequency=58.29/ OR (95% CI)=1.04 (1.02-1.07)<br>• Severe Hematological Disorders (CC44)/ Frequency=2.07 /OR (95% CI)=1.12 (1.04-1.20)<br>• Iron Deficiency and Other/Unspecified Anemias and Blood Disease (CC 47)/ Frequency=42.09/ OR (95% CI)=1.13 (1.10-1.16)<br>• Dementia and senility (CC 49-50)/ Frequency=17.07 /OR (95% CI)=1.00 (0.97-1.04)<br>• Drug/Alcohol Induced Dependence/Psychosis (CC 51-52)/ Frequency=3.67/ OR (95% CI)=1.15 (1.09-1.22)<br>• Major Psych Disorders (CC 54-56)/ Frequency=10.79/ OR (95% CI)=1.08 (1.04-1.12)<br>• Depression (CC 58)/ Frequency=19.63/ OR (95% CI)=1.06 (1.03-1.09)<br>• Anxiety Disorders (CC 59)/ Frequency=3.27/ OR (95% CI)=1.15 (1.08-1.22)<br>• Other Psychiatric Disorders (CC 60)/ Frequency=18.37/ OR (95% CI)=1.11 (1.08-1.15)<br>• Quadriplegia, paraplegia, functional disability (CC 67-69, 100-102, 177-178)/ Frequency=5.02/ OR (95% CI)=1.08 (1.02-1.13)<br>• Polyneuropathy (CC 71)/ Frequency=7.91/ OR (95% CI)=1.11 (1.06-1.16)<br>• Acute Coronary Syndrome (CC 81-82)/ Frequency=9.54/ OR (95% CI)=1.08 (1.04-1.12)<br>• Hypertensive Heart and Renal Disease or Encephalopathy (CC 89)/ Frequency=13.20/ OR (95% CI)=1.13 (1.09-1.17)<br>• Stroke (CC 95-96)/ Frequency=6.84/ OR (95% CI)=1.04 (1.00-1.09)<br>• Renal Failure (CC 131)/ Frequency=18.61/ OR (95% CI)=1.10 (1.06-1.14)<br>• Decubitus ulcer or chronic skin ulcer (CC 148-149)/ Frequency=7.43/ OR (95% CI)=1.03 (0.99-1.08)<br>• Cellulitis, Local Skin Infection (CC 152)/ Frequency=12.50/ OR (95% CI)=1.07 (1.03-1.11)<br>• Vertebral Fractures (CC 157)/ Frequency=5.24/ OR (95% CI)=1.14 (1.08 -1.19)<br>ICD-10-CM codes for model variables (for those variables defined by ICD-9 CM codes rather than CCs)<br>Mechanical Ventilation<br>• 5A09357 Assistance with Respiratory Ventilation, Less than 24 Consecutive Hours, Continuous Positive Airway Pressure<br>• 5A09457 Assistance with Respiratory Ventilation, 24-96 Consecutive Hours, Continuous Positive Airway Pressure<br>• 5A09557 Assistance with Respiratory Ventilation, Greater than 96 Consecutive Hours, Continuous Positive Airway Pressure<br>• 5A1935Z Respiratory Ventilation, Less than 24 Consecutive Hours<br>• 5A1945Z Respiratory Ventilation, 24-96 Consecutive Hours<br>•5A1955Z Respiratory Ventilation, Greater than 96 Consecutive Hours<br>Sleep Apnea<br>• G4730 Sleep apnea, unspecified<br>• G4731 Primary central sleep apnea<br>• G4733 Obstructive sleep apnea (adult) (pediatric) |

| | 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization |
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| | • G4737 Central sleep apnea in conditions classified elsewhere<br>• G4739 Other sleep apnea<br>Attachment Delv49b_COPD_ReadmissionMethodologyReport-9-29-11.pdf |
| Stratification | Results of this measure will not be stratified. |
| Type Score | Rate/proportion better quality = lower score |
| Algorithm | 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.<br>The predicted hospital outcome (the numerator) is the sum of predicted probabilities of readmission for all patients at a particular hospital. The predicted probability of each patient in that hospital is calculated using the hospital-specific intercept and patient risk factors. The expected number of readmissions (the denominator) is the sum of expected probabilities of readmission for all patients at a hospital. The expected probability of each patient in a hospital is calculated using a common intercept and patient risk factors.<br>Please see attachment for more details on the calculation algorithm. Attachment COPD Readmission Calculation Algorithm.pdf |
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| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| Status | Maintenance, Original Endorsement: May 15, 2008, Most Recent Endorsement: Jan 31, 2012 |
| Steward | Centers for Medicare and Medicaid Services Other organizations: The Joint Commission, Centers for Disease Control and Prevention, Infectious Diseases Society of America, American Thoracic Society, Johns Hopkins University, Northeastern Ohio Univ. College of Medicine, Pneumonia Patient Outcomes Team, New Jersey Medical |
| Description | Percent of pneumonia patients, age 18 years or older, transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital. |
| Type | Process |
| Data Source | Administrative claims, Paper Records Patient medical record can be collected using the CMS Abstraction and Reporting Tool (CART).<br>URL<br>http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1135267770141 N/A URL<br>http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4 |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | &cid=1228767363466 N/A |
| Level | Facility, Population : National, Population : Regional, Population : State |
| Setting | Hospital/Acute Care Facility |
| Numerator Statement | Number of pneumonia patients transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital |
| Numerator Details | Time Window: The time period included in this measure is from arrival to the hospital through 24 hours after arrival to the hospital.<br><br>The following patients are included in the numerator; pneumonia patients transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital<br>The data elements needed for the numerator are:<br>Arrival Date<br>Arrival Time<br>Blood Culture Collected<br>Initial Blood Culture Collection Date<br>Initial Blood Culture Collection Time |
| Denominator Statement | Patients, age 18 years or older, discharged with: ICD-9-CM principal diagnosis code of pneumonia OR ICD-9-CM principal diagnosis code of septicemia or respiratory failure (acute or chronic) AND an ICD-9-CM Other diagnosis code of pneumonia<br>Table 3.1 Pneumonia (PN)<br>ICD-9 Code Shortened Description<br>481 PNEUMOCOCCAL PNEUMONIA<br>482.0 K. PNEUMONIAE PNEUMONIA<br>482.1 PSEUDOMONAL PNEUMONIA<br>482.2 H.INFLUENZAE PNEUMONIA<br>482.30 STREPTOCOCCAL PNEUMN NOS<br>482.31 PNEUMONIA STRPTOCOCCUS A<br>482.32 PNEUMONIA STRPTOCOCCUS B<br>482.39 PNEUMONIA OTH STREP<br>482.40 STAPHYLOCOCCAL PNEU NOS<br>482.41 METH SUS PNEUM D/T STAPH<br>482.42 METH RES PNEU D/T STAPH<br>482.49 STAPH PNEUMONIA NEC<br>482.82 PNEUMONIA E COLI<br>482.83 PNEUMO OTH GRM-NEG BACT<br>482.84 LEGIONNAIRES´ DISEASE<br>482.89 PNEUMONIA OTH SPCF BACT<br>482.9 BACTERIAL PNEUMONIA NOS<br>483.0 PNEU MYCPLSM PNEUMONIAE<br>483.1 PNEUMONIA D/T CHLAMYDIA<br>483.8 PNEUMON OTH SPEC ORGNSM |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
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| | 485 BRONCHOPNEUMONIA ORG NOS<br>486 PNEUMONIA, ORGANISM NOS<br>Table 3.2 Septicemia<br>ICD-9 Code Shortened Description<br>038.0 STREPTOCOCCAL SEPTICEMIA<br>038.10 STAPHYLCOCC SEPTICEM NOS<br>038.11 METH SUSC STAPH AUR SEPT<br>038.12 MRSA SEPTICEMIA<br>038.19 STAPHYLCOCC SEPTICEM NEC<br>038.2 PNEUMOCOCCAL SEPTICEMIA<br>038.3 ANAEROBIC SEPTICEMIA<br>038.40 GRAM-NEG SEPTICEMIA NOS<br>038.41 H. INFLUENAE SEPTICEMIA<br>038.42 E COLI SEPTICEMIA<br>038.43 PSEUDOMONAS SEPTICEMIA<br>038.44 SERRATIA SEPTICEMIA<br>038.49 GRAM-NEG SEPTICEMIA NEC<br>038.8 SEPTICEMIA NEC<br>038.9 SEPTICEMIA NOS<br>995.91 SEPSIS<br>995.92 SEVERE SEPSIS<br>Table 3.3 Respiratory Failure<br>ICD-9 Code Shortened Description<br>518.81 ACUTE RESPIRATRY FAILURE<br>518.84 ACUTE & CHRONC RESP FAIL<br>Table 3.1 Pneumonia (PN)<br>ICD-10 Code Shortened Description<br>J 13 Pneumonia due to Streptococcus pneumoniae<br>J 18.1 Lobar pneumonia, unspecified organism<br>J 15.0 Pneumonia due to Klebsiella pneumoniae<br>J 15.1 Pneumonia due to Pseudomonas<br>J 14 Pneumonia due to Hemophilus influenzae<br>J 15.4 Pneumonia due to other streptococci<br>J 15.3 Pneumonia due to streptococcus, group B<br>J 15.20 Pneumonia due to staphylococcus, unspecified<br>J 15.21 Pneumonia due to staphylococcus aureus<br>Z 16 Infection and drug resistant microorganisms<br>J 15.29 Pneumonia due to other staphylococcus<br>J 15.5 Pneumonia due to Escherichia coli<br>J 15.6 Pneumonia due to other aerobic Gram-negative bacteria<br>A 48.1 Legionnaires' disease<br>J 15.8 Pneumonia due to other specified bacteria<br>J 15.9 Unspecified bacterial pneumonia |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
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| | J 15.7 Pneumonia due to Mycoplasma pneumoniae<br>J 16.0 Chlamydial pneumonia<br>J 16.8 Pneumonia due to other specified infectious organisms<br>J 18.0 Bronchopneumonia, unspecified organism<br>J 18.8 Other pneumonia, unspecified organism<br>J 18.9 Pneumonia, unspecified organism<br>J 17 Pneumonia in diseases classified elsewhere<br>J 18.2 Hypostatic pneumonia, unspecified organism<br>J 85.1 Abscess of lung with pneumonia<br>Table 3.2 Septicemia<br>ICD-10 Code Shortened Description<br>A 40.0 Sepsis due to streptococcus, group A<br>A 40.1 Sepsis due to streptococcus, group B<br>A 40.3 Sepsis due to Streptococcus pneumoniae<br>A 40.8 Other streptococcal sepsis<br>A 40.9 Streptococcal sepsis, unspecified<br>A 41.9 Sepsis unspecified<br>A 41.2 Sepsis due to other unspecified specified staphylococcus<br>A 41.0 Sepsis due to Staphylococcus aureus<br>A 41.0 AND U80.1 Sepsis due to Staphylococcus aureus AND Methicillin-resistant staph aureus infection<br>A 41.1 Sepsis due to other specified staphylococcus<br>A 41.89 Other specified sepsis<br>A 41.4 Sepsis due to anaerobes<br>A 41.50 Gram-negative sepsis, unspecified<br>A 41.3 Sepsis due to Hemophilus influenzae<br>A 41.51 Sepsis due to Escherichia coli ( E coli)<br>A 41.52 Sepsis due to pseudomonas<br>A 41.53 Sepsis due to Serratia<br>A 41.59 Other Gram-negative sepsis<br>A 41.81 Sepsis due to Enterococcus<br>A 42.7 Actinomycotic sepsis<br>A 41.9 Sepsis, unspecified<br>R65.20 Severe sepsis without septic shock<br>R65.21 Severe sepsis with septic shock<br>Table 3.3 Respiratory Failure<br>ICD-10 Code Shortened Description<br>J 96.0 Acute respiratory failure<br>J 96.9 Respiratory failure, unspecified<br>J 96.2 Acute and chronic respiratory failure<br>J 96.1 Chronic respiratory failure<br>J 80 Acute respiratory syndrome<br>J 22 Unspecified acute lower respiratory infection |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
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| | J 98.8 Other specified respiratory disorders |
| Denominator Details | Time Window: The time period included in this measure is from arrival to the hospital through 24 hours after arrival to the hospital.<br><br>Patients, age 18 years or older, discharged with: ICD-9-CM principal diagnosis code of pneumonia OR ICD-9-CM principal diagnosis code of septicemia or respiratory failure (acute or chronic) AND an ICD-9-CM Other diagnosis code of pneumonia<br>Table 3.1 Pneumonia (PN)<br>ICD-9 Code Shortened Description<br>481 PNEUMOCOCCAL PNEUMONIA<br>482.0 K. PNEUMONIAE PNEUMONIA<br>482.1 PSEUDOMONAL PNEUMONIA<br>482.2 H.INFLUENZAE PNEUMONIA<br>482.30 STREPTOCOCCAL PNEUMN NOS<br>482.31 PNEUMONIA STRPTOCOCCUS A<br>482.32 PNEUMONIA STRPTOCOCCUS B<br>482.39 PNEUMONIA OTH STREP<br>482.40 STAPHYLOCOCCAL PNEU NOS<br>482.41 METH SUS PNEUM D/T STAPH<br>482.42 METH RES PNEU D/T STAPH<br>482.49 STAPH PNEUMONIA NEC<br>482.82 PNEUMONIA E COLI<br>482.83 PNEUMO OTH GRM-NEG BACT<br>482.84 LEGIONNAIRES´ DISEASE<br>482.89 PNEUMONIA OTH SPCF BACT<br>482.9 BACTERIAL PNEUMONIA NOS<br>483.0 PNEU MYCPLSM PNEUMONIAE<br>483.1 PNEUMONIA D/T CHLAMYDIA<br>483.8 PNEUMON OTH SPEC ORGNSM<br>485 BRONCHOPNEUMONIA ORG NOS<br>486 PNEUMONIA, ORGANISM NOS<br>Table 3.2 Septicemia<br>ICD-9 Code Shortened Description<br>038.0 STREPTOCOCCAL SEPTICEMIA<br>038.10 STAPHYLCOCC SEPTICEM NOS<br>038.11 METH SUSC STAPH AUR SEPT<br>038.12 MRSA SEPTICEMIA<br>038.19 STAPHYLCOCC SEPTICEM NEC<br>038.2 PNEUMOCOCCAL SEPTICEMIA<br>038.3 ANAEROBIC SEPTICEMIA<br>038.40 GRAM-NEG SEPTICEMIA NOS<br>038.41 H. INFLUENAE SEPTICEMIA<br>038.42 E COLI SEPTICEMIA |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
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| | 038.43 PSEUDOMONAS SEPTICEMIA<br>038.44 SERRATIA SEPTICEMIA<br>038.49 GRAM-NEG SEPTICEMIA NEC<br>038.8 SEPTICEMIA NEC<br>038.9 SEPTICEMIA NOS<br>995.91 SEPSIS<br>995.92 SEVERE SEPSIS<br>Table 3.3 Respiratory Failure<br>ICD-9 Code Shortened Description<br>518.81 ACUTE RESPIRATRY FAILURE<br>518.84 ACUTE & CHRONC RESP FAIL<br>Table 3.1 Pneumonia (PN)<br>ICD-10 Code Shortened Description<br>J 13 Pneumonia due to Streptococcus pneumoniae<br>J 18.1 Lobar pneumonia, unspecified organism<br>J 15.0 Pneumonia due to Klebsiella pneumoniae<br>J 15.1 Pneumonia due to Pseudomonas<br>J 14 Pneumonia due to Hemophilus influenzae<br>J 15.4 Pneumonia due to other streptococci<br>J 15.3 Pneumonia due to streptococcus, group B<br>J 15.20 Pneumonia due to staphylococcus, unspecified<br>J 15.21 Pneumonia due to staphylococcus aureus<br>Z 16 Infection and drug resistant microorganisms<br>J 15.29 Pneumonia due to other staphylococcus<br>J 15.5 Pneumonia due to Escherichia coli<br>J 15.6 Pneumonia due to other aerobic Gram-negative bacteria<br>A 48.1 Legionnaires' disease<br>J 15.8 Pneumonia due to other specified bacteria<br>J 15.9 Unspecified bacterial pneumonia<br>J 15.7 Pneumonia due to Mycoplasma pneumoniae<br>J 16.0 Chlamydial pneumonia<br>J 16.8 Pneumonia due to other specified infectious organisms<br>J 18.0 Bronchopneumonia, unspecified organism<br>J 18.8 Other pneumonia, unspecified organism<br>J 18.9 Pneumonia, unspecified organism<br>J 17 Pneumonia in diseases classified elsewhere<br>J 18.2 Hypostatic pneumonia, unspecified organism<br>J 85.1 Abscess of lung with pneumonia<br>Table 3.2 Septicemia<br>ICD-10 Code Shortened Description<br>A 40.0 Sepsis due to streptococcus, group A<br>A 40.1 Sepsis due to streptococcus, group B<br>A 40.3 Sepsis due to Streptococcus pneumoniae |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | A 40.8 Other streptococcal sepsis<br>A 40.9 Streptococcal sepsis, unspecified<br>A 41.9 Sepsis unspecified<br>A 41.2 Sepsis due to other unspecified specified staphylococcus<br>A 41.0 Sepsis due to Staphylococcus aureus<br>A 41.0 AND U80.1 Sepsis due to Staphylococcus aureus AND Methicillin-resistant staph aureus infection<br>A 41.1 Sepsis due to other specified staphylococcus<br>A 41.89 Other specified sepsis<br>A 41.4 Sepsis due to anaerobes<br>A 41.50 Gram-negative sepsis, unspecified<br>A 41.3 Sepsis due to Hemophilus influenzae<br>A 41.51 Sepsis due to Escherichia coli ( E coli)<br>A 41.52 Sepsis due to pseudomonas<br>A 41.53 Sepsis due to Serratia<br>A 41.59 Other Gram-negative sepsis<br>A 41.81 Sepsis due to Enterococcus<br>A 42.7 Actinomycotic sepsis<br>A 41.9 Sepsis, unspecified<br>R65.20 Severe sepsis without septic shock<br>R65.21 Severe sepsis with septic shock<br>Table 3.3 Respiratory Failure<br>ICD-10 Code Shortened Description<br>J 96.0 Acute respiratory failure<br>J 96.9 Respiratory failure, unspecified<br>J 96.2 Acute and chronic respiratory failure<br>J 96.1 Chronic respiratory failure<br>J 80 Acute respiratory syndrome<br>J 22 Unspecified acute lower respiratory infection<br>J 98.8 Other specified respiratory disorders<br>The data elements needed for the denominator are:<br>Admission Date<br>Birthdate<br>Chest X-Ray<br>Clinical Trial<br>Comfort Measures Only<br>Discharge Date<br>ICD-9-CM Other Diagnosis Codes<br>ICD-9-CM Principal Diagnosis Codes<br>ICU Admission or Transfer<br>Pneumonia Diagnosis: ED/Direct Admit<br>Transfer from Another Hospital or ASC |
| Exclusions | Patients less than 18 years of age, |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | Patients with a length of stay greater than 120 days,<br>Patients with Cystic Fibrosis,<br>Patients who had not chest x-ray or CT scan that indicated abnormal findings within 24 hours prior to hospital arrival or anytime during this hospitalization,<br>Patients with Comfort Measures Only,<br>Patients enrolled in clinical trial,<br>Patients received as a transfer from emergency/observation department of another hospital,<br>Patients received as a transfer from an inpatient or outpatient department of another hospital,<br>Patients received as a transfer from an ambulatory surgery center,<br>Patients who had no diagnosis of pneumonia either as an ED final diagnosis/impression or direct admission diagnosis/impression and<br>Patients who have a duration of stay less than or equal to one day |
| Exclusion Details | All exclusions listed above.<br>Table 3.4 Cystic Fibrosis<br>ICD-9 Code Shortened Description<br>277.00 CYSTIC FIBROSIS W/O ILEUS<br>277.01 CYSTIC FIBROSIS W ILEUS<br>277.02 CYSTIC FIBROSIS W PUL MAN<br>277.03 CYSTIC FIBROSIS W GI MAN<br>277.09 CYSTIC FIBROSIS NEC<br>Table 3.4 Cystic Fibrosis<br>ICD-10 Code Shortened Description<br>E 84.9 Cystic fibrosis, unspecified<br>E 84.11 Meconium ileus in Cystic Fibrosis<br>E 84.0 Cystic fibrosis with pulmonary manifestations<br>E 84.19 Cystic fibrosis with other intestinal manifestations<br>E 84.8 Cystic fibrosis with other manifestations |
| Risk Adjustment | No risk adjustment or risk stratification<br>N/A |
| Stratification | This measure is not stratified. |
| Type Score | Rate/proportion better quality = higher score |
| Algorithm | Numerator: Number of pneumonia patients transferred or admitted to the ICU within 24 hours of hospital arrival who had blood cultures performed within 24 hours prior to or 24 hours after arrival at the hospital.<br>Denominator: Pneumonia ICU patients 18 years of age and older.<br>Variable Key: Duration of Stay, Arrival Date Time, Initial Blood Culture Date Time, Initial Blood Day, and Initial Blood Minutes<br>1. Start processing. Run cases that are included in the Pneumonia (PN) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.<br>2. Check Chest X-Ray<br>a. If Chest X-Ray is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | b. If Chest X-Ray equals 2 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If Chest X-Ray equals 1, continue processing and proceed to Comfort Measures Only.<br>3. Check Comfort Measures Only<br>a. If Comfort Measures Only is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If Comfort Measures Only equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If Comfort Measures Only equals 2, 3, or 4, continue processing and proceed to Clinical Trial.<br>4. Check Clinical Trial<br>a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If Clinical Trial equals No, continue processing and proceed to Transfer From Another Hospital or ASC.<br>5. Check Transfer From Another Hospital or ASC<br>a. If Transfer From Another Hospital or ASC is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If Transfer From Another Hospital or ASC equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If Transfer From Another Hospital or ASC equals No, continue processing and proceed to Pneumonia Diagnosis: ED/Direct Admit.<br>6. Check Pneumonia Diagnosis: ED/Direct Admit<br>a. If Pneumonia Diagnosis: ED/Direct Admit is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If Pneumonia Diagnosis: ED/Direct Admit equals 2, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If Pneumonia Diagnosis: ED/Direct Admit equals 3, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>d. If Pneumonia Diagnosis: ED/Direct Admit equals 1, continue processing and proceed to ICU Admission or Transfer.<br>7. Check ICU Admission or Transfer<br>a. If ICU Admission or Transfer is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If ICU Admission or Transfer equals 2 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>c. If ICU Admission or Transfer equals 1, continue processing and proceed to Blood Culture Collected.<br>8. Check Blood Culture Collected<br>a. If Blood Culture Collected is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If Blood Culture Collected equals 3, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing. |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | c. If Blood Culture Collected equals 1, 2, or 4, continue processing and proceed to Arrival Date.<br>9. Check Arrival Date<br>a. If the Arrival Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If the Arrival Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>c. If the Arrival Date equals a Non Unable to Determine Value, continue processing and proceed to the Duration of Stay calculation.<br>10. Calculate Duration of Stay. Duration of Stay, in days, is equal to the Discharge Date minus the Arrival Date.<br>11. Check Duration of Stay<br>a. If the Duration of Stay is less than or equal to 1, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.<br>b. If the Duration of Stay is greater than 1, continue processing and proceed to recheck Blood Culture Collected.<br>12. Recheck Blood Culture Collected<br>a. If Blood Culture Collected equals 4, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>b. If Blood Cultures Collected equals 1 or 2, continue processing and proceed to Initial Blood Culture Collection Date.<br>13. Check Initial Blood Culture Collection Date<br>a. If the Initial Blood Culture Collection Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If the Initial Blood Culture Collection Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>c. If the Initial Blood Culture Collection Date equals a Non Unable to Determine Value, continue processing and proceed to the Initial Blood Day calculation.<br>14. Calculate Initial Blood Day. The Initial Blood Day is equal to the Initial Blood Culture Collection Date minus the Arrival Date.<br>15. Check Initial Blood Day<br>a. If the Initial Blood Day is less than zero, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>If the Initial Blood Day is equal to zero, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population.<br>Note: Initial Blood Day equals zero means blood culture date same day as arrival date. So it is within 24 hours, no need for exact time. Stop processing.<br>b. If the Initial Blood Day is greater than zero, continue processing and proceed to Arrival Time.<br>16. Check Arrival Time<br>a. If the Arrival Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If the Arrival Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>c. If the Arrival Time equals a Non Unable to Determine Value, continue processing and proceed to |

| | 0356 PN3a--Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival |
|---|---|
| | Initial Blood Culture Collection Time.<br>17. Check Initial Blood Culture Collection Time<br>a. If the Initial Blood Culture Collection Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If the Initial Blood Culture Collection Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.<br>c. If the Initial Blood Culture Collection Time equals a Non Unable to Determine Value, continue processing and continue to concatenate the variables Arrival Date Time and Initial Blood Culture Date Time.<br>18. Concatenate arrival date and arrival time to create the variable Arrival Date Time. Concatenate initial blood culture collection date and initial blood culture collection time to create the variable Initial Blood Culture Date Time. Continue processing and proceed to the Initial Blood Minutes calculation.<br>19. Calculate Initial Blood Minutes. Initial Blood Minutes is equal to the Initial Blood Culture Date Time minus the Arrival Date Time.<br>20. Check Initial Blood Minutes<br>a. If the Initial Blood Minutes is less than zero, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.<br>b. If the Initial Blood Minutes is greater than or equal to zero and less than or equal to 1440 (24 hours), the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing.<br>c. If the Initial Blood Minutes is greater than 1440 (24 hours), the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing. URL<br>http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1228767363466 |
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# RESPECIFYING THE HOSPITAL 30-DAY PNEUMONIA AND 30-DAY CHRONIC OBSTRUCTIVE PULMONARY DISEASE READMISSION MEASURES BY ADDING A PLANNED READMISSION ALGORITHM

**Submitted By Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)**

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## Background

The Centers for Medicare & Medicaid Services (CMS) has developed hospital risk-standardized readmission measures for pneumonia and chronic obstructive pulmonary disorder (COPD). The pneumonia measure has been approved by the National Quality Forum (NQF), and both measures are currently under review at NQF[1]. CMS has contracted with Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE) to update these measures to identify and remove planned readmissions from the measure outcomes. This report describes the changes to each measure for consideration by NQF.

Readmission measures are intended to capture unplanned readmissions that arise from acute clinical events requiring urgent rehospitalization within 30 days of discharge. Higher than expected unplanned readmission rates suggest lower quality of hospital and post-discharge care and are the focus of hospital quality measurement as part of efforts to promote quality improvement. In contrast, planned readmissions are generally not a signal of quality of care. Furthermore, there is concern that including planned readmissions in a readmission measure could create a disincentive to provide appropriate care to patients who are scheduled for elective or necessary procedures unrelated to the prior admissions.

During development of the readmission measures, YNHHSC/CORE clinicians, additional clinical consultants, and technical expert panels identified readmissions for each measure that are typically scheduled as follow-up care within 30 days of discharge. For pneumonia and COPD they concluded that there are no readmissions that are typically scheduled as follow-up care to treat either condition within 30 days of a discharge. However, there has been growing interest in identifying and excluding from this measure planned readmissions for procedures and treatments such as chemotherapy, which are not directly related to the index admission, but were likely planned.

To more broadly identify planned readmissions, CMS contracted with YNHHSC/CORE to develop a planned readmission "algorithm" (a set of criteria) for classifying readmissions as planned using 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 was developed for a hospital-wide cohort of patients regardless of the index admission diagnosis. Since it identifies commonly planned readmissions for all types of patients, it is a comprehensive definition of planned readmissions that includes procedures and conditions that are not considered follow-up care for pneumonia or COPD admissions (e.g. elective cholecystectomy). The planned readmission algorithm therefore can be used to enhance the identification of planned readmissions in the readmission measures.

We have updated both readmission measures by applying this planned readmission algorithm. In this report we present: (1) an overview of the planned readmission algorithm; (2) our approach to applying the planned readmission algorithm to each readmission measure; (3) an impact analysis of how this

[1] Measure numbers are: pneumonia – 0506 and COPD - 1891

change in the measure affects the readmissions identified as planned, the rate of planned readmissions, model performance, and the distribution of hospital rates; and (4) a summary of the measure updates.

## 1. Planned Readmission Algorithm Overview

We based the planned readmission algorithm on three principles:

1. A few specific, limited types of care are always considered planned (obstetrical delivery, transplant surgery, maintenance chemotherapy, rehabilitation);
2. 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.

Clinicians in our internal working group reviewed the full list of Agency for Healthcare Research and Quality (AHRQ) Procedure Clinical Classification Software (Proc CCS) codes and identified procedure categories that are commonly planned based on these principles. The full preliminary list of planned readmissions and acute diagnoses was posted as part of two public comment periods for the Hospital-Wide All-Cause Unplanned Readmission Measure. The details of the resulting algorithm are presented in Appendix A. In brief, the algorithm uses a flow chart (Figure A 1) and four tables of specific procedure categories and discharge diagnosis categories to classify readmissions as planned or unplanned. Specifically:

1. Table A 1 lists four procedure categories that are always planned regardless of diagnosis;
2. Table A 2 lists four diagnosis categories that are always planned regardless of procedure;
3. Table A 3 presents the list of potentially planned procedure categories (readmissions with these procedures are considered planned if not accompanied by an acute discharge diagnosis); and
4. Table A 4 presents the acute diagnosis categories that disqualify a potentially planned readmission from being considered planned.

## 2. Applying the Planned Readmission Algorithm

### Approach to applying the planned readmission algorithm

Since we developed the planned readmission algorithm in a hospital-wide cohort of patients, our first step in applying it to condition-specific measures was to review the potentially planned procedures in the algorithm (Table A 3) and identify any procedures that should be added or removed to adapt the algorithm for each cohort of patients. Specifically, we took the following steps:

1. We applied the algorithm to each readmission measure, and examined the procedures and associated diagnoses that were identified as being potentially planned.
2. YNHHSC/CORE clinicians reviewed the results for face validity and determined whether any procedures considered planned by the algorithm were likely unplanned among each patient population.

3. Our team of clinicians also determined whether any additional procedures not identified as potentially planned by the algorithm should in fact be considered planned for these patient groups.
4. Based on these considerations, we finalized the algorithm for each readmission measure.

## 3. Impact Analyses

### Pneumonia Measure

Based on our review, we updated the pneumonia readmission measure by applying the planned readmission algorithm without any adaptation. In reviewing the planned readmission algorithm for use in the pneumonia readmission measure (**step 2**), our clinicians did not identify any procedure categories that should be removed from the algorithm because they would unlikely be planned in this patient population. Similarly, the clinicians felt that the algorithm captured all appropriate planned readmissions for this measure (**step 3**).

We compared the results of the original, NQF-endorsed and updated pneumonia readmission measures to assess the effect of updating the measure with the planned readmission algorithm.

#### Data

The measures were applied to admissions during the period between July 2008 to June 2011. There were 1,096,708 index admissions for pneumonia at 4,859 hospitals.

#### Readmissions identified as planned in the updated measure

The updated measure identified 6,928 planned readmissions. The top 10 procedures among planned readmissions identified by the updated measure are presented in Table 1.

**Table 1: Top 10 Planned Procedures among Planned Readmissions Following Pneumonia Discharge**

| Procedure CCS | Procedure Description | Number of Planned Procedures |
|---|---|---|
| 47 | Diagnostic cardiac catheterization; coronary arteriography | 1,129 |
| 48 | Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator | 582 |
| 84 | Cholecystectomy and common duct exploration | 428 |
| 67 | Other therapeutic procedures; hemic and lymphatic system | 310 |
| 211 | Therapeutic radiology for cancer treatment | 298 |
| 999 | Maintenance Chemotherapy | 284 |
| 78 | Colorectal resection | 277 |
| 169 | Debridement of wound; infection or burn | 274 |
| 157 | Amputation of lower extremity | 214 |
| 159 | Other diagnostic procedures on musculoskeletal system | 214 |

### Rate of planned readmissions identified by the original NQF-endorsed and updated measures

Using the original, NQF-endorsed measure, the crude 30-day unplanned readmission rate was 18.5%. The updated measure decreased the number of readmissions counted in the outcome by identifying some readmissions as planned. For the updated measure, the crude 30-day unplanned readmission rate was 17.8%. The updated measure has a planned readmission rate of 0.6% (discrepancy due to rounding).

### Comparison of model performance

To assess potential change in model performance, we calculated the c-statistic for the original, NQF-endorsed measure and the updated measure. The c-statistic changed negligibly from 0.631 to 0.634.

We also examined the odds ratios for the risk factors and their 95% confidence intervals (CIs) to determine whether this update substantially changed model variables, which would suggest they should be re-selected. The odds ratios for the original, NQF-endorsed measure and for the updated measure are in Appendix B in Table B.1. The odds ratios are nearly identical, indicating that the risk factors have a similar magnitude of effect regardless of whether or not the planned readmissions are counted in the readmission outcome.

### Impact on distribution of RSRRs and relative performance of hospitals

To assess the effect on hospitals' relative performance, we examined the distribution of the Risk-Standardized Readmission Rates (RSRR) in the original, NQF-endorsed measure and the updated measure. The distribution of RSRRs shifted slightly downward from the original, NQF-endorsed measure (Figure 1) for the updated measure (Figure 2). This is expected given that the updated crude 30-day unplanned readmission rate decreased from 18.5% to 17.8%.

We then examined the distribution of the difference in hospitals' RSRR values (RSRR of the original, NQF-endorsed measure subtracted from the RSRR of the updated measure). A narrow distribution would suggest that the relative performance of hospitals is not substantially affected by the change. The median difference in hospital RSRRs was -0.6. All hospitals experienced a decrease in their rate and, for most, the difference was between -1.3 and -0.3 (Figure 3).

**Figure 1: Distribution of Hospital RSRRs for the Original, NQF-Endorsed Pneumonia Measure**

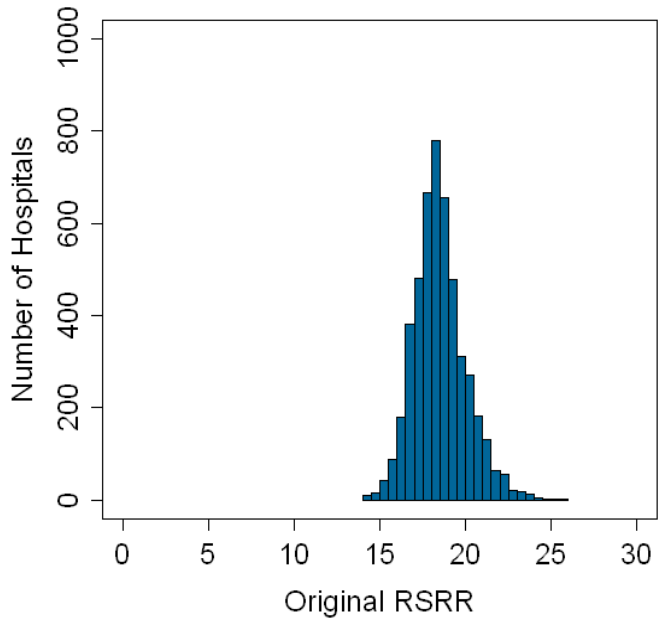



**Figure 2: Distribution of Hospital RSRRs for the Updated Pneumonia Measure**

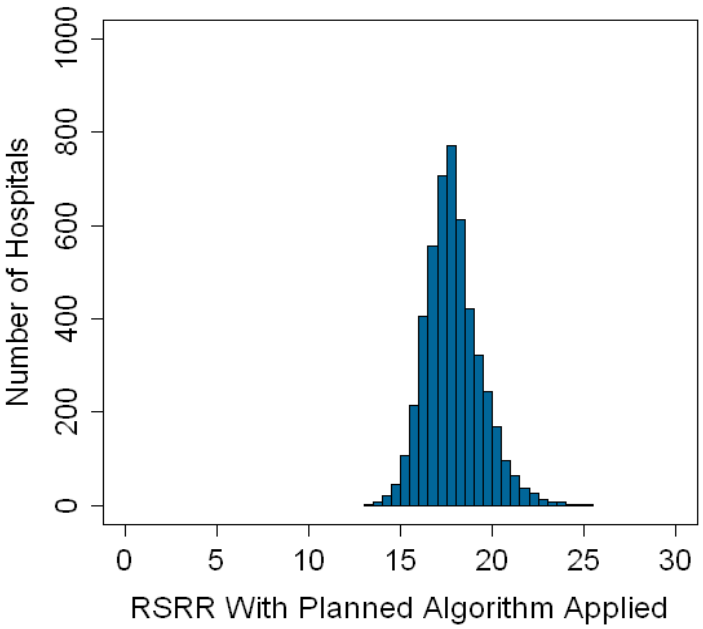
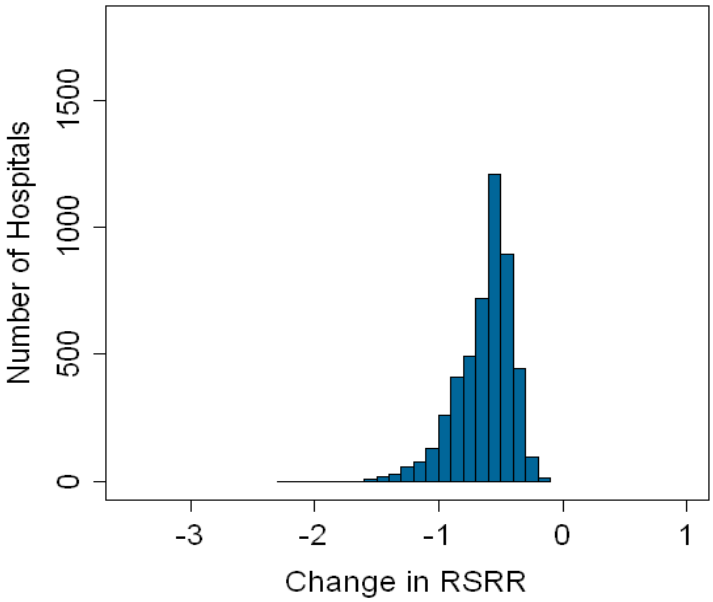


**Figure 3: Distribution of Hospitals' Change in RSRR for Pneumonia after Applying the Planned Readmission Algorithm**



## COPD Measure

Based on our review, we updated the COPD readmission measure by applying the planned readmission algorithm without any adaptation. In reviewing the planned readmission algorithm for use in the COPD readmission measure (**step 2**), our clinicians did not identify any procedure categories that should be removed from the algorithm because they would likely be unplanned in this patient population. Similarly, the clinicians felt that the algorithm captured all appropriate planned readmissions for this measure (**step 3**).

We compared the results of the original, NQF-endorsed and updated readmission measures to assess the effect of updating the measure with the planned readmission algorithm.

### Data

The measures were applied to admissions during the 2008 calendar year. There were 352,631 index admissions for COPD at 4,637 hospitals.

### Readmissions identified as planned in the updated measure

The updated measure identified 2,219 planned readmissions. The top 10 procedures among planned readmissions identified by the updated measure are presented in Table 2.

**Table 2: Top 10 Planned Procedures among Planned Readmissions Following COPD Discharge**

| Procedure CCS | Procedure Description | Number of Planned Procedures |
|---|---|---|
| 47 | Diagnostic cardiac catheterization; coronary arteriography | 601 |
| 48 | Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator | 153 |
| 84 | Cholecystectomy and common duct exploration | 132 |
| 78 | Colorectal resection | 91 |
| 159 | Other diagnostic procedures on musculoskeletal system | 79 |
| 211 | Therapeutic radiology for cancer treatment | 75 |
| 113 | Transurethral resection of prostate (TURP) | 69 |
| 51 | Endarterectomy; vessel of head and neck | 57 |
| 5 | Insertion of catheter or spinal stimulator and injection into spinal canal | 54 |
| 86 | Other hernia repair | 53 |

### Rate of planned readmissions identified by original NQF-endorsed and updated measures

Using the original, NQF-endorsed measure, the crude 30-day unplanned readmission rate was 21.9%. The updated measure decreased the number of readmissions counted in the outcome by identifying some readmissions as planned. For the updated measure, the crude 30-day unplanned readmission rate was 21.3%. The revised measure has a planned readmission rate of 0.6%.

### Comparison of model performance

To assess potential change in model performance, we calculated the c-statistic for the original, NQF-endorsed measure and the updated measure. The c-statistic changed negligibly from 0.629 to 0.631.

We also examined the odds ratios for the risk factors and their 95% confidence intervals (CIs) to determine whether this update substantially changed model variables, which would suggest they should be re-selected. The odds ratios for the original, NQF-endorsed measure and for the updated measure are in Appendix B in Table B 2. The odds ratios are nearly identical, indicating that the risk factors have a similar magnitude of effect regardless of whether or not the planned readmissions are counted in the readmission outcome.

### Impact on distribution of RSRRs and relative performance of hospitals

To assess the effect on hospitals' relative performance, we examined the distribution of the Risk-Standardized Readmission Rates (RSRR) in the original, NQF-endorsed measure and the updated measure. The distribution of RSRRs shifted slightly downward from the original, NQF-endorsed measure (Figure 4) for the updated measure (Figure 5). This is expected given that the updated measured readmission rate decreased from 21.9% to 21.3%.

We then examined the distribution of the difference in hospitals' RSRR values (RSRR of the original, NQF-endorsed measure subtracted from the RSRR of the updated measure). A narrow distribution would suggest that the relative performance of hospitals is not substantially affected by the change. The median difference in hospital RSRRs was -0.6. All hospitals experienced a decrease in their rate and, for most, the difference was between -1.2 and -0.4. (Figure 6)

**Figure 4: Distribution of Hospital RSRRs for the Original, NQF-Endorsed COPD Measure**

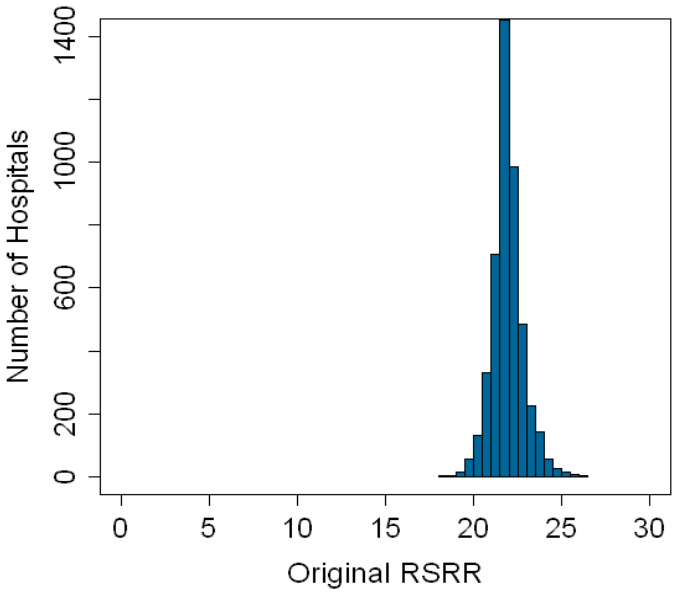



**Figure 5: Distribution of Hospital RSRRs for the Updated COPD Measure**

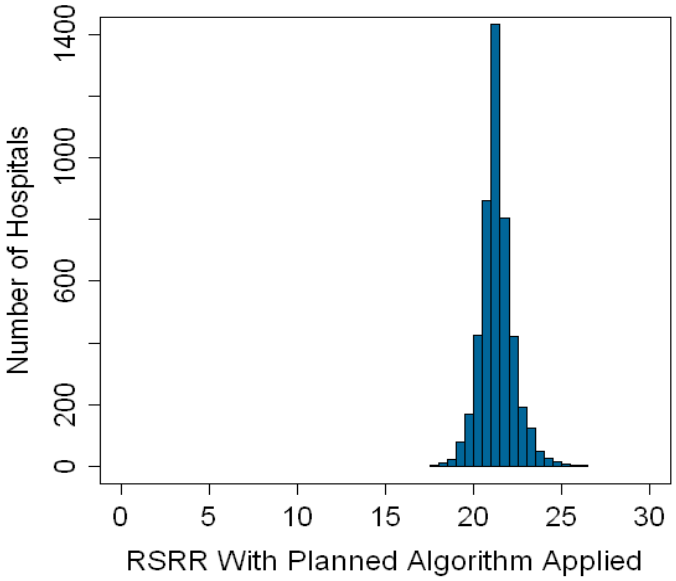
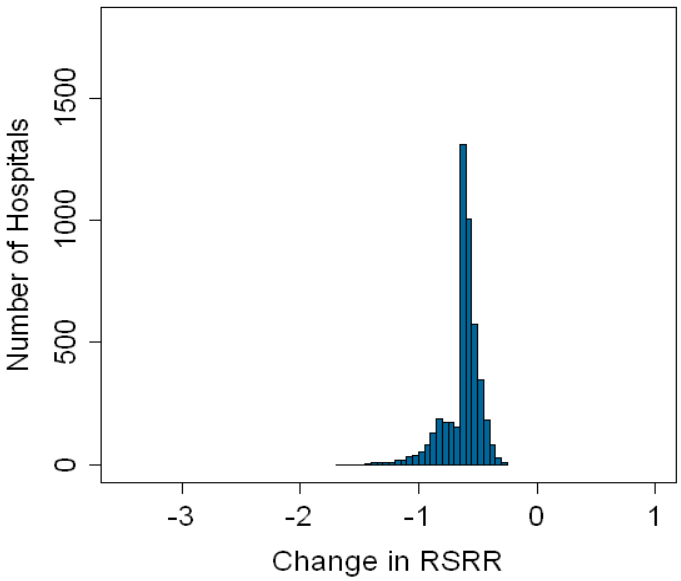


**Figure 6: Distribution of Hospitals' Change in RSRR for COPD after Applying the Planned Readmission Algorithm**



## 4. Summary of Measure Updates

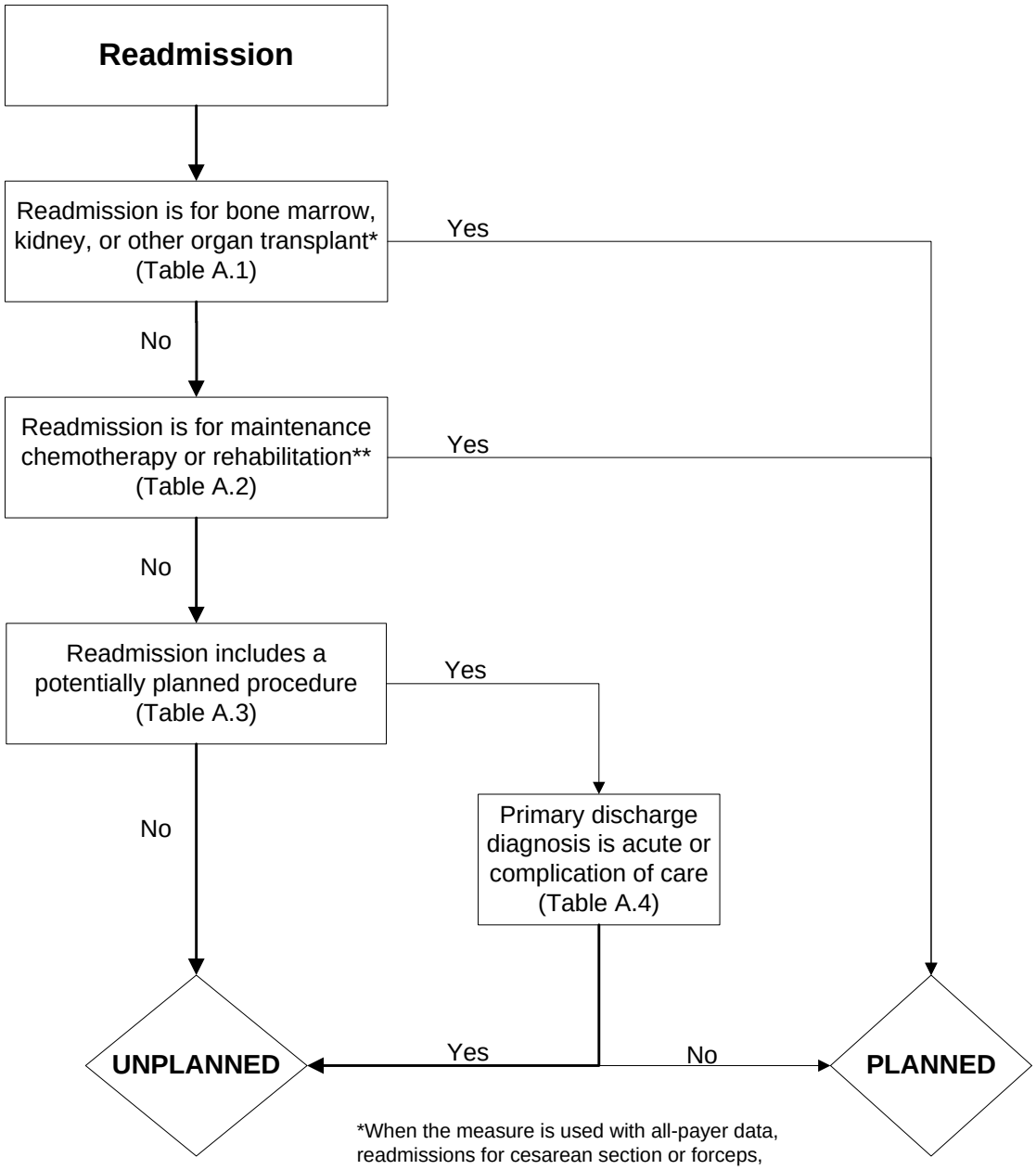
For the pneumonia readmission measure, we applied the planned readmission algorithm without adaptation to the original, NQF-endorsed measure. In the updated measure, the measured crude readmission rate was 17.8%.

For the COPD readmission measure, we also applied the planned readmission algorithm without adaptation to the original, NQF-endorsed measure. In the updated measure, the measured crude readmission rate was 21.3%.

Using the planned readmission algorithm improves the way the readmission measures identify planned readmissions. These measure updates further strengthen the measures' validity and minimizes any incentive on the part of hospitals to postpone appropriate care for patients who are scheduled for elective or necessary procedures.

# Appendix A

**Figure A 1: Planned Readmission Algorithm**




*When the measure is used with all-payer data, readmissions for cesarean section or forceps, vacuum, or breech delivery are considered planned

**When the measure is used with all-payer data, readmissions for forceps or normal delivery are considered planned

## Planned Readmission Algorithm

1. There are several procedures (Table A.1) and diagnoses (Table A.2) for which readmissions are always considered planned

**Table A 1: Procedure Categories that are Always Planned regardless of Diagnosis**

| Procedure CCS[2] | Description |
|---|---|
| 64 | Bone marrow transplant |
| 105 | Kidney transplant |
| 134 | Cesarean section[3] |
| 135 | Forceps; vacuum; and breech delivery[3] |
| 176 | Other organ transplantation |

**Table A 2: Diagnosis Categories that are Always Planned regardless of Procedure**

| Diagnosis CCS[2] | Description |
|---|---|
| 45 | Maintenance chemotherapy |
| 194 | Forceps delivery[3] |
| 196 | Normal pregnancy and/or delivery[3] |
| 254 | Rehabilitation |

[2] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

[3] CCS to be included only in all-payer settings, not intended for inclusion in CMS' claims-based readmission measures for Medicare fee-for-service beneficiaries aged 65+ years

2. Readmissions that include any typically scheduled or elective procedures are considered planned *if the readmission is not for an acute diagnosis*

    - The algorithm identifies a finite list of typically scheduled or elective procedures

    - The list includes 60 AHRQ procedure categories from among 231 AHRQ procedure categories, plus 11 individual ICD-9 procedure codes (Table A.3)
        Examples: total hip replacement; hernia repair

    - Readmissions with these specific procedures are considered planned unless the readmission diagnosis is acute
        - Example: hip replacement is considered unplanned if hip fracture is the discharge diagnosis

3. Readmissions for acute diagnoses or complications of care are not considered planned

    - The algorithm identifies a finite list of acute diagnoses (Table A.4)

    - The list includes 99 diagnosis groups from among 285 AHRQ condition categories, plus 4 groupings of individual ICD-9 diagnosis codes that represent cardiac diagnoses that would not be associated with a planned readmission
        - Examples: sepsis, acute myocardial infarction, fracture, ischemic stroke, pneumonia

    - No readmissions with these specific discharge diagnoses are considered planned (unless a procedure always considered planned, such as transplant or obstetrical delivery, occurred)

**Table A 3: List of Potentially Planned Procedure Categories**

| Procedure CCS[4] | Description |
|---|---|
| 3 | Laminectomy; excision intervertebral disc |
| 5 | Insertion of catheter or spinal stimulator and injection into spinal |
| 9 | Other OR therapeutic nervous system procedures |
| 10 | Thyroidectomy; partial or complete |
| 12 | Other therapeutic endocrine procedures |
| 33 | Other OR therapeutic procedures on nose; mouth and pharynx |
| 36 | Lobectomy or pneumonectomy |
| 38 | Other diagnostic procedures on lung and bronchus |
| 40 | Other diagnostic procedures of respiratory tract and mediastinum |
| 43 | Heart valve procedures |
| 44 | Coronary artery bypass graft (CABG) |
| 45 | Percutaneous transluminal coronary angioplasty (PTCA) |
| 47 | Diagnostic cardiac catheterization; coronary arteriography |
| 48 | Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator |
| 49 | Other OR heart procedures |
| 51 | Endarterectomy; vessel of head and neck |
| 52 | Aortic resection; replacement or anastomosis |
| 53 | Varicose vein stripping; lower limb |
| 55 | Peripheral vascular bypass |
| 56 | Other vascular bypass and shunt; not heart |
| 59 | Other OR procedures on vessels of head and neck |
| 62 | Other diagnostic cardiovascular procedures |
| 66 | Procedures on spleen |
| 67 | Other therapeutic procedures; hemic and lymphatic system |
| 74 | Gastrectomy; partial and total |
| 78 | Colorectal resection |
| 79 | Local excision of large intestine lesion (not endoscopic) |
| 84 | Cholecystectomy and common duct exploration |
| 85 | Inguinal and femoral hernia repair |
| 86 | Other hernia repair |
| 99 | Other OR gastrointestinal therapeutic procedures |
| 104 | Nephrectomy; partial or complete |
| 106 | Genitourinary incontinence procedures |
| 107 | Extracorporeal lithotripsy; urinary |
| 109 | Procedures on the urethra |
| 112 | Other OR therapeutic procedures of urinary tract |
| 113 | Transurethral resection of prostate (TURP) |

[4] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

| Procedure CCS[4] | Description |
|---|---|
| 114 | Open prostatectomy |
| 119 | Oophorectomy; unilateral and bilateral |
| 120 | Other operations on ovary |
| 124 | Hysterectomy; abdominal and vaginal |
| 129 | Repair of cystocele and rectocele; obliteration of vaginal vault |
| 132 | Other OR therapeutic procedures; female organs |
| 142 | Partial excision bone |
| 152 | Arthroplasty knee |
| 153 | Hip replacement; total and partial |
| 154 | Arthroplasty other than hip or knee |
| 157 | Amputation of lower extremity |
| 158 | Spinal fusion |
| 159 | Other diagnostic procedures on musculoskeletal system |
| 166 | Lumpectomy; quadrantectomy of breast |
| 167 | Mastectomy |
| 169 | Debridement of wound; infection or burn |
| 172 | Skin graft |
| 211 | Therapeutic radiology for cancer treatment |
| **ICD-9 Codes** | **Description** |
| 30.1, 30.29, 30.3, 30.4, 31.74, 34.6 | Laryngectomy, revision of tracheostomy, scarification of pleura (from Proc CCS 42- Other OR Rx procedures on respiratory system and mediastinum) |
| 38.18 | Endarterectomy leg vessel (from Proc CCS 60- Embolectomy and endarterectomy of lower limbs) |
| 55.03, 55.04 | Percutaneous nephrostomy with and without fragmentation (from Proc CCS 103- Nephrotomy and nephrostomy) |
| 94.26, 94.27 | Electroshock therapy (from Proc CCS 218- Psychological and psychiatric evaluation and therapy) |

**Table A 4: Acute Diagnosis Categories that Disqualify a Readmission from Being Considered Planned**

| Diagnosis CCS[5] | Description |
|---|---|
| 1 | Tuberculosis |
| 2 | Septicemia (except in labor) |
| 3 | Bacterial infection; unspecified site |
| 4 | Mycoses |
| 5 | HIV infection |
| 7 | Viral infection |
| 8 | Other infections; including parasitic |
| 9 | Sexually transmitted infections (not HIV or hepatitis) |
| 54 | Gout and other crystal arthropathies |
| 55 | Fluid and electrolyte disorders |
| 60 | Acute posthemorrhagic anemia |
| 61 | Sickle cell anemia |
| 63 | Diseases of white blood cells |
| 76 | Meningitis (except that caused by tuberculosis or sexually transmitted disease) |
| 77 | Encephalitis (except that caused by tuberculosis or sexually transmitted disease) |
| 78 | Other CNS infection and poliomyelitis |
| 82 | Paralysis |
| 83 | Epilepsy; convulsions |
| 84 | Headache; including migraine |
| 85 | Coma; stupor; and brain damage |
| 87 | Retinal detachments; defects; vascular occlusion; and retinopathy |
| 89 | Blindness and vision defects |
| 90 | Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease) |
| 91 | Other eye disorders |
| 92 | Otitis media and related conditions |
| 93 | Conditions associated with dizziness or vertigo |
| 100 | Acute myocardial infarction |
| 102 | Nonspecific chest pain |
| 104 | Other and ill-defined heart disease |
| 107 | Cardiac arrest and ventricular fibrillation |
| 109 | Acute cerebrovascular disease |
| 112 | Transient cerebral ischemia |
| 116 | Aortic and peripheral arterial embolism or thrombosis |
| 118 | Phlebitis; thrombophlebitis and thromboembolism |
| 120 | Hemorrhoids |
| 122 | Pneumonia (except that caused by TB or sexually transmitted disease) |
| 123 | Influenza |

[5] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

| Diagnosis CCS[5] | Description |
|---|---|
| 124 | Acute and chronic tonsillitis |
| 125 | Acute bronchitis |
| 126 | Other upper respiratory infections |
| 127 | Chronic obstructive pulmonary disease and bronchiectasis |
| 128 | Asthma |
| 130 | Pleurisy; pneumothorax; pulmonary collapse |
| 131 | Respiratory failure; insufficiency; arrest (adult) |
| 135 | Intestinal infection |
| 137 | Diseases of mouth; excluding dental |
| 139 | Gastroduodenal ulcer (except hemorrhage) |
| 140 | Gastritis and duodenitis |
| 142 | Appendicitis and other appendiceal conditions |
| 145 | Intestinal obstruction without hernia |
| 146 | Diverticulosis and diverticulitis |
| 148 | Peritonitis and intestinal abscess |
| 153 | Gastrointestinal hemorrhage |
| 154 | Noninfectious gastroenteritis |
| 157 | Acute and unspecified renal failure |
| 159 | Urinary tract infections |
| 165 | Inflammatory conditions of male genital organs |
| 168 | Inflammatory diseases of female pelvic organs |
| 169 | Debridement of wound; infection or burn |
| 172 | Ovarian cyst |
| 197 | Skin and subcutaneous tissue infections |
| 198 | Other inflammatory condition of skin |
| 225 | Joint disorders and dislocations; trauma-related |
| 226 | Fracture of neck of femur (hip) |
| 227 | Spinal cord injury |
| 228 | Skull and face fractures |
| 229 | Fracture of upper limb |
| 230 | Fracture of lower limb |
| 232 | Sprains and strains |
| 233 | Intracranial injury |
| 234 | Crushing injury or internal injury |
| 235 | Open wounds of head; neck; and trunk |
| 237 | Complication of device; implant or graft |
| 238 | Complications of surgical procedures or medical care |
| 239 | Superficial injury; contusion |
| 240 | Burns |
| 241 | Poisoning by psychotropic agents |
| 242 | Poisoning by other medications and drugs |

| Diagnosis CCS[5] | Description |
|---|---|
| 243 | Poisoning by nonmedicinal substances |
| 244 | Other injuries and conditions due to external causes |
| 245 | Syncope |
| 246 | Fever of unknown origin |
| 247 | Lymphadenitis |
| 249 | Shock |
| 250 | Nausea and vomiting |
| 251 | Abdominal pain |
| 252 | Malaise and fatigue |
| 253 | Allergic reactions |
| 259 | Residual codes; unclassified |
| 650 | Adjustment disorders |
| 651 | Anxiety disorders |
| 652 | Attention-deficit, conduct, and disruptive behavior disorders |
| 653 | Delirium, dementia, and amnestic and other cognitive disorders |
| 656 | Impluse control disorders, NEC |
| 658 | Personality disorders |
| 660 | Alcohol-related disorders |
| 661 | Substance-related disorders |
| 662 | Suicide and intentional self-inflicted injury |
| 663 | Screening and history of mental health and substance abuse codes |
| 670 | Miscellaneous disorders |
| **ICD-9 codes** | **Description** |
| **Acute ICD-9 codes within Dx CCS 97: Peri-; endo-; and myocarditis; cardiomyopathy** | |
| 03282 | Diphtheritic myocarditis |
| 03640 | Meningococcal carditis nos |
| 03641 | Meningococcal pericarditis |
| 03642 | Meningococcal endocarditis |
| 03643 | Meningococcal myocarditis |
| 07420 | Coxsackie carditis nos |
| 07421 | Coxsackie pericarditis |
| 07422 | Coxsackie endocarditis |
| 07423 | Coxsackie myocarditis |
| 11281 | Candidal endocarditis |
| 11503 | Histoplasma capsulatum pericarditis |
| 11504 | Histoplasma capssulatum endocarditis |
| 11513 | Histoplasma duboisii pericarditis |
| 11514 | Histoplasma duboisii endocarditis |
| 11593 | Histoplasmosis pericarditis |
| 11594 | Histoplasmosis endocarditis |
| 1303 | Toxoplasma myocarditis |
| 3910 | Acute rheumatic pericarditis |

| Diagnosis CCS[5] | Description |
|---|---|
| 3911 | Acute rheumatic endocarditis |
| 3912 | Acute rheumatic myocarditis |
| 3918 | Acute rheumatic heart disease nec |
| 3919 | Acute rheumatic heart disease nos |
| 3920 | Rheumatic chorea w heart involvement |
| 3980 | Rheumatic myocarditis |
| 39890 | Rheumatic heart disease nos |
| 39899 | Rheumatic heart disease nec |
| 4200 | Acute pericarditis in other disease |
| 42090 | Acute pericarditis nos |
| 42091 | Acute idiopath pericarditis |
| 42099 | Acute pericarditis nec |
| 4210 | Acute/subacute bacterial endocarditis |
| 4211 | Acute endocarditis in other diseases |
| 4219 | Acute/subacute endocarditis nos |
| 4220 | Acute myocarditis in other diseases |
| 42290 | Acute myocarditis nos |
| 42291 | Idiopathic myocarditis |
| 42292 | Septic myocarditis |
| 42293 | Toxic myocarditis |
| 42299 | Acute myocarditis nec |
| 4230 | Hemopericardium |
| 4231 | Adhesive pericarditis |
| 4232 | Constrictive pericarditis |
| 4233 | Cardiac tamponade |
| 4290 | Myocarditis nos |
| **Acute ICD-9 codes within Dx CCS 105: Conduction disorders** | |
| 4260 | Atrioventricular block complete |
| 42610 | Atrioventricular block nos |
| 42611 | Atrioventricular block-1st degree |
| 42612 | Atrioventricular block-mobitz ii |
| 42613 | Atrioventricular block-2nd degree nec |
| 4262 | Left bundle branch hemiblock |
| 4263 | Left bundle branch block nec |
| 4264 | Right bundle branch block |
| 42650 | Bundle branch block nos |
| 42651 | Right bundle branch block/left posterior fascicular block |
| 42652 | Right bundle branch block/left ant fascicular block |
| 42653 | Bilateral bundle branch block nec |
| 42654 | Trifascicular block |
| 4266 | Other heart block |
| 4267 | Anomalous atrioventricular excitation |
| 42681 | Lown-ganong-levine syndrome |

| Diagnosis CCS[5] | Description |
|---|---|
| 42682 | Long qt syndrome |
| 4269 | Conduction disorder nos |
| **Acute ICD-9 codes within Dx CCS 106: Dysrhythmia** | |
| 4272 | Paroxysmal tachycardia nos |
| 7850 | Tachycardia nos |
| 42789 | Cardiac dysrhythmias nec |
| 4279 | Cardiac dysrhythmia nos |
| 42769 | Premature beats nec |
| **Acute ICD-9 codes within Dx CCS 108: Congestive heart failure; nonhypertensive** | |
| 39891 | Rheumatic heart failure |
| 4280 | Congestive heart failure |
| 4281 | Left heart failure |
| 42820 | Unspecified systolic heart failure |
| 42821 | Acute systolic heart failure |
| 42823 | Acute on chronic systolic heart failure |
| 42830 | Unspecified diastolic heart failure |
| 42831 | Acute diastolic heart failure |
| 42833 | Acute on chronic diastolic heart failure |
| 42840 | Unpec combined syst & dias heart failure |
| 42841 | Acute combined systolic & diastolic heart failure |
| 42843 | Acute on chronic combined systolic & diastolic heart failure |
| 4289 | Heart failure nos |

# Appendix B

**Table B 1: Pneumonia Measure Odds Ratios and 95% Confidence Intervals**

| Pneumonia Effect | NQF Endorsed Measure OR (Lower CI - Upper CI) | Updated Measure OR (Lower CI - Upper CI) | diff |
|---|---|---|---|
| **Demographic** | | | |
| Age-65 (years above 65, continuous) | 1.00 (1.00-1.00) | 1.00 (1.00-1.00) | 0.00 |
| Male | 1.07 (1.06-1.08) | 1.07 (1.05-1.08) | 0.00 |
| **Comorbidity** | | | |
| History of CABG | 0.88 (0.86-0.90) | 0.89 (0.87-0.91) | -0.01 |
| History of infection (CC 1, 3-6) | 1.04 (1.03-1.05) | 1.05 (1.04-1.06) | -0.01 |
| Septicemia/shock (CC 2) | 1.07 (1.05-1.09) | 1.06 (1.04-1.08) | 0.01 |
| Metastatic cancer or acute leukemia (CC 7) | 1.21 (1.18-1.24) | 1.21 (1.18-1.24) | 0.00 |
| Lung or other server cancers (CC 8) | 1.20 (1.18-1.22) | 1.20 (1.17-1.23) | 0.01 |
| Other major cancer (CC 9-10) | 1.02 (1.01-1.01) | 1.01 (0.99-1.02) | 0.01 |
| Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) | 1.08 (1.07-1.09) | 1.08 (1.07-1.10) | 0.00 |
| Protein-calorie malnutrition (CC 21) | 1.16 (1.15-1.18) | 1.17 (1.15-1.19) | -0.01 |
| Disorders of fluid, electrolyte, acid-base (CC 22-23) | 1.16 (1.15-1.17) | 1.16 (1.15-1.18) | 0.00 |
| Other gastrointestinal disorders (CC 36) | 1.03 (1.02-1.05) | 1.03 (1.02-1.05) | 0.00 |
| Severe hematological disorders (CC 44) | 1.21 (1.18-1.23) | 1.20 (1.18-1.23) | 0.01 |
| Iron deficiency or other anemias and blood disease (CC 47) | 1.12 (1.11-1.14) | 1.13 (1.12-1.14) | -0.01 |
| Dementia or other specified brain disorders (CC 49-50) | 1.01 (1.00-1.02) | 1.02 (1.01-1.03) | -0.01 |
| Drug/alcohol abuse/dependence/psychosis (CC 51-53) | 1.08 (1.07-1.10) | 1.09 (1.07-1.10) | -0.01 |
| Major psychiatric disorders (CC 54-56) | 1.04 (1.03-1.06) | 1.05 (1.04-1.07) | -0.01 |
| Other psychiatric disorders (CC 60) | 1.09 (1.08-1.11) | 1.10 (1.08-1.12) | -0.01 |
| Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177, 178) | 1.08 (1.06-1.10) | 1.08 (1.06-1.10) | 0.00 |
| Cardio-respiratory failure or shock (CC 79) | 1.15 (1.13-1.16) | 1.17 (1.15-1.18) | -0.02 |
| Congestive heart failure (CC 80) | 1.19 (1.17-1.20) | 1.19 (1.17-1.20) | 0.00 |
| Acute coronary syndrome (CC 81-82) | 1.10 (1.08-1.12) | 1.09 (1.07-1.11) | 0.01 |
| Coronary atherosclerosis or angina (CC 83-84) | 1.06 (1.05-1.07) | 1.05 (1.04-1.06) | 0.01 |
| Valvular or rheumatic heart disease (CC 86) | 1.07 (1.06-1.08) | 1.06 (1.05-1.08) | 0.01 |
| Specified Arrhythmias (CC 92-93) | 1.10 (1.09-1.11) | 1.09 (1.08-1.10) | 0.01 |
| Stroke (CC 95-96) | 1.06 (1.05-1.07) | 1.06 (1.04-1.07) | 0.00 |
| Vascular or circulatory disease (CC 104-106) | 1.06 (1.05-1.07) | 1.06 (1.05-1.07) | -0.01 |
| Chronic obstructive pulmonary disease (CC 108) | 1.18 (1.16-1.19) | 1.19 (1.18-1.21) | -0.01 |
| Fibrosis of lung or other chronic lung disorders (CC 109) | 1.09 (1.07-1.10) | 1.09 (1.07-1.10) | 0.00 |
| Asthma (CC 110) | 0.98 (0.97-1.00) | 0.98 (0.97-1.00) | 0.00 |
| Pneumonia (CC 111-113) | 1.06 (1.05-1.07) | 1.07 (1.05-1.08) | -0.01 |
| Pleural effusion/pneumothorax (CC 114) | 1.12 (1.10-1.13) | 1.12 (1.10-1.13) | 0.00 |
| Other lung disorder (CC 115) | 1.03 (1.02-1.04) | 1.03 (1.02-1.04) | 0.00 |
| End stage renal disease or dialysis (CC 129-130) | 1.20 (1.17-1.23) | 1.21 (1.17-1.24) | -0.01 |

| Pneumonia Effect | NQF Endorsed Measure OR (Lower CI - Upper CI) | Updated Measure OR (Lower CI - Upper CI) | diff |
|---|---|---|---|
| Renal failure (CC 131) | 1.16 (1.15-1.17) | 1.17 (1.16-1.19) | -0.01 |
| Urinary tract Infection (CC 135) | 1.06 (1.04-1.07) | 1.06 (1.04-1.07) | 0.00 |
| Other urinary tract disorders (CC 136) | 1.03 (1.02-1.04) | 1.04 (1.02-1.05) | -0.01 |
| Decubitus ulcer or chronic skin ulcer (CC 148-149) | 1.11 (1.09-1.12) | 1.09 (1.08-1.11) | 0.01 |
| Vertebral fractures (CC 157) | 1.10 (1.08-1.12) | 1.09 (1.07-1.11) | 0.01 |
| Other injuries (CC 162) | 1.05 (1.04-1.07) | 1.05 (1.04-1.06) | 0.00 |

**Table B 2: COPD Measure Odds Ratios and 95% Confidence Intervals**

| COPD Effect | Originally Submitted Measure OR (Lower CI - Upper CI) | Updated Measure OR (Lower CI - Upper CI) | diff |
|---|---|---|---|
| **Demographics** | | | |
| Age-65 (continuous) | 1.00 (1.00 - 1.00) | 1.00 (1.00 - 1.00) | 0.00 |
| **Cardiovascular/Respiratory** | | | |
| Sleep Apnea (ICD-9 codes: 327.20, 327.21, 327.23, 327.27, 327.29, 780.51, 780.53, 780.57) | 1.01 (0.98 - 1.03) | 1.00 (0.98 - 1.03) | 0.01 |
| History of Mechanical Ventilation (ICD-9 codes: 93.90, 96.70, 96.71, 96.72) | 1.14 (1.10 - 1.17) | 1.13 (1.09 - 1.16) | 0.01 |
| Respirator Dependence/Respiratory Failure (CC 77-78) | 1.10 (1.03 - 1.17) | 1.11 (1.04 - 1.18) | -0.01 |
| Cardio-Respiratory Failure and Shock (CC 79) | 1.22 (1.19 - 1.24) | 1.20 (1.18 - 1.23) | 0.02 |
| Congestive Heart Failure (CC 80) | 1.23 (1.21 - 1.26) | 1.23 (1.21 - 1.25) | 0.00 |
| Chronic Atherosclerosis (CC 83-84) | 1.09 (1.07 - 1.11) | 1.10 (1.08 - 1.12) | -0.01 |
| Arrhythmias (CC 92-93) | 1.14 (1.12 - 1.17) | 1.15 (1.13 - 1.17) | -0.01 |
| Other and Unspecified Heart Disease (CC 94) | 1.07 (1.05 - 1.10) | 1.07 (1.05 - 1.09) | 0.00 |
| Vascular or Circulatory Disease (CC 104-106) | 1.09 (1.07 - 1.11) | 1.09 (1.07 - 1.11) | 0.00 |
| Fibrosis of Lung and Other Chronic Lung Disorder (CC 109) | 1.09 (1.07 - 1.12) | 1.09 (1.07 - 1.12) | 0.00 |
| Pneumonia (CC 111-113) | 1.10 (1.09 - 1.12) | 1.10 (1.08 - 1.12) | 0.00 |
| **Comorbidities** | | | |
| History of Infection (CC 1, 3-6) | 1.07 (1.05 - 1.09) | 1.07 (1.05 - 1.09) | 0.00 |
| Metastatic Cancer and Acute Leukemia (CC 7) | 1.19 (1.13 - 1.25) | 1.20 (1.14 - 1.27) | -0.01 |
| Lung, Upper Digestive Tract, and Other Severe Cancers (CC 8) | 1.17 (1.13 - 1.21) | 1.18 (1.14 - 1.22) | -0.01 |
| Lymphatic, Head and Neck, Brain, and Other Major Cancers; Breast, Prostate, Colorectal and Other Cancers and Tumors; Other Respiratory and Heart Neoplasms (CC 9-11) | 1.03 (1.01 - 1.06) | 1.04 (1.02 - 1.07) | -0.01 |
| Other Digestive and Urinary Neoplasms(CC 12) | 0.98 (0.95 - 1.01) | 0.98 (0.95 - 1.01) | 0.00 |
| Diabetes Mellitus (DM) or DM Complications (CC 15-20, 119-120) | 1.07 (1.05 - 1.09) | 1.07 (1.05 - 1.09) | 0.00 |
| Protein-calorie Malnutrition (CC 21) | 1.16 (1.13 - 1.20) | 1.15 (1.12 - 1.18) | 0.01 |
| Disorders of Fluid/Electrolyte/Acid-Base (CC 22-23) | 1.16 (1.14 - 1.18) | 1.15 (1.13 - 1.18) | 0.01 |
| Other Endocrine/Metabolic/Nutritional Disorders (CC 24) | 0.92 (0.90 - 0.94) | 0.92 (0.91 - 0.94) | 0.00 |
| Pancreatic Disease (CC 32) | 1.13 (1.09 - 1.17) | 1.12 (1.08 - 1.16) | 0.01 |
| Peptic Ulcer, Hemorrhage, Other Specified Gastrointestinal Disorders (CC 34) | 1.08 (1.05 - 1.11) | 1.08 (1.06 - 1.11) | 0.00 |
| Other Gastrointestinal Disorders (CC 36) | 1.06 (1.05 - 1.08) | 1.07 (1.05 - 1.09) | -0.01 |
| Severe Hematological Disorders (CC44) | 1.15 (1.09 - 1.21) | 1.14 (1.09 - 1.21) | 0.01 |
| Iron Deficiency and Other/Unspecified Anemias and Blood Disease (CC 47) | 1.13 (1.11 - 1.15) | 1.13 (1.11 - 1.15) | 0.00 |
| Dementia and Senility (CC 49-50) | 0.99 (0.97 - 1.02) | 0.99 (0.97 - 1.01) | 0.00 |
| Drug/Alcohol Induced Dependence/Psychosis (CC 51-52) | 1.14 (1.10 - 1.19) | 1.14 (1.09 - 1.18) | 0.00 |
| Major Psychiatric Disorders (CC 54-56) | 1.06 (1.04 - 1.09) | 1.06 (1.04 - 1.09) | 0.00 |
| Depression (CC 58) | 1.05 (1.03 - 1.07) | 1.05 (1.02 - 1.07) | 0.00 |
| Anxiety Disorders (CC 59) | 1.14 (1.09 - 1.19) | 1.13 (1.09 - 1.18) | 0.01 |
| Other Psychiatric Disorders (CC 60) | 1.13 (1.11 - 1.16) | 1.13 (1.11 - 1.15) | 0.00 |
| Quadriplegia, Paraplegia, Functional Disability (CC 67-69, 100-102, 177-178) | 1.06 (1.02 - 1.09) | 1.06 (1.02 - 1.10) | 0.00 |
| Polyneuropathy (CC 71) | 1.11 (1.07 - 1.14) | 1.10 (1.07 - 1.14) | 0.01 |
| Acute Coronary Syndrome (CC 81-82) | 1.09 (1.06-1.12) | 1.10 (1.07 - 1.13) | -0.01 |

| COPD Effect | Originally Submitted Measure OR (Lower CI - Upper CI) | Updated Measure OR (Lower CI - Upper CI) | diff |
|---|---|---|---|
| Hypertensive Heart and Renal Disease or Encephalopathy (CC 89) | 1.12 (1.09 - 1.16) | 1.12 (1.09 - 1.15) | 0.00 |
| Stroke (CC 95-96) | 1.03 (1.00 - 1.07) | 1.03 (1.00 - 1.07) | 0.00 |
| Renal Failure (CC 131) | 1.10 (1.07 - 1.13) | 1.10 (1.07 - 1.13) | 0.00 |
| Decubitus Ulcer or Chronic Skin Ulcer (CC 148-149) | 1.05 (1.02 - 1.09) | 1.06 (1.03 - 1.09) | -0.01 |
| Cellulitis, Local Skin Infection (CC 152) | 1.06 (1.04 - 1.09) | 1.06 (1.03 - 1.09) | 0.00 |
| Vertebral Fractures (CC 157) | 1.17 (1.13 - 1.21) | 1.17 (1.13 - 1.21) | 0.00 |