



TO: NQF Members and Public
FR: NQF Staff
RE: Pre-Voting review for *Pulmonary and Critical Care Consensus Standards Endorsement Maintenance: Report Addendum*
DA: November 1, 2012

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 two measures:

- 0506 Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalizations
- 1891 Thirty-day all-cause risk standardized readmission rate following COPD hospitalizations

An additional measure was originally recommended by the Committee but submitted comments by the public and NQF membership indicated lack of support for the measure due to insufficient evidence to meet NQF's criteria. After re-review of all information, the Committee did not recommend the following measure for continued endorsement:

- [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](#)

The final evaluations and recommendations are included in this addendum report. The draft document, *National Voluntary Consensus Standards: Pulmonary and Critical Care Endorsement Maintenance, Addendum Report* is posted on the NQF website along with the [measure submission forms](#). This report recommends endorsement of two measures.

Pursuant to section II.A of the Consensus Development Process v. 1.9, this draft document, along with the accompanying material, is being provided to you at this time for purposes of review and comment only and is not intended to be used for voting purposes. You may post your comments and view the comments of others on the [NQF website](#).

All comments must be submitted no later than 6:00 pm ET, November 30, 2012.

Thank you for your interest in NQF's work. We look forward to your review and comments.

Pulmonary and Critical Care Consensus Standards Endorsement Maintenance

ADDENDUM DRAFT TECHNICAL
REPORT FOR REVIEW

November 1, 2012



NATIONAL
QUALITY FORUM

Contents

Introduction 3

Measure Evaluation Summary 3

 Measures Recommended 4

 Measure Not Recommended 16

Appendix A: Measure Specifications 22

Appendix B: Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation Report "Respecifying the Hospital 30-day pneumonia and 30-day chronic obstructive pulmonary disease readmission measures by adding a planned readmission algorithm"45

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

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization.....	4
1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization.....	8

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	16
--	----

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

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

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 quality 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.

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

- 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 response: 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 Committee 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

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

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

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 18 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.

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 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.

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).

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

- 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

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

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)
- 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)

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

- 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
- 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)

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

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 exacerbations 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.

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)

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

Rationale:

- The measure is based on administrative 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, YNHHS/CORE, to conduct a brief literature review and consult with 2-3 experts to explore this suggestion. YNHHS/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. YNHHS/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, YNHHS/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. YNHHS/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. YNHHS/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

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

Comments included:

- Concerns about the reliability and validity 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 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 addressing all four issues. CMS will provide additional information on including exclusions for planned readmissions by July 11 for the Committee to consider.

- 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.

Steering Committee response:

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

- The Committee agrees with the change in age to 40 and above for measures 1891 and 1893.
- 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 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.

Additional Steering Committee Review – October 16, 2012

- The Committee reviewed the additional information on the algorithm for planned readmissions provided 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

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 ORGNM
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

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

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 RESPIRATORY FAILURE

518.84 ACUTE & CHRONIC 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
A 41.3 Sepsis due to Hemophilus influenzae
A 41.51 Sepsis due to Escherichia coli (E coli)
A 41.52 Sepsis due to pseudomonas
A 41.53 Sepsis due to Serratia
A 41.59 Other Gram-negative sepsis
A 41.81 Sepsis due to Enterococcus
A 42.7 Actinomycotic sepsis
A 41.9 Sepsis, unspecified

R65.20 Severe sepsis without septic shock

R65.21 Severe sepsis with septic shock

Table 3.3 Respiratory Failure

ICD-10 Code Shortened Description

J 96.0 Acute respiratory failure

J 96.9 Respiratory failure, unspecified

J 96.2 Acute and chronic respiratory failure

J 96.1 Chronic respiratory failure

J 80 Acute respiratory syndrome

J 22 Unspecified acute lower respiratory infection

J 98.8 Other specified respiratory disorders

Exclusions: Patients less than 18 years of age,
Patients with a length of stay greater than 120 days,
Patients with Cystic Fibrosis,

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,

Patients with Comfort Measures Only,

Patients enrolled in clinical trial,

Patients received as a transfer from emergency/observation department of another hospital,

Patients received as a transfer from an inpatient or outpatient department of another hospital,

Patients received as a transfer from an ambulatory surgery center,

Patients who had no diagnosis of pneumonia either as an ED final diagnosis/impression or direct admission diagnosis/impression and

Patients who have a duration of stay less than or equal to one day

Adjustment/Stratification: No risk adjustment or risk stratification N/A This measure is not stratified.

Level of Analysis: Facility, Population : National, Population : Regional, Population : State

Type of Measure: Process

Data Source: Administrative claims, Paper Records

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

- 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 or 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 transferred 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 accreditation.

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 specifications are modified every 6 months according to feedback from hospital 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 APIC, 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 Committee 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

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.

Additional Steering Committee Review – October 16, 2012:

- 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.
- 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.

Steering Committee Reassessment of Importance Criteria Met/Suitable for Endorsement: Y-4; N-10

DO NOT RECOMMEND FOR ENDORSEMENT

Appendix A: Measure Specifications

0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization.....	22
1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization.....	27

	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	<p>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.</p> <p>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.</p>
Type	Outcome
Data Source	<p>Administrative claims Data sources for the FFS measure:</p> <ol style="list-style-type: none"> 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. 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). <p>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.</p> <p>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.</p> <p>Data sources for the all-payer update</p> <p>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.</p>

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	<p>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).</p> <p>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.</p> <p>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</p>
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	<p>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.</p> <p>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.)</p>
Numerator Details	<p>Time Window: We define this as readmission for any cause within 30 days from the date of discharge of the index pneumonia hospitalization.</p> <p>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.</p> <p>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.</p> <p>Planned admissions not counted as readmissions</p> <p>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.</p> <p>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%.</p> <p>The detailed algorithm for identifying planned readmissions is in the attached report, Respecifying</p>

	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization
	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. 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. This outcome measure does not have a traditional numerator and denominator like a core process measure (e.g., percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year); thus, we use this field to define the measure cohort. The denominator includes patients 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. 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: For all cohorts, the measure excludes admissions for patients: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 For all cohorts, the measure excludes admissions for patients: <ul style="list-style-type: none"> Admissions with an in-hospital death are identified in the discharge disposition indicator in claims data. 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;

	<p>0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization</p>
	<ul style="list-style-type: none"> • Discharges against medical advice (AMA) are identified by examining the discharge destination indicator in claims data; • 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 <p>For Medicare FFS patients, the measure additionally excludes admissions for patients who:</p> <ul style="list-style-type: none"> • Admissions without at least 30 days post-discharge enrollment in FFS Medicare is obtained by examining the Medicare Enrollment Database (EDB)
<p>Risk Adjustment</p>	<p>Statistical risk model</p> <p>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).</p> <p>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.</p> <p>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.</p> <p>The final set of risk-adjustment variables is:</p> <p>Demographics</p> <p>Age-65 (years above 65, continuous)</p> <p>Male</p> <p>Comorbidities</p> <p>History of coronary artery bypass graft (CABG) surgery</p> <p>History of infection (CC 1, 3-6)</p> <p>Septicemia/shock (CC 2)</p> <p>Metastatic cancer and acute leukemia (CC7)</p> <p>Lung, upper digestive tract, and other severe cancers (CC8)</p> <p>Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors (CC 9-10)</p> <p>Diabetes mellitus (DM) and DM complications (CC 15-20, 119-120)</p> <p>Protein-calorie malnutrition (CC 21)</p> <p>Disorders of fluid/electrolyte/acid-base (CC 22-23)</p>

	<p>0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization</p> <p>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 of lung and other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Pleural effusion/pneumothorax (CC 114) Other lung disorders (CC 115) End-stage renal disease or dialysis (CC 129-130) Renal failure (CC 131) Urinary tract infection (CC 135) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) Vertebral fractures (CC 157) Other injuries (CC 162)</p> <p>References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. <i>Circulation</i> 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. <i>Stat Sci</i> 22 (2): 206-226.</p> <p>URL http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1219069855841 N/A</p>
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

	<p>0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization</p>
	<p>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.</p> <p>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.</p> <p>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.</p> <p>References: 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</p>
Copyright/Disclaimer	N/A

	<p>1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization</p>
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 18 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 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

	<p>1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization</p>
	<p>claims data are used.</p> <p>The Medicare data sources used to create the measure were:</p> <ol style="list-style-type: none"> 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. 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. <p>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.</p> <p>Attachment COPD ICD 9 to ICD10_Diag + Proc.pdf</p>
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	<p>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 18 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.</p>
Numerator Details	<p>Time Window: Patients who are readmitted for any cause within 30 days from the date of discharge of the index COPD admission.</p> <p>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.</p> <p>Measure includes readmissions to any acute care hospital for any cause within 30 days from the date of discharge of the index admission.</p> <p>Planned admissions not counted as readmissions</p> <p>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.</p> <p>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%.</p> <p>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</p>

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	Measures by adding a Planned Readmission Algorithm.
Denominator Statement	<p>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.</p> <p>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.</p>
Denominator Details	<p>Time Window: This measure was developed with 12 months of data.</p> <p>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. The denominator includes patients 18 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.</p> <p>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:</p> <p>ICD-9-CM codes used to define COPD:</p> <p>491.21 Obstructive chronic bronchitis; with (acute) exacerbation; acute exacerbation of COPD, decompensated COPD, decompensated COPD with exacerbation.</p> <p>491.22 Obstructive chronic bronchitis; with acute bronchitis</p> <p>491.8 Other chronic bronchitis. Chronic: tracheitis, tracheobronchitis.</p> <p>491.9 Unspecified chronic bronchitis</p> <p>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</p> <p>493.20 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, unspecified</p> <p>493.21 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with status asthmaticus</p> <p>493.22 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with (acute) exacerbation</p> <p>496 Chronic: nonspecific lung disease, obstructive lung disease, obstructive pulmonary disease (COPD) NOS.</p> <p>ICD-10-CM codes used to define COPD:</p> <p>J441 Chronic obstructive pulmonary disease with (acute) exacerbation</p> <p>J418 Mixed simple and mucopurulent chronic bronchitis</p> <p>J42 Unspecified chronic bronchitis</p> <p>J439 Emphysema, unspecified</p> <p>J449 Chronic obstructive pulmonary disease, unspecified</p> <p>J440 Chronic obstructive pulmonary disease with acute lower respiratory infection</p> <p>ICD-9-CM codes used to define respiratory failure:</p> <p>518.81 Other diseases of lung; acute respiratory failure; respiratory failure NOS</p> <p>518.82 Other diseases of lung; acute respiratory failure; other pulmonary insufficiency, acute</p>

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	<p>respiratory distress</p> <p>518.84 Other diseases of lung; acute respiratory failure; acute and chronic respiratory failure</p> <p>799.1 Other ill-defined and unknown causes of morbidity and mortality; respiratory arrest, cardiorespiratory failure</p> <p>ICD-9-CM codes used to define acute exacerbation of COPD:</p> <p>491.21 Obstructive chronic bronchitis; with (acute) exacerbation; acute exacerbation of COPD, decompensated COPD, decompensated COPD with exacerbation.</p> <p>491.22 Obstructive chronic bronchitis; with acute bronchitis</p> <p>493.21 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with status asthmaticus</p> <p>493.22 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with (acute) exacerbation</p> <p>ICD-10-CM codes used to define respiratory failure:</p> <p>J9600 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia</p> <p>J9690 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia</p> <p>J80 Acute Respiratory distress syndrome</p> <p>J9620 Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia</p> <p>R092 Respiratory arrest</p> <p>ICD-10-CM codes used to define acute exacerbation of COPD:</p> <p>J441 Chronic obstructive pulmonary disease with (acute) exacerbation</p> <p>J440 Chronic obstructive pulmonary disease with acute low respiratory infection</p>
Exclusions	<p>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:</p> <ul style="list-style-type: none"> • 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). <p>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.</p> <p>Of note, a patient may satisfy multiple exclusion criteria.</p>
Exclusion Details	<p>We provide denominator exclusions details for the Medicare data. The specific fields used in “all-payer” data will vary.</p> <p>In-hospital deaths are identified using the discharge disposition vital status indicator.</p> <p>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.</p> <p>Discharges Against Medical Advice (AMA) are identified using the discharge disposition indicator.</p> <p>Lack of claims data for 30 days post-discharge is identified by patient enrollment status in the</p>

	<p>1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization</p>
	<p>CMS' Enrollment Database (EDB) (for Medicare FFS patients only).</p>
<p>Risk Adjustment</p>	<p>Statistical risk model</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

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

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)

- 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)

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	<ul style="list-style-type: none"> • 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) <p>ICD-10-CM codes for model variables (for those variables defined by ICD-9 CM codes rather than CCs)</p> <p>Mechanical Ventilation</p> <ul style="list-style-type: none"> • 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 <p>Sleep Apnea</p> <ul style="list-style-type: none"> • G4730 Sleep apnea, unspecified

	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
	<ul style="list-style-type: none"> • G4731 Primary central sleep apnea • G4733 Obstructive sleep apnea (adult) (pediatric) • G4737 Central sleep apnea in conditions classified elsewhere • G4739 Other sleep apnea 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	<p>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.</p> <p>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.</p> <p>Please see attachment for more details on the calculation algorithm. Attachment COPD Readmission Calculation Algorithm.pdf</p>
Copyright/Disclaimer	N/A

	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). URL http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3

	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=1135267770141 N/A URL http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&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	<p>Time Window: The time period included in this measure is from arrival to the hospital through 24 hours after arrival to the hospital.</p> <p>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</p> <p>The data elements needed for the numerator are:</p> <p>Arrival Date Arrival Time Blood Culture Collected Initial Blood Culture Collection Date Initial Blood Culture Collection Time</p>
Denominator Statement	<p>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</p> <p>Table 3.1 Pneumonia (PN)</p> <p>ICD-9 Code Shortened Description</p> <p>481 PNEUMOCOCCAL PNEUMONIA</p> <p>482.0 K. PNEUMONIAE PNEUMONIA</p> <p>482.1 PSEUDOMONAL PNEUMONIA</p> <p>482.2 H.INFLUENZAE PNEUMONIA</p> <p>482.30 STREPTOCOCCAL PNEUMN NOS</p> <p>482.31 PNEUMONIA STRPTOCOCCUS A</p> <p>482.32 PNEUMONIA STRPTOCOCCUS B</p> <p>482.39 PNEUMONIA OTH STREP</p> <p>482.40 STAPHYLOCOCCAL PNEU NOS</p> <p>482.41 METH SUS PNEUM D/T STAPH</p> <p>482.42 METH RES PNEU D/T STAPH</p> <p>482.49 STAPH PNEUMONIA NEC</p> <p>482.82 PNEUMONIA E COLI</p> <p>482.83 PNEUMO OTH GRM-NEG BACT</p> <p>482.84 LEGIONNAIRES' DISEASE</p> <p>482.89 PNEUMONIA OTH SPCF BACT</p> <p>482.9 BACTERIAL PNEUMONIA NOS</p> <p>483.0 PNEU MYCPLSM PNEUMONIAE</p>

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

- 483.1 PNEUMONIA D/T CHLAMYDIA
- 483.8 PNEUMON OTH SPEC ORGNM
- 485 BRONCHOPNEUMONIA ORG NOS
- 486 PNEUMONIA, ORGANISM NOS
- Table 3.2 Septicemia
- ICD-9 Code Shortened Description
- 038.0 STREPTOCOCCAL SEPTICEMIA
- 038.10 STAPHYLOCOCC SEPTICEM NOS
- 038.11 METH SUSC STAPH AUR SEPT
- 038.12 MRSA SEPTICEMIA
- 038.19 STAPHYLOCOCC 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
- 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 RESPIRATORY FAILURE
- 518.84 ACUTE & CHRONIC 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

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

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
A 41.50	Gram-negative sepsis, unspecified
A 41.3	Sepsis due to Hemophilus influenzae
A 41.51	Sepsis due to Escherichia coli (E coli)
A 41.52	Sepsis due to pseudomonas
A 41.53	Sepsis due to Serratia
A 41.59	Other Gram-negative sepsis
A 41.81	Sepsis due to Enterococcus
A 42.7	Actinomycotic sepsis
A 41.9	Sepsis, unspecified
R65.20	Severe sepsis without septic shock
R65.21	Severe sepsis with septic shock
Table 3.3 Respiratory Failure	
ICD-10 Code	Shortened Description
J 96.0	Acute respiratory failure
J 96.9	Respiratory failure, unspecified
J 96.2	Acute and chronic respiratory failure
J 96.1	Chronic respiratory failure

	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
	J 80 Acute respiratory syndrome J 22 Unspecified acute lower respiratory infection J 98.8 Other specified respiratory disorders
Denominator Details	<p>Time Window: The time period included in this measure is from arrival to the hospital through 24 hours after arrival to the hospital.</p> <p>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</p> <p>Table 3.1 Pneumonia (PN)</p> <p>ICD-9 Code Shortened Description</p> <p>481 PNEUMOCOCCAL PNEUMONIA</p> <p>482.0 K. PNEUMONIAE PNEUMONIA</p> <p>482.1 PSEUDOMONAL PNEUMONIA</p> <p>482.2 H.INFLUENZAE PNEUMONIA</p> <p>482.30 STREPTOCOCCAL PNEUMN NOS</p> <p>482.31 PNEUMONIA STRPTOCOCCUS A</p> <p>482.32 PNEUMONIA STRPTOCOCCUS B</p> <p>482.39 PNEUMONIA OTH STREP</p> <p>482.40 STAPHYLOCOCCAL PNEU NOS</p> <p>482.41 METH SUS PNEUM D/T STAPH</p> <p>482.42 METH RES PNEU D/T STAPH</p> <p>482.49 STAPH PNEUMONIA NEC</p> <p>482.82 PNEUMONIA E COLI</p> <p>482.83 PNEUMO OTH GRM-NEG BACT</p> <p>482.84 LEGIONNAIRES' DISEASE</p> <p>482.89 PNEUMONIA OTH SPCF BACT</p> <p>482.9 BACTERIAL PNEUMONIA NOS</p> <p>483.0 PNEU MYCPLSM PNEUMONIAE</p> <p>483.1 PNEUMONIA D/T CHLAMYDIA</p> <p>483.8 PNEUMON OTH SPEC ORGNM</p> <p>485 BRONCHOPNEUMONIA ORG NOS</p> <p>486 PNEUMONIA, ORGANISM NOS</p> <p>Table 3.2 Septicemia</p> <p>ICD-9 Code Shortened Description</p> <p>038.0 STREPTOCOCCAL SEPTICEMIA</p> <p>038.10 STAPHYLCOCC SEPTICEM NOS</p> <p>038.11 METH SUSC STAPH AUR SEPT</p> <p>038.12 MRSA SEPTICEMIA</p> <p>038.19 STAPHYLCOCC SEPTICEM NEC</p> <p>038.2 PNEUMOCOCCAL SEPTICEMIA</p> <p>038.3 ANAEROBIC SEPTICEMIA</p> <p>038.40 GRAM-NEG SEPTICEMIA NOS</p>

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

038.41 H. INFLUENAE SEPTICEMIA
 038.42 E COLI SEPTICEMIA
 038.43 PSEUDOMONAS SEPTICEMIA
 038.44 SERRATIA SEPTICEMIA
 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 RESPIRATORY FAILURE
 518.84 ACUTE & CHRONIC 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

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 40.1 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
- A 41.50 Gram-negative sepsis, unspecified
- A 41.3 Sepsis due to Hemophilus influenzae
- A 41.51 Sepsis due to Escherichia coli (E coli)
- A 41.52 Sepsis due to pseudomonas
- A 41.53 Sepsis due to Serratia
- A 41.59 Other Gram-negative sepsis
- A 41.81 Sepsis due to Enterococcus
- A 42.7 Actinomycotic sepsis
- A 41.9 Sepsis, unspecified
- R65.20 Severe sepsis without septic shock
- R65.21 Severe sepsis with septic shock
- Table 3.3 Respiratory Failure
- ICD-10 Code Shortened Description
- J 96.0 Acute respiratory failure
- J 96.9 Respiratory failure, unspecified
- J 96.2 Acute and chronic respiratory failure
- J 96.1 Chronic respiratory failure
- J 80 Acute respiratory syndrome
- J 22 Unspecified acute lower respiratory infection
- J 98.8 Other specified respiratory disorders
- The data elements needed for the denominator are:
- Admission Date
- Birthdate
- Chest X-Ray
- Clinical Trial
- Comfort Measures Only
- Discharge Date
- ICD-9-CM Other Diagnosis Codes
- ICD-9-CM Principal Diagnosis Codes
- ICU Admission or Transfer
- Pneumonia Diagnosis: ED/Direct Admit

	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
	Transfer from Another Hospital or ASC
Exclusions	<p>Patients less than 18 years of age, Patients with a length of stay greater than 120 days, Patients with Cystic Fibrosis, 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, Patients with Comfort Measures Only, Patients enrolled in clinical trial, Patients received as a transfer from emergency/observation department of another hospital, Patients received as a transfer from an inpatient or outpatient department of another hospital, Patients received as a transfer from an ambulatory surgery center, Patients who had no diagnosis of pneumonia either as an ED final diagnosis/impression or direct admission diagnosis/impression and Patients who have a duration of stay less than or equal to one day</p>
Exclusion Details	<p>All exclusions listed above.</p> <p>Table 3.4 Cystic Fibrosis</p> <p>ICD-9 Code Shortened Description</p> <p>277.00 CYSTIC FIBROSIS W/O ILEUS</p> <p>277.01 CYSTIC FIBROSIS W ILEUS</p> <p>277.02 CYSTIC FIBROSIS W PUL MAN</p> <p>277.03 CYSTIC FIBROSIS W GI MAN</p> <p>277.09 CYSTIC FIBROSIS NEC</p> <p>Table 3.4 Cystic Fibrosis</p> <p>ICD-10 Code Shortened Description</p> <p>E 84.9 Cystic fibrosis, unspecified</p> <p>E 84.11 Meconium ileus in Cystic Fibrosis</p> <p>E 84.0 Cystic fibrosis with pulmonary manifestations</p> <p>E 84.19 Cystic fibrosis with other intestinal manifestations</p> <p>E 84.8 Cystic fibrosis with other manifestations</p>
Risk Adjustment	<p>No risk adjustment or risk stratification</p> <p>N/A</p>
Stratification	This measure is not stratified.
Type Score	Rate/proportion better quality = higher score
Algorithm	<p>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.</p> <p>Denominator: Pneumonia ICU patients 18 years of age and older.</p> <p>Variable Key: Duration of Stay, Arrival Date Time, Initial Blood Culture Date Time, Initial Blood Day, and Initial Blood Minutes</p> <ol style="list-style-type: none"> 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. 2. Check Chest X-Ray

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. If Chest X-Ray is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
- 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.
- c. If Chest X-Ray equals 1, continue processing and proceed to Comfort Measures Only.
- 3. Check Comfort Measures Only
 - a. If Comfort Measures Only is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - 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.
 - c. If Comfort Measures Only equals 2, 3, or 4, continue processing and proceed to Clinical Trial.
- 4. Check Clinical Trial
 - a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - 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.
 - c. If Clinical Trial equals No, continue processing and proceed to Transfer From Another Hospital or ASC.
- 5. Check Transfer From Another Hospital or ASC
 - 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.
 - 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.
 - c. If Transfer From Another Hospital or ASC equals No, continue processing and proceed to Pneumonia Diagnosis: ED/Direct Admit.
- 6. Check Pneumonia Diagnosis: ED/Direct Admit
 - 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.
 - 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.
 - 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.
 - d. If Pneumonia Diagnosis: ED/Direct Admit equals 1, continue processing and proceed to ICU Admission or Transfer.
- 7. Check ICU Admission or Transfer
 - 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.
 - 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.
 - c. If ICU Admission or Transfer equals 1, continue processing and proceed to Blood Culture Collected.
- 8. Check Blood Culture Collected
 - a. If Blood Culture Collected 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 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.
- c. If Blood Culture Collected equals 1, 2, or 4, continue processing and proceed to Arrival Date.
- 9. Check Arrival Date
 - a. If the Arrival Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - 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.
 - c. If the Arrival Date equals a Non Unable to Determine Value, continue processing and proceed to the Duration of Stay calculation.
- 10. Calculate Duration of Stay. Duration of Stay, in days, is equal to the Discharge Date minus the Arrival Date.
- 11. Check Duration of Stay
 - 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.
 - b. If the Duration of Stay is greater than 1, continue processing and proceed to recheck Blood Culture Collected.
- 12. Recheck Blood Culture Collected
 - 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.
 - b. If Blood Cultures Collected equals 1 or 2, continue processing and proceed to Initial Blood Culture Collection Date.
- 13. Check Initial Blood Culture Collection Date
 - 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.
 - 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.
 - 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.
- 14. Calculate Initial Blood Day. The Initial Blood Day is equal to the Initial Blood Culture Collection Date minus the Arrival Date.
- 15. Check Initial Blood Day
 - 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.

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.

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.

 - b. If the Initial Blood Day is greater than zero, continue processing and proceed to Arrival Time.
- 16. Check Arrival Time
 - a. If the Arrival Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - b. If the Arrival Time equals Unable to Determine, the case will proceed to a Measure Category

	<p>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</p>
	<p>Assignment of D and will be in the Measure Population. Stop processing.</p> <p>c. If the Arrival Time equals a Non Unable to Determine Value, continue processing and proceed to Initial Blood Culture Collection Time.</p> <p>17. Check Initial Blood Culture Collection Time</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>19. Calculate Initial Blood Minutes. Initial Blood Minutes is equal to the Initial Blood Culture Date Time minus the Arrival Date Time.</p> <p>20. Check Initial Blood Minutes</p> <p>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.</p> <p>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.</p> <p>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 http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1228767363466</p>
Copyright/ Disclaimer	Public measure N/A

**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)**

CMS Contract # HHSM-500-2008-000251/HHSM-500-T0001, Modification No. 000007

September 21, 2012

*Prepared for the Centers for Medicare & Medicaid Services for
submission to the National Quality Forum Pulmonary Project*

Contents

- List of Tables 3
- List of Figures 4
- Background 5
- 1. Planned Readmission Algorithm Overview 6
- 2. Applying the Planned Readmission Algorithm 6
 - Approach to applying the planned readmission algorithm 6
- 3. Impact Analyses 7
 - Pneumonia Measure 7
 - Data 7
 - Readmissions identified as planned in the updated measure 7
 - Rate of planned readmissions identified by the original NQF-endorsed and updated measures 8
 - Comparison of model performance 8
 - Impact on distribution of RSRRs and relative performance of hospitals 8
 - COPD Measure 11
 - Data 11
 - Readmissions identified as planned in the updated measure 11
 - Rate of planned readmissions identified by original NQF-endorsed and updated measures 11
 - Comparison of model performance 12
 - Impact on distribution of RSRRs and relative performance of hospitals 12
- 4. Summary of Measure Updates 15
- Appendix A 16
 - Planned Readmission Algorithm 17
- Appendix B 26

List of Tables

Table 1: Top 10 Planned Procedures among Planned Readmissions Following Pneumonia Discharge.....	7
Table 2: Top 10 Planned Procedures among Planned Readmissions Following COPD Discharge	11
Table A 1: Procedure Categories that are Always Planned regardless of Diagnosis.....	17
Table A 2: Diagnosis Categories that are Always Planned regardless of Procedure.....	17
Table A 3: List of Potentially Planned Procedure Categories.....	19
Table A 4: Acute Diagnosis Categories that Disqualify a Readmission from Being Considered Planned ...	21
Table B 1: Pneumonia Measure Odds Ratios and 95% Confidence Intervals	26
Table B 2: COPD Measure Odds Ratios and 95% Confidence Intervals	28

List of Figures

Figure 1: Distribution of Hospital RSRRs for the Original, NQF-Endorsed Pneumonia Measure..... 9

Figure 2: Distribution of Hospital RSRRs for the Updated Pneumonia Measure..... 9

Figure 3: Distribution of Hospitals' Change in RSRR for Pneumonia after Applying the Planned
Readmission Algorithm 10

Figure 4: Distribution of Hospital RSRRs for the Original, NQF-Endorsed COPD Measure..... 13

Figure 5: Distribution of Hospital RSRRs for the Updated COPD Measure 13

Figure 6: Distribution of Hospitals' Change in RSRR for COPD after Applying the Planned Readmission
Algorithm 14

Figure A 1: Planned Readmission Algorithm..... 16

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 NQF¹. 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. YNHSC/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

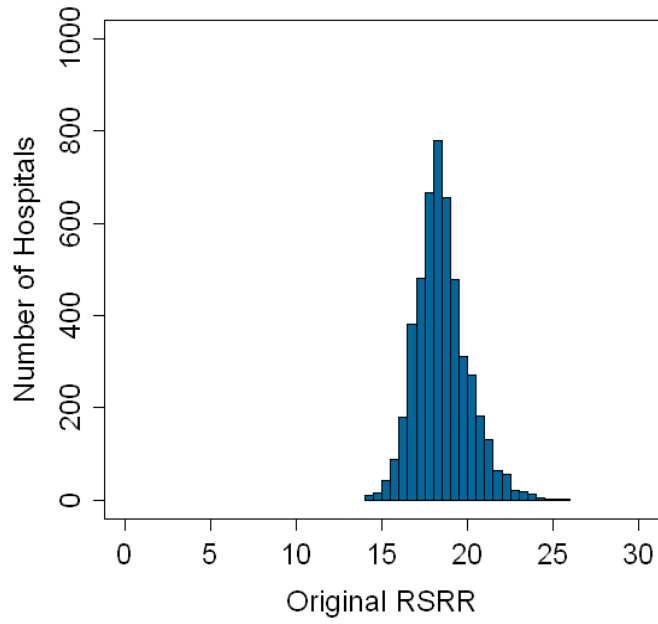


Figure 2: Distribution of Hospital RSRRs for the Updated Pneumonia Measure

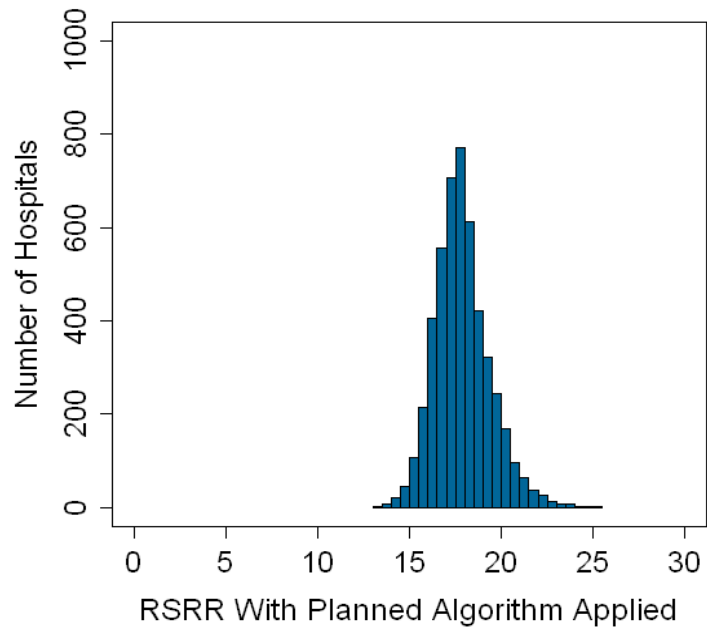
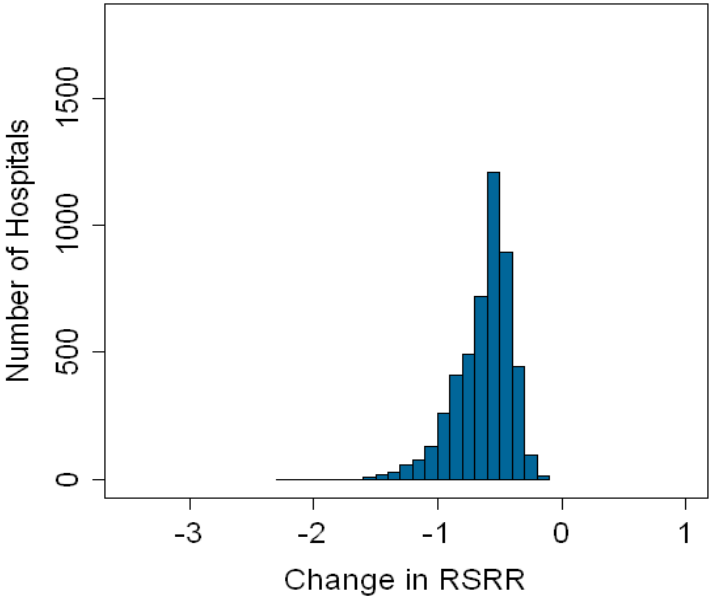


Figure 3: Distribution of Hospitals' Change in RSRR for Pneumonia after Applying the Planned Readmission Algorithm



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

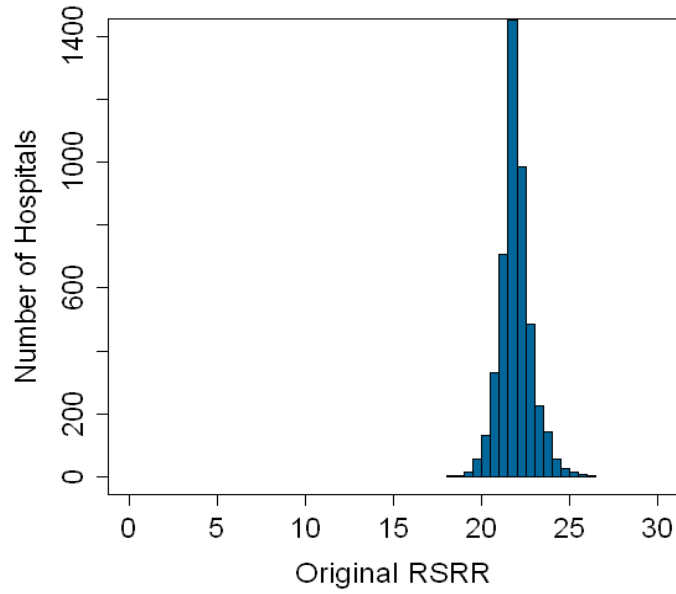


Figure 5: Distribution of Hospital RSRRs for the Updated COPD Measure

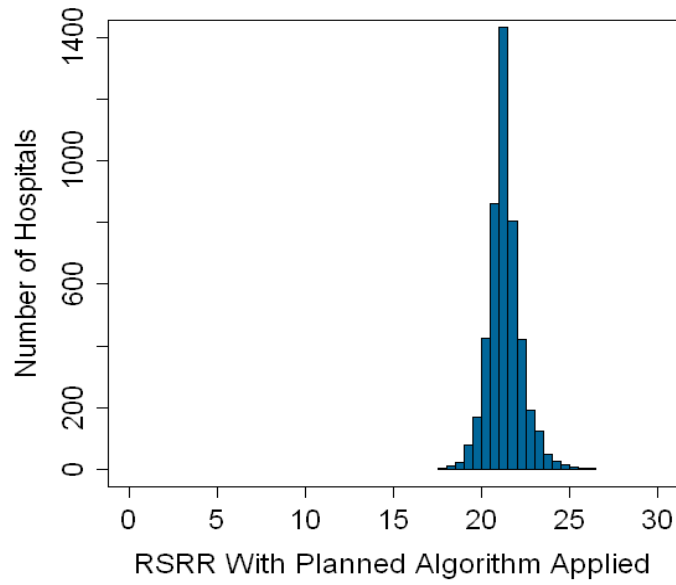
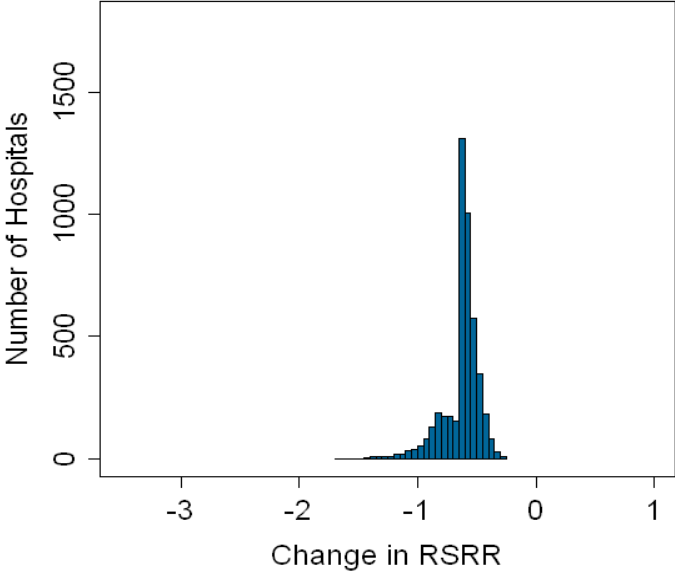


Figure 6: Distribution of Hospitals' Change in RSRR for COPD after Applying the Planned Readmission Algorithm



4. Summary of Measure Updates

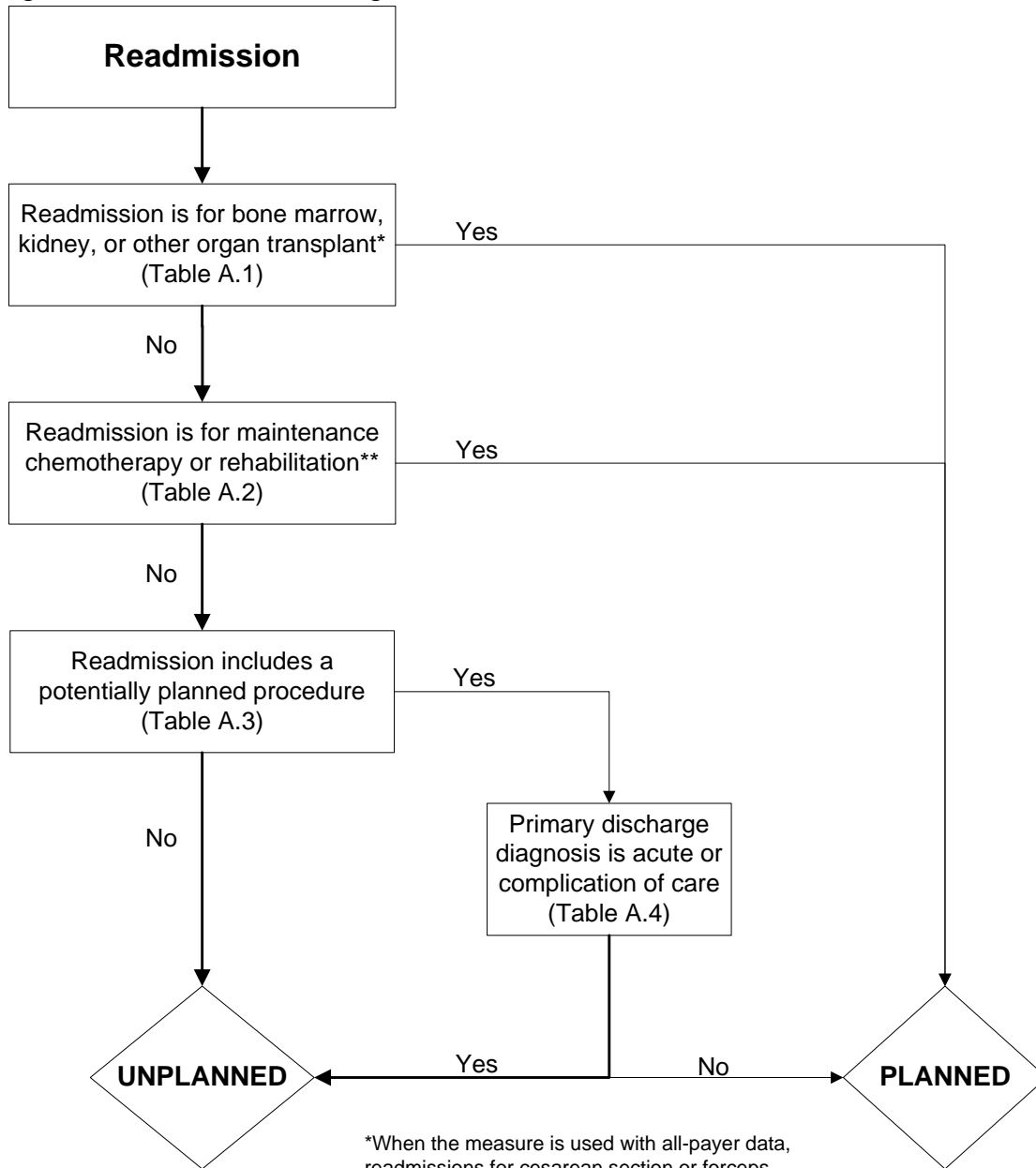
For the pneumonia readmission measure, we applied the planned readmission algorithm without adaptation to the original, NQF-endorsed measure. In the updated measure, the measured crude readmission rate was 17.8%.

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 minimize 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 CCS⁴	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 CCS⁵	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 CCS⁵	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	Impulse 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 capsulatum 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 CCS⁵	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