

Cardiovascular, Fall 2018 Cycle: CDP Report

FINAL REPORT

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NATIONAL
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Contents

Executive Summary	3
Introduction.....	4
NQF Portfolio of Performance Measures for Cardiovascular Conditions	4
Table 1. NQF Cardiovascular Portfolio of Measures	4
Cardiovascular Measure Evaluation.....	5
Table 2. Cardiovascular Measure Evaluation Summary.....	5
Comments Received Prior to Committee Evaluation	5
Comments Received After Committee Evaluation	5
Summary of Measure Evaluation	5
References.....	8
Appendix A: Details of Measure Evaluation.....	9
Measures Endorsed	9
3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest	9
2377 Overall Defect Free Care for AMI.....	15
0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients	18
2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI)	22
Appendix B: Cardiovascular Portfolio—Use in Federal Programs	25
Appendix C: Cardiovascular Standing Committee and NQF Staff	27
Appendix D: Measure Specifications.....	30
3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest	30
0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients	32
2377 Overall Defect Free Care for AMI.....	35
2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI).	39

Cardiovascular, Fall 2018 Cycle

TECHNICAL REPORT

Executive Summary

Cardiovascular disease (CVD) is a significant burden in the United States leading to approximately 1 in 4 deaths per year.¹ CVD is the leading cause of death for men and women in the United States.² Considering the toll of cardiovascular disease, measures that assess clinical care performance and patient outcomes are critical to reducing the negative impacts of CVD.

For this project, the Standing Committee evaluated one newly submitted measure and three measures undergoing maintenance review against [NQF's standard evaluation criteria](#). The Standing Committee recommended all four measures for endorsement and the Consensus Standards Approval Committee (CSAC) upheld all of the Committee's recommendations. The endorsed measures are:

- 3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest
- 2377 Overall Defect Free Care for AMI
- 0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients
- 2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI)

The body of this report summarizes the measures reviewed; [Appendix A](#) provides detailed summaries of the Committee's discussion and ratings of the criteria for each measure.

Introduction

The measures in the cardiovascular portfolio have been grouped into various conditions, diseases, or procedures related to cardiovascular health topic areas. These topic areas include primary prevention and screening, coronary artery disease (CAD), ischemic vascular disease (IVD), acute myocardial infarction (AMI), cardiac catheterization, percutaneous catheterization intervention (PCI), heart failure (HF), rhythm disorders, implantable cardioverter-defibrillators (ICDs), cardiac imaging, cardiac rehabilitation, and high blood pressure. The fall 2018 review cycle of this project addressed the following topic areas:

- In-hospital cardiac arrest survival rates
- Percutaneous coronary intervention (PCI)
- Acute myocardial infarction (AMI)

NQF Portfolio of Performance Measures for Cardiovascular Conditions

The Cardiovascular Standing Committee ([Appendix C](#)) oversees NQF's portfolio of Cardiovascular measures ([Appendix B](#)) that includes measures for AMI, cardiac catheterization/(PCI), CAD/IVD, cardiac imaging, heart failure, hyperlipidemia, hypertension, ICDs, and rhythm disorders. This portfolio contains 42 endorsed measures: 19 process/structure measures, 14 outcome measures, five composite measures, and four efficiency measures (see table below).

Table 1. NQF Cardiovascular Portfolio of Measures

	Process/Structure	Outcome	Composite	Efficiency
Acute myocardial infarction (AMI)	5	3	1	0
Cardiac catheterization/percutaneous coronary intervention (PCI)	0	6	1	1
Coronary artery disease (CAD)/ischemic vascular disease (IVD)	6	1	1	0
Cardiac imaging	0	0	0	3
Heart failure	5	2	0	0
Hyperlipidemia	1	0	0	0
Hypertension	0	1	0	0
Implantable cardiovascular devices (ICDS)	1	0	2	0
Rhythm disorders	1	1	0	0
Total	19	14	5	4

The remaining measures have been assigned to other portfolios. These include readmission measures for AMI and HF (All-Cause Admissions/Readmissions), measures for coronary artery bypass graft (CABG) (Surgery), and primary prevention measures (Prevention and Population Health).

Cardiovascular Measure Evaluation

On February 6-7, 2019 the Cardiovascular Standing Committee evaluated one new measure and three measures undergoing maintenance review against [NQF's standard evaluation criteria](#).

Table 2. Cardiovascular Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	3	1	4
Measures endorsed	3	1	4
Reasons for not recommending	Importance – 0 Scientific Acceptability – 0 Use – 0 Overall Suitability – 0 Competing Measure – 0	Importance – 0 Scientific Acceptability – 0 Overall Suitability – 0 Competing Measure – 0	

Comments Received Prior to Committee Evaluation

NQF solicits comments on endorsed measures on an ongoing basis through the [Quality Positioning System \(QPS\)](#). In addition, NQF solicits comments for a continuous 16-week period during each evaluation cycle via an online tool located on the project webpage. For this evaluation cycle, the commenting period opened on December 5, 2018 and closed on April 16, 2019. No comments were submitted prior to the measure evaluation meetings.

Comments Received After Committee Evaluation

The continuous 16-week public commenting period with NQF member support closed on April 16, 2019. Following the Committee's evaluation of the measures under consideration, NQF received three comments from three organizations (including a member organization) and individuals pertaining to the draft report and to the measures under consideration. All comments for each measure under consideration have been summarized in [Appendix A](#).

Throughout the 16-week continuous public commenting period, NQF members had the opportunity to express their support ("support" or "do not support") for each measure submitted for endorsement consideration to inform the Committee's recommendations. No NQF members provided their expression of support.

Summary of Measure Evaluation

The following brief summaries of the measure evaluation highlight the major issues that the Committee considered. Details of the Committee's discussion and ratings of the criteria for each measure are included in [Appendix A](#).

Survival after Cardiac Arrest

3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest (American Heart Association): Endorsed

Description: This measure estimates a hospital -level risk standardized survival rate (RSSR) for patients aged 18 years and older who experience an in-hospital cardiac arrest. **Measure Type:** Outcome; **Level of Analysis:** Facility; **Setting of Care:** Emergency Department and Services, Inpatient/Hospital; **Data Source:** Registry Data

The Standing Committee recommended this measure for endorsement. The Committee found no major concerns with evidence as it directly relates to the measure, and they noted a performance gap across hospitals for this measure. The Standing Committee agreed that the measure is reliable and valid but asked the measure developer to clarify the risk-adjustment methodology and if trauma hospitals and DNR (do not resuscitate) statuses are included in the measure. The measure developer clarified that they used a multivariable hierarchical logistic regression model to calculate the risk-standardized survival rate for in-hospital cardiac arrest. The measure developer explained that trauma hospitals are not included in the measure, and the *Get with the Guidelines* registry does not currently capture DNR status. The Committee agreed that the measure is feasible and meets NQF's use and usability criteria. NQF received three comments supporting the endorsement of this measure.

Acute Myocardial Infarction (AMI)

2377 Overall Defect Free Care for AMI (American College of Cardiology): Endorsed

Description: The proportion of acute MI patients ≥ 18 years of age that receive "perfect care" based upon their eligibility for each performance measures; **Measure Type:** Composite; **Level of Analysis:** Facility; **Setting of Care:** Inpatient/Hospital; **Data Source:** Other, Registry Data

The Standing Committee recommended the measure for continued endorsement. The Committee discussed whether the title of this measure accurately represents the intent. The developer stated that there is a public title that better suits the intention of the measure. The Committee discussed the evidence and agreed that strong evidence supported the components of the composite measure. Performance for this composite measure continues to have significant variation. There were no major concerns for reliability of this measure. The developer provided empirical validity testing and performed construct validation, comparing this measure with 30-day AMI mortality rates. The Committee discussed the validity of this measure since testing was against a short-term outcome measure, and testing results demonstrated a low correlation between the two measures. The Committee noted that STEMI and NSTEMIs have different target populations, and perhaps facility performance can be affected by the relative frequency of the two different conditions. Ultimately, the Committee agreed that this measure passed validity testing. The Committee agreed that this maintenance measure is feasible, currently in use, and meets the usability criteria.

Percutaneous Coronary Intervention (PCI)

0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients (American College of Cardiology): Endorsed

Description: Proportion of eligible patients = 18 years of age, who were prescribed aspirin, P2Y12 inhibitor, and statin at discharge following PCI with or without stenting. **Measure Type:** Composite; **Level of Analysis:** Facility; **Setting of Care:** Inpatient/Hospital; **Data Source:** Other, Registry Data

The Standing Committee recommended the measure for continued endorsement. Evidence for this measure is strong, and it suggests there is still a performance gap, despite improvement from 2011 to 2016. The Committee agreed that the quality construct rationale is strong and there were no major concerns regarding reliability and validity. While the Committee noted that this registry measure may exclude some facilities, 98 percent of hospitals performing percutaneous coronary interventions (PCIs) are included in the registry. The Committee did not voice concerns about feasibility or the use and usability of this measure.

2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI) (American College of Cardiology): Endorsed

Description: Risk adjusted rate of intra and post procedure bleeding for all patients age 18 and over undergoing PCI. **Measure Type:** Outcome; **Level of Analysis:** Facility; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

The Standing Committee recommended the measure for continued endorsement. They noted strong evidence for this measure and a considerable gap in performance of care. The Committee also noted that the developer updated the bleeding definition for this model to align with the definition used in other registries in the National Cardiovascular Data Registry (NCDR). There were no concerns with the reliability and validity testing of this measure. The Committee agreed that this measure is feasible because the data elements are in defined fields and it has been used in a registry for many years. They did not have any concerns about use, as the measure is publicly reported and used in an accountability program. A Committee member asked about the unintended harm of bleeding if anticoagulants are used prior to a PCI. The developer acknowledged this as a potential harm if the PCI procedure is emergent but stressed mitigation strategies to decrease this risk. However, if the procedure is nonemergent, this potential harm is nonexistent. The Committee had no additional concerns for usability.

References

- 1 Heron M. Deaths: leading causes for 2014. *Natl Vital Stat Rep*. 2016;65(5):96.
- 2 Centers for Disease Control and Prevention. CDC Wonder - About Multiple Cause of Death, 1999-2017. <https://wonder.cdc.gov/mcd-icd10.html>. Last accessed August 2019.

Appendix A: Details of Measure Evaluation

Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

Measures Endorsed

3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest

[Submission](#) | [Specifications](#)

Description: This measure estimates a hospital -level risk standardized survival rate (RSSR) for patients aged 18 years and older who experience an in-hospital cardiac arrest.

Numerator Statement: Patients who were alive at discharge

Denominator Statement: Patients aged 18 years and older with in-hospital cardiac arrest who received chest compression and/or defibrillation

Exclusions: None

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Emergency Department and Services, Inpatient/Hospital

Type of Measure: Outcome

Data Source: Registry Data

Measure Steward: American Heart Association

STANDING COMMITTEE MEETING 2/6/2019

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

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

1a. Evidence: **Y-20; No-1** 1b. Performance Gap: **H-7; M-12; L-0; I-2**

Rationale:

- The developer outlines several care processes that can be undertaken by the provider to influence patient survival at discharge, such as: the utilization of increased training of staff in resuscitation procedures (including the use of mock codes), earlier recognition of patients in cardiac arrest and shorter staff response time, and improved quality of chest compressions.
- The developer noted that survival rates post-in-hospital cardiac arrest (IHCA) have shown to improve with facility participation in the Get With The Guidelines-Resuscitation registry (from 16% up to 24% from 2010 to 2013) which could be linked to improved resuscitation care (Girota, et. al., 2012).
- Based on a sample of 326 hospitals from 2011-May 2015, the minimum and maximum performance rate is 11% and 38%, respectively.
- Race-specific survival was not assessed at the patient-level. The developer divided hospitals between 2011 and 2015 with at least 20 inpatient hospital cardiac arrest patients into quartiles of patients of black race. The median hospital percentage of IHCA patients of black race was 11% (IQR: 4% to 27%). Hospitals with the smallest number of black patients (quartile 1) had a higher unadjusted (observed) and risk-standardized survival rates (RSSR) for IHCA as compared with hospitals that had the highest number of black patients (quartile 4).

- The developer indicates that these data suggest some degree of disparity in RSSRs by hospital racial composition and therefore did not include race/ethnicity as a model covariate.
- The Committee found no major concerns with evidence as it directly relates to the measure, and they noted a performance gap across hospitals for this measure.

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

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

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

Rationale:

- Reliability testing was conducted at the measure score level using a signal-to-noise (SNR) analysis (specifically, Adams' beta-binomial method). Using the entire prospective validation period (2011-2015): Signal-to-Noise Ratio mean= 0.76; median= 0.78
- The developer assessed face validity of the measure score. The testing results showed that 34 of the 34 TEP members responded, and 71% of respondents (n=24) either agreed or strongly agreed with the following statement, "The scores obtained from the measure as specified will provide an accurate reflection of quality and can be used to distinguish good and poor quality".
- The developer used nine patient-level and clinical risk factors to risk adjust but did not include social risk factors in the adjustment approach.
- This measure was reviewed by the Scientific Methods Panel. The Scientific Methods Panel had no major methodological concerns and recommended a moderate rating for both reliability and validity. The Committee agreed the measure specifications are defined and consistent with the evidence, and there were no major concerns for reliability.
- The Committee requested greater clarity on the risk adjustment methodology, and if trauma hospitals as well as DNR (Do Not Resuscitate) status are included in the measure. The developer clarified that they used a multivariable hierarchical logistic regression model to calculate the risk-standardized survival rate for in-hospital cardiac arrest. The measure developer explained that trauma hospitals are not included in the measure, and the Get with the Guidelines registry does not currently capture DNR status. The Committee did not express additional concerns and agreed the measure meets the validity criterion.

3. Feasibility: H-5; M-15; L-0; I-1

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

Rationale:

- Data elements are generated or collected by and used by healthcare personnel during the provision of care and abstracted from a record by someone other than the person obtaining original information.
- Data collected through Get with the Guidelines – Resuscitation Registry.
- All data elements are in defined fields in electronic clinical data.
- The Committee agreed the measure is feasible.

4. Use and Usability

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-20; No Pass-1** 4b. Usability: **H-6; M-13; L-1; I-1**

Rationale:

- This measure is used in an accountability program: Get With The Guidelines (GWTG) - Resuscitation Professional Certifications or Recognition Program.
- 373 hospitals that are geographically diverse participate in the registry, and in 2017, 128 hospitals received public recognition.
- The Committee did not have concerns about use since the measure is used in the American Heart Association GWTG -Resuscitation Professional Certifications or Recognition Program, and it is currently in the early stages of voluntary public report for the GWTG Program.
- A committee member voiced concern on the possible unintended harm of cases where physicians would be reluctant to perform CPR on patients who are deemed to be “helpless” that institutions pressured into discussing DNR plans. The developer rebutted that discussing DNR plans would be helpful, rather than harmful, to patients and their family.

5. Related and Competing Measures

- No related or competing measures noted.

6. Standing Committee Recommendation for Endorsement: **Yes-18; No-3**

7. Public and Member Comment

- The draft report was posted on March 18 through April 16. NQF received three post-evaluation comments supporting the Committee’s decision to recommend the measure. While two commenters supported the measure, one commenter requested clarification from the developer about covariates and coefficients.

- Measure Steward/Developer Response

1) The specific covariates used for the risk-adjustment should be defined in terms of time-frame and specific values. For example, is "hypotension" a systolic blood pressure <100, <90 or something else? Is this considered present if measured <1 hour prior to arrest, <24 hours prior to arrest or something else?

We appreciate the opportunity to clarify this point. The 9 variables used in the risk standardization model use strict definitions. Age, location of cardiac arrest, and initial rhythm have relatively straightforward definitions.

- Age (in years)
- Hospital location of cardiac arrest (defined as occurring in the intensive care unit, monitored unit, non-monitored unit, emergency room, procedural or surgical area, and other hospital areas)

- Initial cardiac arrest rhythm (defined as 1 of 4 rhythms: ventricular fibrillation, pulseless ventricular tachycardia, pulseless electrical activity, and asystole)

For the other 6 variables in the model for risk standardization, the variable definitions include not only clinical criteria but also the time frame, where indicated. Specifically, 4 of these 6 variables define that the clinical criteria must be present either within 24 hours or at the time of the cardiac arrest. Those definitions are described below:

- Hypotension – Evidence for any of the following within 24 hours of cardiac arrest:
 - SBP < 90 or MAP < 60 mmHg.
 - Vasopressor/inotropic requirement after volume expansion (except for dopamine = 3 mcg/kg/min).
 - Intra-aortic balloon pump
- Sepsis -- Documented bloodstream infection where antibiotics have not yet been started or the infection is still being treated with antibiotics.
- Hepatic insufficiency – Evidence for any of the following within 24 hours of cardiac arrest:
 - Total bilirubin > 2 mg/dL and AST > 2x normal
 - Cirrhosis
- Metastatic or hematologic malignancy – Documentation of any solid tissue malignancy with evidence of metastasis, or any blood borne malignancy.
- Mechanical ventilation – Requirement for assisted ventilation via an endotracheal tube or tracheostomy within 24 hours of cardiac arrest.
- IV vasopressor -- Continuous intravenous infusion of at least one of the following vasoactive agents at the time of cardiac arrest:
 - Dobutamine
 - Dopamine > 3 mcg/kg/min
 - Epinephrine
 - Norepinephrine
 - Phenylephrine
 - Other Vasoactive Agent

Therefore, we agree that the model variables should be clearly defined definitions (clinical criteria and time period, if indicated), and the variables used in the risk-standardized survival rate measure do stipulate a time frame (if indicated) and discrete clinical criteria.

2) It should be clarified if the coefficients for adjustment will be re-calculated each year or as new sites are incorporated into the data set. Re-calculation could lead to fluctuations in the overall population mean which make it hard for a hospital to track

secular trends in its own performance. It might be better to keep the coefficients fixed from year to year.

Risk standardization for survival measures use random-effects hierarchical models. In order to accomplish this, the risk-standardized survival rate measure needs to be re-calculated annually. The reason for this is not so much because the coefficients for the variables for risk-standardization change that much from year to year (as they generally fall within a similar range from year to year), but because risk-standardization requires the use of hospital-specific intercepts which need re-calculation annually.

To calculate risk-standardized survival rates for in-hospital cardiac arrest, we use the hospital-specific estimates (i.e., random intercepts) for each hospital from the hierarchical models. The risk-standardized survival rate is calculated by multiplying the registry's unadjusted survival rate by the ratio of each hospital's predicted to expected survival rate at a given hospital.

- For these calculations, the expected hospital number of cardiac arrest survivors is the number of cardiac arrest survivors expected at the hospital if the hospital's patients were treated at a "reference" hospital (i.e. the average hospital-level intercept from all hospitals in the given time period of interest). This is determined by regressing patients' risk factors and characteristics on in-hospital survival with all hospitals in the sample, and then applying the subsequent estimated regression coefficients to the patient characteristics observed at a given hospital, and then summing the expected number of deaths (i.e., the expected rate is a form of indirect standardization).
- In contrast, the predicted hospital outcome is the number of survivors at a specific hospital, which is determined in the same way that the expected number of deaths is calculated, except that the hospital's individual random effect intercept is used.
- The risk-standardized survival rate is then calculated as the ratio of predicted to expected survival rate, multiplied by the unadjusted rate for the entire study sample.

Therefore, the expected and predicted survival rate for in-hospital cardiac arrest will depend on obtaining the individual hospital's given intercept in the model, as well as the reference hospital intercept (which is based on the average hospital-level intercept for hospitals for a given year). As a result, the models are re-run on an annual basis, not because the coefficients may vary substantially from year to year, but so as to derive the hospital-specific intercepts and the average hospital intercept for that given year.

Keep in mind that the purpose of risk-standardization is to provide an "apples-to-apples" comparison on how each hospital performed on survival outcomes for their patients with in-hospital cardiac arrest. The risk-standardization process provides important information as to how each hospital performed relative to other hospitals. If

there are not substantial changes year over year in hospitals submitting data for this measure (e.g., if only 10% to 20% of the hospitals in a given year are new sites submitting data), the risk-standardized survival measure will also provide a site the ability to compare how it performed on this measure over time.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019 Decision: Approved for endorsement)

9. Appeals

No appeals received

2377 Overall Defect Free Care for AMI

[Submission](#) | [Specifications](#)

Description: The proportion of acute MI patients ≥ 18 years of age that receive "perfect care" based upon their eligibility for each performance measures

Numerator Statement: The number of perfect care opportunities met from all eligible acute MI patients

Denominator Statement: All acute MI patients (including STEMI and NSTEMI)

Note:

- Patients less than 18 years of age are not included in the denominator
- The guidelines-based care for STEMI and NSTEMI populations differ in some respects.

Exclusions: The exclusions for this measure were minimal and comprised: patients <18 years of age, hospital submissions that did not pass the NCDR quality check, and patients who were ineligible for defect free care measure (e.g., contraindications, clinical studies).

Adjustment/Stratification: none

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Composite

Data Source: Other, Registry Data

Measure Steward: American College of Cardiology

STANDING COMMITTEE MEETING 2/6/2019

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

(1a. Evidence, 1b. Performance Gap, 1c. Composite – Quality Construct and Rationale)

1a. Evidence: **H-4; M-16; L-1; I-0**; 1b. Performance Gap: **H-3; M-16; L-2; I-0**; 1c. Composite – Quality Construct and Rationale: **H-3; M-16; L-2; I-0**

Rationale:

- The developer added two additional sources of evidence: The 2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes and the 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction.
- The median rate of performance for defect free care across 781 hospitals was 71.7% from 2016-2017.
- There was considerable variation in providing defect free care, ranging from 50.1% to 83.2% for the first and third quartiles of hospitals, respectively.
- The developer states each individual measure characterizes individual guideline-recommended processes of care for AMI. The construction of a composite measure encompassing all the scientifically validated best practices allows for a holistic assessment of evidence-based AMI care.
- The Committee had no concerns on evidence; they considered the evidence strong.

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

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

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

2c. Composite Construction: **H-4; M-14; L-3; I-0**

Rationale:

- Reliability testing was performed at the data element and measure score level.
- Data element level testing was accomplished via registry audit program and performed inter-rater reliability using 330 patients to assess item-level reliability. Results reported a kappa value range from 0.384 to 0.987 (aspirin in first 24 hours=0.384; cardiac rehab referral=0.386).
- For measure score level testing, the developer performed split sample methodology using Pearson for the performance rates and social risk data using the 2016-17 data. Results reported a Pearson correlation coefficient= 0.97. The developer states the results demonstrate a very reliable measure with an extremely high correlation between hospital performance assessed in the two samples.
- Empirical validity testing was performed at the measure score level.
- The developer used construct validation and compared this measure with 30-day AMI mortality rates using 2013-2014 data. Results from this show Pearson correlation coefficient = -0.1093 (statistically significant). The developer suggests the low correlation may be due to comparing a process measure to outcome measures or other unmeasured factors that contribute to the mortality results.
- The developer computed hospital-level results for the various components and correlated them with the composite results (via the Pearson correlation statistic). They found mostly moderate to strong correlations (range of $r = 0.12 - 0.94$).
- The Committee discussed the validity of this measure since testing of this measure was against a short-term outcome measure, and the correlation was low. Discussion of combining STEMI and NSTEMI also transpired. STEMI and NSTEMI have different target populations, and perhaps facility performance can be affected by the relative frequency of STEMI and NSTEMI.
- The Committee agreed the reliability and validity testing is sufficient and meets NQF's criteria.

3. Feasibility: H-6; M-13; L-2; I-0

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

Rationale:

- All data elements are in defined fields in an electronic clinical data.
- The developer states no difficulties were reported in regard to data collection, availability of data, missing data, and the frequency of data collection.
- The Committee had no concerns on the feasibility of this measure.

4. Use and Usability

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-19; No Pass-2**; 4b. Usability: **H-9; M-10; L-2; I-0**

Rationale:

- The measure is used in the following programs: NCDR Public Reporting, Professional Certification or Recognition Program, Chest Pain-MI Recognition Program, NCDR Chest Pain MI, and the ACC Patient Navigator.
- The Committee had no concerns on the use and usability of this measure as it is used widely and regularly for quality improvement.

5. Related and Competing Measures

This measure is related to the following measures:

- 0132 Aspirin on arrival for acute MI
- 0137 ACEI or ARB for left ventricular systolic dysfunction AMI patients
- 0142 Aspirin prescribed at discharge for AMI
- 0160 Beta-blocker prescribed at discharge for AMI
- 0163 Primary PCI received within 90 min of hospital arrival
- 0288 Fibrinolytic therapy received within 30 minutes of ED arrival
- 0639 Statin prescribed a discharge
- 0642 Cardiac rehabilitation patient referral from an inpatient setting

The Committee discussed these measures during previous phases of the cardiovascular project and no new information warranted further discussion.

6. Standing Committee Recommendation for Endorsement: Y-19; N-2

7. Public and Member Comment

- No NQF member or public comments were received by or during the February 6-7 measure evaluation web meetings.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019 Decision: Approved for continued endorsement)

9. Appeals

No appeals received

0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients

[Submission](#) | [Specifications](#)

Description:) Proportion of eligible patients = 18 years of age, who were prescribed aspirin, P2Y12 inhibitor, and statin at discharge following PCI with or without stenting.

Numerator Statement: Patients who receive all medications for which they are eligible.

1. Aspirin prescribed at discharge (if eligible for aspirin as described in denominator)

AND

2. P2Y12 agent (clopidogrel, prasugrel, ticlopidine, or ticagrelor) prescribed at discharge (if eligible for P2Y12 as described in denominator)

AND

3. Statin prescribed at discharge (if eligible for statin as described in denominator)

Denominator Statement: Patients surviving hospitalization who are eligible to receive any of the three medication classes:

1) Eligible for aspirin (ASA): Patients undergoing PCI who do not have a contraindication to aspirin documented

AND

2) Eligible for P2Y12 agent (clopidogrel, prasugrel, ticlopidine, or ticagrelor): Patients undergoing PCI with stenting who do not have a contraindication to P2Y12 agent documented

AND

3) Eligible for statin therapy: Patients undergoing PCI who do not have a contraindication to statin therapy.

Exclusions: The exclusions for this measure are comprised of patients without the following: (1) a PCI during the admission, (2) discharge status of deceased (9040), and (3) discharge location of "other acute hospital, hospice, or against medical advice.

Adjustment/Stratification: none

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Composite

Data Source: Other, Registry Data

Measure Steward: American College of Cardiology

STANDING COMMITTEE MEETING 2/7/2019

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

(1a. Evidence, 1b. Performance Gap, 1c. Composite – Quality Construct and Rationale)

1a. Evidence: **H-11; M-10; L-0; I-0** 1b. Performance Gap: **H-3; M-16; L-2; I-0** 1c. Composite – Quality Construct and Rationale: **H-10; M-10; L-1; I-0**

Rationale:

- This composite measure has three process measure components: Aspirin at discharge; P2Y12 agent (clopidogrel, prasugrel, or ticlopidine) prescribed at discharge; and Statin prescribed at discharge.
- There have been no changes to the evidence since the measure was last evaluated in 2015. The developer provided performance scores from 2015-2016 (n=1633). Across all hospitals: Mean= 93.6%; Median=95.8% ; Min=25.9% ; and Max=100%. The performance data provided demonstrated most hospitals scoring between 90% to 100% on the discharged medications within the composite measure.
- Disparities data by multiple sub-populations are presented. However, there are no statistically significant differences within subpopulations.
- Performance rates have increased since 2011 to 2016 (89.25% to 95.06%). Performance gap is present despite improvement over time.
- The developer stated that a composite provides an additive value over the individual measures due to: data reduction, scope expansion, and provider performance valuation. Because this is an “all-or-none measure”, the developer states that no empirical analyses pertinent to aggregations or weighting were conducted.
- The Committee noted that evidence for this measure is strong, and it suggests there is still a performance gap, despite improvement from 2011-2016.
- The Committee agreed that the quality construct rationale is high.

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

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

2a. Reliability: **H-9; M-12; L-0; I-0** 2b. Validity: **H-6; M-15; L-0; I-0**; 2c. Composite Construction **H-6; M-14; L-1; I-0**

Rationale:

- Reliability testing was conducted at the measure score level using a split-sample methodology. Pearson correlation is $r=0.90$. Pearson correlation coefficient between this measure and STEMI/Shock mortality measure (NQF#: 0536): -0.07465 ($n=1,273$). Pearson correlation coefficient between this measure and NSTEMI/No Shock mortality measure (NQF#: 0535): -0.16380 ($n=1,283$). These results supported the developer’s hypothesis (i.e., better provision of discharge medications was associated with lower mortality), although the magnitude of the correlations was low.
- While the Committee noted this measure is only within a registry and therefore may exclude some facilities, those excluded would be minor because 98% of hospitals performing percutaneous coronary interventions (PCIs) are included in the registry.
- Empirical validity testing was conducted at the measure score level. Developers conducted a construct validation analysis by correlating the results of this measure with results from two measures of 30-day all-cause mortality following PCI (NQF #0536, which includes patients with STEMI/shock, and NQF #0535, which includes patients without STEMI/shock) using data from Q4 2013 to Q3 2014.

3. Feasibility: H-7; M-14; L-0; I-0

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

Rationale:

- All information is obtained from the Cath PCI registry in the National Cardiovascular Data Registry (NCDR).
- The developer reports that the data are available via several methods: electronic transfer to the registry from the procedure/care setting; web-based tool for manual data entry or from an EHR.
- The developer states that the captured data elements (patient demographics, medical history, risk factors, hospital presentation, initial cardiac status, procedural details, medications, laboratory values and in-hospital outcomes) are readily available in medical records or can be attained without undue burden.
- The fees for participating in the registry: “For calendar year 2017 the annual pricing for hospitals, NCDR Analytic and Reporting Services, and licensing of measure specifications ranges from \$2900-\$50,000.”
- The Committee had no concerns for feasibility as data are readily available and the majority of hospitals participate in the NCDR registry.

4. Use and Usability

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-20; No Pass-1** 4b. Usability: **H-14; M-6; L-1; I-0**

Rationale:

- The measure is currently used by the Blue Distinction Centers for Cardiac Care; participating centers get feedback and benchmarking.
- The Committee had no concerns related to use and usability as this measure has been used for many years and is widely utilized for public reporting and payment programs.

5. Related and Competing Measures

This measure is related to the following measures below:

- **0067** Chronic Stable Coronary Artery Disease: Antiplatelet Therapy
- **0068** Ischemic Vascular Disease (IVD): Use of Aspirin or Another Antiplatelet
- **0074** Chronic Stable Coronary Artery Disease: Lipid Control
- **0118** Anti-Lipid Treatment Discharge
- **0142** Aspirin prescribed at discharge for AMI
- **0543** Adherence to Statin Therapy for Individuals with Cardiovascular Disease
- **0569** Adherence to Statins
- **0631** Secondary Prevention of Cardiovascular Events - Use of Aspirin or Antiplatelet Therapy
- **0639** Statin Prescribed at Discharge

- **2452** Percutaneous Coronary Intervention (PCI): Post-procedural Optimal Medical Therapy
Percentage of patients aged 18 years and older for whom PCI is performed who are prescribed optimal medical therapy at discharge

The Committee discussed these measures during previous phases of the cardiovascular project and no new information warranted further discussion.

6. Standing Committee Recommendation for Endorsement: Y-20; N-1

7. Public and Member Comment

- No NQF member or public comments were received by or during the February 6-7 measure evaluation web meetings.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019 Decision: Approved for continued endorsement)

9. Appeals

No appeals received

2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI)

[Submission](#) | [Specifications](#)

Description: Risk adjusted rate of intra and post procedure bleeding for all patients age 18 and over undergoing PCI.

Numerator Statement: Patients 18 years of age and older with a post-PCI bleeding event as defined below:

Post-PCI bleeding defined as any ONE of the following:

1. Bleeding event w/in 72 hours ; OR
2. Hemorrhagic stroke; OR
3. Cardiac Tamponade; OR
4. Post-PCI transfusion for patients with a pre-procedure hemoglobin (Hgb) >8 g/dL and pre-procedure Hgb not missing; OR
5. Absolute Hgb decrease from pre-PCI to post-PCI of ≥ 4 g/dl AND pre-procedure Hgb ≤ 16 g/dL AND pre-procedure Hgb not missing

Denominator Statement: Patients 18 years of age and older with a PCI procedure performed during admission

Exclusions:

1. Patients who did not have a PCI (episodes of care with a diagnostic catheterization only);
2. Patients who died on the same day of the procedure
3. Patients who underwent CABG during the episode of care

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Registry Data

Measure Steward: American College of Cardiology

STANDING COMMITTEE MEETING 2/7/2019

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

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

1a. Evidence: **Yes-18; No-0**; 1b. Performance Gap: **H-3; M-15; L-0; I-0**;

Rationale:

- The developer updated the evidence demonstrating the direct relationship between periprocedural bleeding and increased mortality. Three additional publications are cited describing the utility of risk scores associated with bleeding. Seven additional citations with relevant empirical data are provided.
- Updates on the national performance for the risk-standardized bleeding rates are provided for 2015 and 2016. The developer states that the data show that bleeding events are lower than when the model was first developed because the previous version of this model used a

threshold of hemoglobin drop of 3g/dl to reflect a bleeding event. The current model raised the hemoglobin drop to 4g/dl to align with the bleeding definitions used in other NCDR registries. The 2016 data show that there is substantial variation across hospitals in bleed rate, ranging from a 1.7% rate in the top performing decile to an almost 3-fold greater rate of 5.0% in the worst performing decile.

- The Committee noted strong evidence for this measure and a considerable gap in performance of care.

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

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

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

Rationale:

- Reliability testing was conducted at both the data element and measure score levels.
- Data element testing was conducted for some, but not all, critical data elements. The developer conducted a test-retest analysis by reviewing data for CathPCI patients who were readmitted or had a repeat procedure in 2016 (n=42,637). Results: Inconsistencies in values for the 7 data elements ranged from 0.06% to 3%.
- Score-level testing was conducted using a signal-to-noise (SNR) analysis (specifically, Adams' beta- binomial method). Results: The developer presented reliability estimates (presumably averages), for all procedures, by hospital volume tertiles, and for hospitals with greater than average volume. Values ranged from 0.706 to 0.819.
- Empirical validity testing was conducted at the measure score level. The developer conducted a construct validation analysis by examining the association of this measure (by quintile) with other outcomes including mortality, complications of heart failure and stroke, length of stay, and rates of same-day discharge. Results: The developer found statistically significant associations between quintiles of bleeding rates and the outcomes of interest (higher rates of bleeding were associated with poorer outcomes). These results support the developers' hypothesis.
- This measure is risk-adjusted using hierarchical logistic regression with 32 risk factors. Model discrimination: C-statistic=0.79 for re-calibrated model using data from 2016 for 1,619 hospitals. (NOTE: c-statistic= 0.78 for initial model developed using data from 2/2008-4/2011 for 1,142 hospitals) Model calibration: The developer assessed risk-model calibration by plotting observed versus predicted values. They report a slope=1 and intercept=0.
- The Committee had no concerns with the reliability and validity testing of this measure.

3. Feasibility: H-7; M-11; L-0; I-0

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

Rationale:

- The developer states that all data elements are in defined fields in electronic clinical data.
- According to the developer, there were no difficulties noted with regard to data collection, availability of data, missing data, the frequency of data collection, patient confidentiality, time and cost of data collection, or other feasibility/implementation issues. The developer provides a detailed outline of the NCDR data collection process.

- For calendar year 2017, the annual pricing for hospitals, NCDR Analytic and Reporting Services, and licensing of measure specifications ranges from \$2900-\$50,000.
- Measures that are aggregated by ACCF and submitted to NQF are intended for public reporting and therefore there is no charge for a standard export package. However, on a case by case basis, requests for modifications to the standard export package will be available for a separate charge.
- The Committee agreed that this measure is feasible because the data elements are in defined fields.

4. Use and Usability

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-18; No Pass-0** 4b. Usability: **H-10; M-8; L-0; I-0**

Rationale:

- This measure is publicly reported and used in an accountability program: Blue Distinction Centers for Cardiac Care; hospitals are provided with feedback and benchmarking.
- The Committee did not have any concerns with use as the measure is publicly reported and used in an accountability program.
- A Committee member asked about the unintended harm of bleeding if anticoagulants are used prior to a PCI. The developer acknowledged this as a potential harm if the PCI procedure is emergent but stressed mitigation strategies to decrease this risk. However, if the procedure is nonemergent, this potential harm is nonexistent.
- The Committee had no additional concerns for usability and passed this measure on usability.

5. Related and Competing Measures

- No related or competing measures noted.

6. Standing Committee Recommendation for Endorsement: Y-18; N-0

7. Public and Member Comment

- No NQF member or public comments were received by or during the February 6-7 measure evaluation web meetings.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Decision: Approved for continued endorsement)

9. Appeals

No appeals received

Appendix B: Cardiovascular Portfolio—Use in Federal Programs^a

NQF #	Title	Federal Programs: Finalized or Implemented as of May 31, 2019
0018	Controlling High Blood Pressure	Medicare Shared Savings Program (SSP), Merit-Based Incentive Payment System (MIPS) Program, Medicaid Adult Core Set, Qualified Health Plan (QHP) Quality Rating System (QRS)
0028	Preventive Care & Screening: Tobacco Use: Screening & Cessation Intervention	MIPS, MSSP
0066	Coronary Artery Disease (CAD): Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy - Diabetes or Left Ventricular Systolic Dysfunction (LVEF < 40%)	Physician Compare; MIPS
0067	Chronic Stable Coronary Artery Disease: Antiplatelet Therapy	MIPS
0068	Ischemic Vascular Disease (IVD): Use of Aspirin or Another Antithrombotic	MIPS
0070/ 0070e	Coronary Artery Disease (CAD): Beta-Blocker Therapy—Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)	MIPS
0071	Persistence of Beta-Blocker Treatment After a Heart Attack	MIPS
0081/ 0081e	Heart Failure (HF): Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction (LVSD)	MIPS
0083/ 0083e	Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)	MIPS
0114	Risk-Adjusted Post-Operative Renal Failure	MIPS
0115	Risk-Adjusted Surgical Re-exploration	MIPS
0119	Risk-Adjusted Operative Mortality for CABG	MIPS
0129	Risk-Adjusted Prolonged Intubation (Ventilation)	MIPS
0130	Risk-Adjusted Deep Sternal Wound Infection Rate	MIPS
0131	Risk-Adjusted Stroke/Cerebrovascular Accident	MIPS
0229	Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older	Hospital Compare, Hospital Inpatient Quality Reporting (IQR), Hospital Value-Based Purchasing (VBP)

^a Per CMS Measures Inventory Tool as of 2/20/2019

NQF #	Title	Federal Programs: Finalized or Implemented as of May 31, 2019
0230	Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older.	IQR, VBP, Hospital Compare
0290	Median Time to Transfer to Another Facility for Acute Coronary Intervention	Hospital Outpatient Quality Reporting (OQR)
0330	Hospital 30-Day, All-Cause, Risk-Standardized Readmission Rate (RSSR) Following Heart Failure Hospitalization	Hospital Readmission Reduction Program (HRRP)
0505	Hospital 30-Day All-Cause, Risk-Standardized Readmission Rate (RSSR) Following Acute Myocardial Infarction (AMI) Hospitalization	IQR; HRRP
0643	Cardiac Rehabilitation Patient Referral from an Outpatient Setting	MIPS
0669	Cardiac Imaging for Preoperative Risk Assessment for Non-Cardiac, Low Risk Surgery	Hospital Compare, OQR
0670	Cardiac stress imaging not meeting appropriate use criteria: Preoperative evaluation in low risk surgery patients	MIPS
0671	Cardiac stress imaging not meeting appropriate use criteria: Routine testing after percutaneous coronary intervention (PCI)	MIPS
0672	Cardiac stress imaging not meeting appropriate use criteria: Testing in asymptomatic, low risk patients	MIPS
1525	Atrial Fibrillation and Atrial Flutter: Chronic Anticoagulation Therapy	MIPS
2474	Cardiac Tamponade and/or Pericardiocentesis Following Atrial Fibrillation Ablation	MIPS

Appendix C: Cardiovascular Standing Committee and NQF Staff

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Appendix D: Measure Specifications

3309 Risk-Standardized Survival Rate (RSSR) for In-Hospital Cardiac Arrest

STEWARD

American Heart Association

DESCRIPTION

This measure estimates a hospital -level risk standardized survival rate (RSSR) for patients aged 18 years and older who experience an in-hospital cardiac arrest.

TYPE

Outcome

DATA SOURCE

Registry Data American Heart Association (AHA) Get With The Guidelines-Resuscitation (GWTG-R) Registry

LEVEL

Facility

SETTING

Emergency Department and Services, Inpatient/Hospital

NUMERATOR STATEMENT

Patients who were alive at discharge

NUMERATOR DETAILS

Target population for the numerator is identified via the Get With The Guidelines (GWTG)—Resuscitation Registry using the time period and data fields below:

Time Period for Data Collection: At each hospital discharge during the measurement period.

‘Discharge Status’ = Alive

DENOMINATOR STATEMENT

Patients aged 18 years and older with in-hospital cardiac arrest who received chest compression and/or defibrillation

DENOMINATOR DETAILS

Target population for the denominator is identified via the Get With The Guidelines (GWTG)—Resuscitation Registry using the time period and data fields below:

Time Period for Data Collection: 12 consecutive months

‘Age at System Entry’ > = 18 years

AND

'First documented pulseless rhythm' = Asystole, Pulseless Electrical Activity (PEA), Pulseless Ventricular Tachycardia, or Ventricular Fibrillation (VF)

AND

'Did patient receive chest compressions and/or defibrillation during this event?' = Yes

EXCLUSIONS

None

EXCLUSION DETAILS

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

Not applicable.

TYPE SCORE

Other (specify): Risk standardized rate better quality = higher score

ALGORITHM

The measure score is calculated as follows:

1. Hospitals with 20 or more cases of in-hospital cardiac arrest during the measurement period are identified as eligible for the measure.
2. Patients for inclusion are identified using inclusion criteria as described above (S.6 through S.9)
3. Patients meeting the numerator (S.4-S.5) are determined.
4. Variables for inclusion in risk adjustment are pulled.
5. Measure score is calculated using data aggregated from all registry participants, as described below and within the testing attachment.

The measure is adjusted using the variables below:

1. Age
2. Initial cardiac arrest rhythm
3. Hospital location
4. Hypotension
5. Sepsis
6. Metastatic or hematologic malignancy
7. Hepatic insufficiency
8. Mechanical ventilation
9. Intravenous vasopressor

Measure Calculation:

- 1) Create a model for predictors of in-hospital cardiac arrest (IHCA). Since patients at a given hospital with IHCA will have correlated outcomes, we use a multivariable hierarchical logistic

regression model, wherein patients will be nested within hospitals in the model and hospitals are modeled as random effects.

2) A number of demographic (age category, sex) and comorbidity variables (includes pre-existing conditions and interventions in place at the time of cardiac arrest) are considered for model inclusion. Essentially, we consider almost all variables as potential predictors in the model.

3) An initial “full” model is generated with significant predictors of survival to discharge.

4) Within this initial “full” model, we then work to sequentially eliminate predictors with the smallest contribution to the model. This is done to derive a more parsimonious, or “reduced”, model with 95% of the initial “full” model’s predictive ability – in essence, to create a model with many fewer variables with almost identical predictive (discriminative) ability as the “full” model.

5) Model discrimination with the “reduced” model is then assessed with c-statistics, and model validation performed by comparing the R2 of the predicted and observed plots (this information is described in the next section).

6) Once the “reduced” predictive model is confirmed, as above, then one can calculate RSSRs for each hospital. This is accomplished by multiplying the weighted average unadjusted hospital survival rate for the entire study sample by the hospital’s predicted vs. expected survival rate. So, a hospital with a predicted vs. expected survival rate > 1 would have a RSSR higher than the weighted mean, and one with a ratio < 1 would have a RSSR below the weighted mean.

7) The expected survival number (denominator) would be determined by applying the model’s regression coefficients for covariates to each patient and summing up the probabilities for all patients within that hospital. This number uses the average hospital-level random intercept in the model.

8) The predicted survival number (numerator) is the number of survivors at a hospital, which is determined in the same way as the expected survival except that the hospital’s specific random intercept is used.

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0964 Therapy with aspirin, P2Y12 inhibitor, and statin at discharge following PCI in eligible patients

STEWARD

American College of Cardiology

DESCRIPTION

Proportion of eligible patients = 18 years of age, who were prescribed aspirin, P2Y12 inhibitor, and statin at discharge following PCI with or without stenting.

TYPE

Composite

DATA SOURCE

Other, Registry Data National Cardiovascular Data Registry (NCDR®) CathPCI Registry®

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Patients who receive all medications for which they are eligible.

1. Aspirin prescribed at discharge (if eligible for aspirin as described in denominator)

AND

2. P2Y12 agent (clopidogrel, prasugrel, ticlopidine, or ticagrelor) prescribed at discharge (if eligible for P2Y12 as described in denominator)

AND

3. Statin prescribed at discharge (if eligible for statin as described in denominator)

NUMERATOR DETAILS

If eligible for Aspirin (9505) and prescribed (9510), then code "Yes"

If eligible for Aspirin (9505) and not prescribed (9510), then code "No"

If eligible for P2Y12 (9505) and prescribed (9510) , then code then "Yes"

If eligible for P2Y12 (9505)and not prescribed (9510), then code "No"

If eligible for statin (9505) and prescribed (9510) , then code "Yes"

If eligible for statin (9505) and not prescribed (9501) given, then code "No"

If any "No, not prescribed" present, then performance not met. Else, performance met.

Note: Contraindicated and those participating in blinded studies are also considered as exceptions and performance met if patient is eligible for at least one medication (aspirin or statin or P2Y12).

DENOMINATOR STATEMENT

Patients surviving hospitalization who are eligible to receive any of the three medication classes:

- 1) Eligible for aspirin (ASA): Patients undergoing PCI who do not have a contraindication to aspirin documented

AND

- 2) Eligible for P2Y12 agent (clopidogrel, prasugrel, ticlopidine, or ticagrelor): Patients undergoing PCI with stenting who do not have a contraindication to P2Y12 agent documented

AND

- 3) Eligible for statin therapy: Patients undergoing PCI who do not have a contraindication to statin therapy.

DENOMINATOR DETAILS

The following patients are included in the denominator:

1. Patients 18 years of age or older (2050)

2. Patients undergoing PCI during the episode of care (5305)

3 .PCI patients who are eligible for at least one of the following medications: aspirin, statin, and P2Y12 (7155, 9505, 9510)

Note:

- Eligibility for measures is determined by whether the PCI procedure included a stent (aspirin, statin, and P2Y12) or no stent (aspirin and statin) and whether patient had contraindication or was blinded to the medication
- All data element numbers listed above are included in the attach data dictionary which includes more detailed definitions for the above elements.

EXCLUSIONS

The exclusions for this measure are comprised of patients without the following: (1) a PCI during the admission , (2)discharge status of deceased (9040), and (3) discharge location of “other acute hospital, hospice, or against medical advice.

EXCLUSION DETAILS

The exclusions for this measure include:

1. Patients without a PCI during the admission (5305)
2. Patients with a discharge status of deceased (9040),
3. Patients with a discharge location of “other acute hospital, hospice, or against medical advice (9405).

NCDR distinguishes between absolute “Exclusions” (e.g., death, transfer) and relative “Exceptions”, (e.g., contraindications). Patients with exclusions are always automatically removed from the denominator and numerator; exceptions allow clinicians the opportunity to identify an intervention/process/medication as not clinically indicated based on the individual circumstances.

Each of the three medications incorporated into this composite may be coded as Yes (medication prescribed), No (medication not prescribed), Blinded (pt. involved in a clinical trial, medication type unavailable for data entry), and Contraindicated.

With respect to exceptions, patients are removed from the denominator if they have contraindication or are blinded across ALL medications that they are eligible for.

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

- 1) Remove patients whose discharge status is deceased
- 2) Check if given patient is eligible for 1 of the 3 medication therapies.
- 3) If eligible for at least 1 medication, then keep this patient.

- 4) If not eligible for any of the 3 medications, then patient is removed from eligibility.
- 5) If eligible for Aspirin and given, then code "Yes"
 If eligible for Aspirin and not given, then code "No, not given"
 If eligible for Aspirin but contraindicated, then code "contraindicated/blinded"
 If eligible for P2Y12 and given, then code then "Yes"
 If eligible for P2Y12 and not given, then code "No, not given"
 If eligible for P2Y12 but contraindicated, then code "contraindicated/blinded"
 If eligible for statin and given, then code "Yes"
 If eligible for statin and not given, then code "No, not given"
 If eligible for statin but contraindicated, then code "contraindicated/blinded"
- 6) If any "No, not given" present, then performance not met. Else, performance met.

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2377 Overall Defect Free Care for AMI

STEWARD

American College of Cardiology

DESCRIPTION

The proportion of acute MI patients ≥ 18 years of age that receive "perfect care" based upon their eligibility for each performance measures

TYPE

Composite

DATA SOURCE

Other, Registry Data The data source is the Chest Pain- MI Registry, formerly known as the ACTION Registry, of the National Cardiovascular Data Registry of the American College of Cardiology.

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

The number of perfect care opportunities met from all eligible acute MI patients

NUMERATOR DETAILS

See attached data dictionary and algorithm details in question S.14.

All eligible care opportunities must be met in order for the composite measure to be achieved. There are 11 potential opportunities for the STEMI population and 8 potential opportunities for the NSTEMI population

DENOMINATOR STATEMENT

All acute MI patients (including STEMI and NSTEMI)

Note:

- Patients less than 18 years of age are not included in the denominator
- The guidelines-based care for STEMI and NSTEMI populations differ in some respects.

DENOMINATOR DETAILS

The denominator includes two populations, those who have had either a STEMI or NSTEMI.

- STEMI: STEMI or STEMI Equivalent= yes (4030)

OR

- NSTEMI: STEMI or STEMI Equivalent= no (4030) AND Positive cardiac markers within first 24 hours (10000)

Note: Please refer to the data dictionary attached for more information on the data elements.

EXCLUSIONS

The exclusions for this measure were minimal and comprised: patients <18 years of age, hospital submissions that did not pass the NCDR quality check, and patients who were ineligible for defect free care measure (e.g., contraindications, clinical studies).

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

There is no stratification.

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

For each individual measure if the denominator is met (patient eligible for care) and the numerator is met (the appropriate care is received) then increase the denominator opportunity and numerator care received each by 1. If the denominator is met but the care received is NOT met then only increase the denominator (eligibility). This logic is followed for 11 individual measures for STEMI and 8 individual measures for NSTEMI. Then if the care opportunities are equal to the number of times care is received then the numerator of the composite measure is increased by one. If the numerator and denominator are not equal the numerator is not increased.

DefectFreeCareCounter = 0

PMCareOpportunity = 0

PMTherapy = 0

CASE Population ID = 41 (STEMI)

IF(ASAArrivalPMInd denominator = 1 AND ASAArrivalPMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(ASAArrivalPMInd denominator = 1 AND ASAArrivalPMInd numerator = 0)

increment PMCareOpportunity by 1

IF(ASADischargePMInd denominator = 1 AND ASADischargePMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(ASADischargePMInd denominator = 1 AND ASADischargePMInd numerator = 0)

increment PMCareOpportunity by 1

IF(BBDischargePMInd denominator = 1 AND BBDischargePMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(BBDischargePMInd denominator = 1 AND BBDischargePMInd numerator = 0)

increment PMCareOpportunity by 1

IF(StatinDischargePMInd denominator = 1 AND StatinDischargePMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(StatinDischargePMInd denominator = 1 AND StatinDischargePMInd numerator = 0)

increment PMCareOpportunity by 1

IF(EvalLVSysFuncPMInd denominator = 1 AND EvalLVSysFuncPMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(EvalLVSysFuncPMInd denominator = 1 AND EvalLVSysFuncPMInd numerator = 0)

increment PMCareOpportunity by 1

IF(ACEARBDDischargePMInd denominator = 1 AND ACEARBDDischargePMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(ACEARBDDischargePMInd denominator = 1 AND ACEARBDDischargePMInd numerator = 0)

increment PMCareOpportunity by 1

IF(D2NPMElapsedTime denominator = 1 AND D2NPMLessThan30Ind numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(D2NPMElapsedTime denominator = 1 AND D2NPMLessThan30Ind numerator = 0)

increment PMCareOpportunity by 1

IF(D2BPMElapsedTime denominator = 1 AND D2BPMLessThan90Ind numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(D2BPMElapsedTime denominator = 1 AND D2BPMLessThan90Ind numerator = 0)

increment PMCareOpportunity by 1

IF(ReperfusionPMInd denominator = 1 AND ReperfusionPMInd numerator = 1)

increment PMCareOpportunity by 1, increment PMTherapy by 1

IF(ReperfusionPMInd denominator = 1 AND ReperfusionPMInd numerator = 0)

increment PMCareOpportunity by 1

IF(SmokePMInd denominator = 1 AND SmokePMInd numerator = 1)

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increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(SmokePMInd denominator = 1 AND SmokePMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(CardRehabPMInd denominator = 1 AND CardRehabPMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(CardRehabPMInd denominator = 1 AND CardRehabPMInd numerator = 0)
    increment PMCareOpportunity by 1
IF PMCareOpportunity = PMTherapy THEN
    increment DefectFreeCareCounter by 1
)
CASE Population ID = 42 (NSTEMI)
IF(ASAArrivalPMInd denominator = 1 AND ASAArrivalPMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(ASAArrivalPMInd denominator = 1 AND ASAArrivalPMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(ASAArrivalPMInd denominator = 1 AND ASADischargePMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(ASAArrivalPMInd denominator = 1 AND ASADischargePMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(BBDDischargePMInd denominator = 1 AND BBDDischargePMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(BBDDischargePMInd denominator = 1 AND BBDDischargePMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(StatinDischargePMInd denominator = 1 AND StatinDischargePMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(StatinDischargePMInd denominator = 1 AND StatinDischargePMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(EvalLVSysFuncPMInd denominator = 1 AND EvalLVSysFuncPMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(EvalLVSysFuncPMInd denominator = 1 AND EvalLVSysFuncPMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(ACEARBDDischargePMInd denominator = 1 AND ACEARBDDischargePMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(ACEARBDDischargePMInd denominator = 1 AND ACEARBDDischargePMInd numerator = 0)
    increment PMCareOpportunity by 1
IF(SmokePMInd denominator = 1 AND SmokePMInd numerator = 1)
    increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(SmokePMInd denominator = 1 AND SmokePMInd numerator = 0)
    increment PMCareOpportunity by 1

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IF(CardRehabPMInd denominator = 1AND CardRehabPMInd numerator = 1)
increment PMCareOpportunity by 1, increment PMTherapy by 1
IF(CardRehabPMInd denominator = 1AND CardRehabPMInd numerator = 0)
increment PMCareOpportunity by 1
IF PMCareOpportunity = PMTherapy THEN
increment DefectFreeCareCounter by 1

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2459 Risk Standardized Bleeding for patients undergoing percutaneous coronary intervention (PCI).

STEWARD

American College of Cardiology

DESCRIPTION

Risk adjusted rate of intra and post procedure bleeding for all patients age 18 and over undergoing PCI.

TYPE

Outcome

DATA SOURCE

Registry Data National Cardiovascular Data Registry CathPCI Registry

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Patients 18 years of age and older with a post-PCI bleeding event as defined below:

Post-PCI bleeding defined as any ONE of the following:

1. Bleeding event w/in 72 hours ; OR
2. Hemorrhagic stroke; OR
3. Cardiac Tamponade; OR
4. Post-PCI transfusion for patients with a pre-procedure hemoglobin (Hgb) >8 g/dL and pre-procedure Hgb not missing; OR
5. Absolute Hgb decrease from pre-PCI to post-PCI of ≥ 4 g/dl AND pre-procedure Hgb ≤ 16 g/dL AND pre-procedure Hgb not missing

NUMERATOR DETAILS

The numerator is defined as any patient ≥ 18 years of age, with post-PCI bleeding which includes meeting any one of the criteria listed below (as shown below).

1. Bleeding event w/in 72 hours (8050); OR
2. Hemorrhagic stroke (8021); OR
3. Tamponade (8025); OR
4. Post-PCI transfusion (8040) for patients with a pre-procedure hgb > 8 g/dL and pre-procedure hgb not missing; OR
5. Absolute hgb decrease (7320 and 7345) from pre-PCI to post-PCI of ≥ 4 g/dl (excluded if any of the following: pre-procedure (7320) hgb > 16 g/dl or IABP (5330) = yes or MVSupport (5340) = yes)

Note:

- All data element numbers listed above are included in the attach data dictionary which includes more detailed definitions for the above elements.
- The measure includes risk adjustment to account for differences in case mix across hospitals, thus the ratio determined by the numerator and denominator are modified based upon the adjustment.

DENOMINATOR STATEMENT

Patients 18 years of age and older with a PCI procedure performed during admission

DENOMINATOR DETAILS

The following patients are included in the denominator:

1. Patients 18 years of age or older
2. Patients undergoing PCI during the episode of care
3. Initial PCI procedures for patients who underwent multiple PCI procedures during the episode of care (subsequent PCIs during a single Episode of Care are excluded).
4. Patient with procedures with non-missing values for outcome variables of bleeding event w/in 72 hours (8050) AND transfusion (8040).

Note that all data element numbers listed above are included in the attached data dictionary which includes more detailed definitions for the above elements.

EXCLUSIONS

1. Patients who did not have a PCI (episodes of care with a diagnostic catheterization only);
2. Patients who died on the same day of the procedure
3. Patients who underwent CABG during the episode of care

EXCLUSION DETAILS

The following patients are excluded from the denominator:

1. Patients who died on the same day of the procedure [Discharge date (9035)=procedure date (5300) AND discharge status=deceased (9040)]
2. Patients with CABG (9000)=yes

Note that all data element numbers listed above are included in the attached data dictionary which includes more detailed definitions for the above elements.

At the facility level, all data submissions must pass the data quality and completeness reports to be included. Note: For some characteristics, missing values are imputed. In the NCDR data quality program, all key variables in the risk model have a high "inclusion" criteria, meaning that when a hospital submits data, they need to have a high level of completeness (>95%) for those variables. If they are not able to meet the criteria in our data quality program, they do not receive risk-adjusted outcomes for any of the records they submitted for that quarter. Because the high-threshold for inclusion is present, the impact of imputation on hospital-specific rates is minimal, but enables a more complete assessment of hospital performance.

Note that all data element numbers listed above are included in the attach data dictionary which includes more detailed definitions for the above elements.

At the facility level, all data submissions must pass the data quality and completeness reports to be included. Note: If one or two variables are missing, the value is imputed for certain characteristics . In our data quality program, all key variables in the risk model have a high "inclusion" criteria. This means that, when a hospital submits data to us , they need to have a high level of completeness (around 95-99%) for those variables. If they are not able to meet the criteria in our data quality program, they do not receive risk adjusted mortality for the records they submitted for that quarter.

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

1. Remove hospitals who fail data quality and completeness reports as outlined in the NCDR Data Quality Program (further discussed in the Testing Supplement)
2. Remove hospitals who have do not have at least one patient with a pre-PCI or post-PCI hemoglobin value.
3. Remove patient's subsequent PCIs during the same admission (if the patient had more than one PCI procedure during that episode of care).
4. Remove patients who did not have a PCI (Patient admissions with a diagnostic cath only during that episode of care)
5. Remove patients who died on the same day of the procedure
6. Remove patients who had CABG during the episode of care
7. Remove patients with pre-procedure hemoglobin <8 g/dL patients (severely anemic) who did not also have a documented bleeding event other than transfusion were not counted in the numerator if they received a transfusion.
8. Calculate measure used weight system based on predictive variables as outlined in the accompanying testing documents and supplemental materials.

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