NCDR®
NATIONAL CARDIOVASCULAR DATA REGISTRY

CathPCI Registry®

V4 Outcomes Report Companion Guide

The mission of the NCDR® is to improve the quality of cardiovascular patient CathPCI by providing information, knowledge and tools; implementing quality initiatives; and supporting research that improves patient CathPCI and outcomes.

The NCDR® is an initiative of the American College of Cardiology Foundation, with partnering support from the Society for Cardiovascular Angiography and Interventions for the CathPCI Registry.

Companion Guide to your
NCDR® Outcomes Report

Contents

Overview

The CathPCI Registry Institutional Outcomes Report provides detailed analysis of a hospital's individual performance in relation to the entire registry population. This gives insight into care variations and quality improvement opportunities. The report provides the opportunity to compare hospital practice patterns to NCDR benchmarks.

Frequently Used Terminology

R4Q (Rolling Four Quarters)	The four (4) consecutive quarters included in this report. (Example: The 2011Q1 report includes 2010Q2, 2010Q3, 2010Q4 and 2011Q1. The "Q" in 'R4Q" indicates the last quarter of the rolling four quarters).
Benchmark Inclusion Status	Indicates whether a submission will be included in the R4Q aggregated data (benchmark) and comparison group statistics. "Green," "Yellow" and "Red" stoplights denote the status.
Green status	A "Green" status G indicates the submission (one quarter/timeframe) is included in the benchmark and comparison group statistics. The data has successfully passed all data assessment and completeness checks.
Yellow status	A "Yellow" status Y indicates the submission (one quarter/timeframe) is not included in the benchmark and comparison group statistics. Data is displayed in the quarterly column, but is not included in the "My Hospital R4Q" summary. The data has not passed the overall completeness assessment checks.
Red status	A "Red" status R indicates the submission (one quarter/timeframe) is not included in the benchmark or comparison group statistics. Data is not displayed in the quarterly column.
Null status	A null or blank status indicates no submission has been received for that quarter/timeframe. Data is not displayed in the quarterly column.
My Hospital R4Q	The values for a metric/measure (over R4Q) of data submitted by your facility with a Benchmark Inclusion Status of "Green".
All Hospital 50th Pctl	The median (or midpoint or 50th percentile) of all participants' aggregated data for the metric or measure. Half of all participants will be above the median, and half will be below. This value will correspond to the midpoint of the box/whisker plot with a Benchmark Inclusion Status of "Green".
All Hospital 90th Pctl	The 90th percentile of all participants' aggregated data for the metric or measure. 10% of all participants will be above the 90th percentile value, and 90% will be below. This value will correspond to the right-most endpoint of the box/whisker plot with a Benchmark Inclusion Status of "Green".
Comparison Group Pts R4Q	Participating hospitals with same PCI annual volume based on reported data.
DQR	The online system used to check that data are well formed and complete. Data must first be submitted to the DQR to be included in the Outcomes Report.

Access to your Report

Step 1: Check Settings

1. Set privileges to ensure access to your Outcomes Reports on the NCDR Dashboard's Comparator and eReports page.
   a. Your registry site manager (RSM) must check the box next to the Comparator and eReports privilege options within the **Site User Administration** menu for each user.
   b. This privilege only needs to be set once.

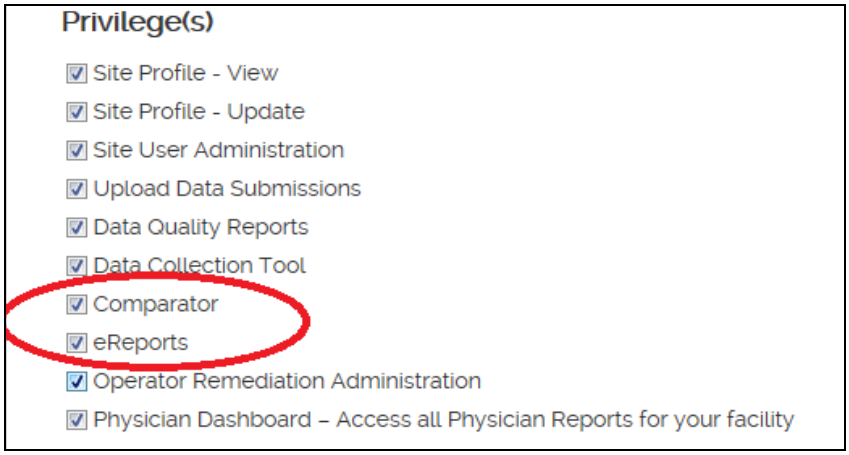

Figure 1: Selecting Privileges: Outcomes Report

2. Set **Email Preferences** to receive the automated Outcomes Report notification.
   a. Click **Individual Profile** from the **Administration** menu.
   b. Check the box next to the privilege marked "Email me when the V4.0 Outcomes Report has been created"
   c. This ensures you will receive an email when a new Outcomes Report is available for download.

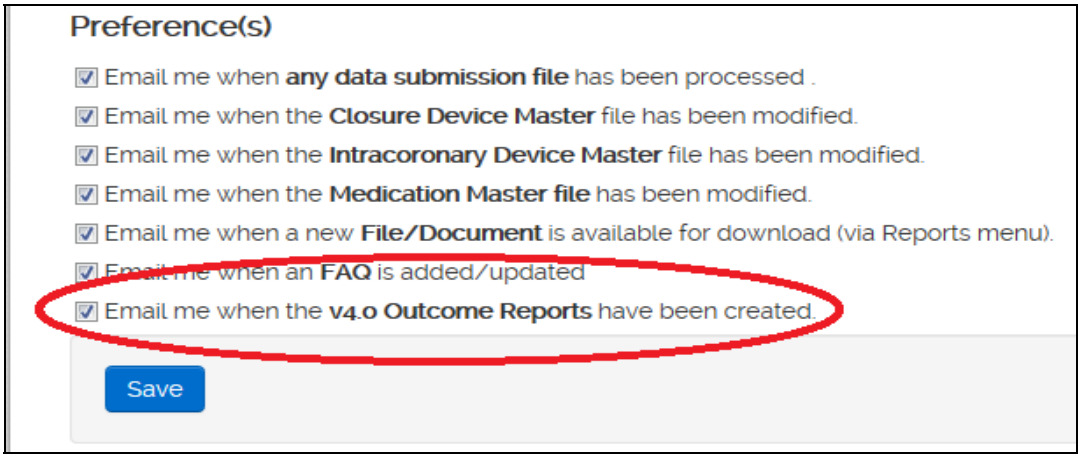

Figure 2: Selecting Email Preferences

Step 2: Download the Report

1) Login to the CathPCI Registry website
2) Select Dashboard from the left menu
   - You must have privileges set to access this function (See Step 1).

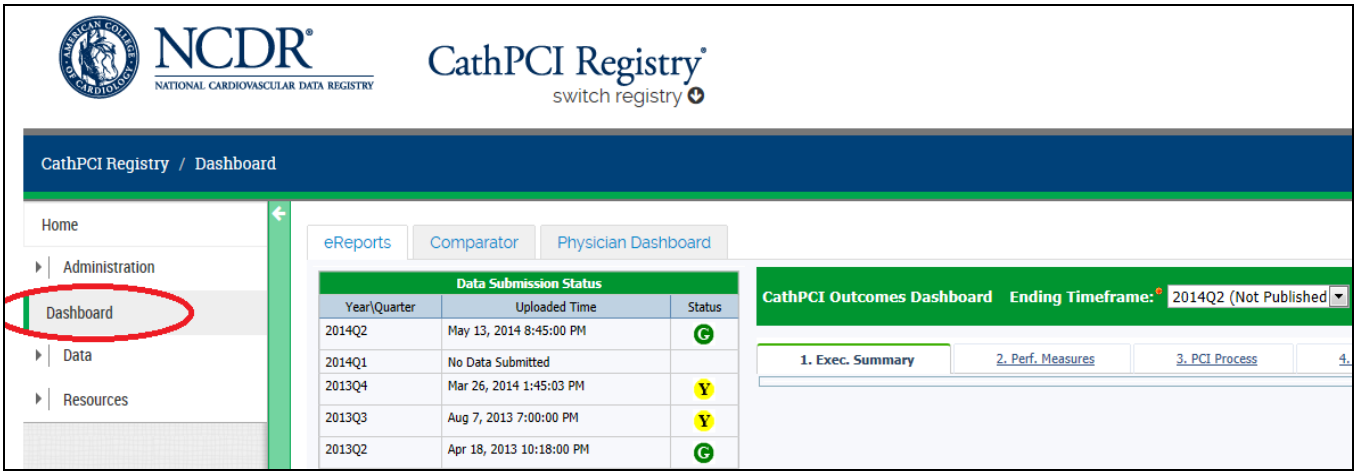

Figure 3: Locating the Dashboard

3) From the Outcomes Report table found on the Dashboard, select your preferred PDF or EXCEL format.

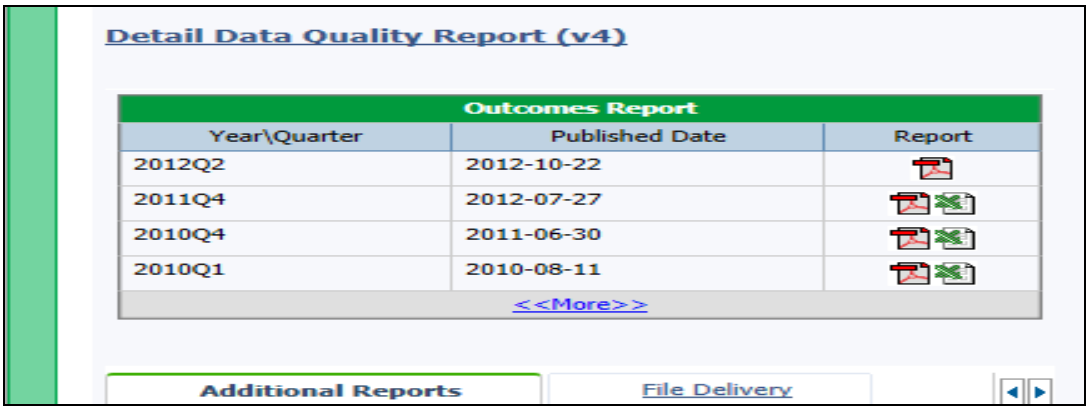

Figure 4: Locating the Reports on the Dashboard

4) When the File Download dialog box appears, select Save. Save the file to your local system.

Specifications for Executive Summary Measures and Metrics

Section I: PCI Performance Measures
Endorsed by the National Quality Forum and appropriate for public reporting

1. **PCI in-hospital risk adjusted mortality (all patients)** **Description:** The hospital risk adjusted mortality rate for patients having PCI	
Numerator	See risk model technical specifications – page 37
Denominator	
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Although death in patients with serious heart disease is not completely unexpected, that rate (adjusted for case mix/patient risk factors) is sensitive to a number of controllable factors such as case selection, procedural judgment and operator skill, as well as institutional support and overall quality of care. The NCDR™ risk adjustment model analyzes multiple elements to account for patient risk factors that are present prior to PCI. Risk adjustment "levels the playing field" among participating institutions and adjusts the "actual" mortality rate based on these factors. In other words, if you have several very sick patients die, your risk adjusted mortality rate would be lower than your actual mortality rate. If you had several very healthy patients die unexpectedly, your risk adjusted mortality rate would be higher than your actual mortality rate. Please refer to the detail section of the report and the risk adjustment technical notes for more information. Risk adjusted mortality does not show an "arrow" position on the Executive Summary if your hospital had no mortality for that quarter. The Current algorithm cannot calculate zero and will be updated.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® - located on ncdr.com in the CathPCI Registry Resources/documents section. Brennan, et al. Enhanced Mortality Risk Prediction With a Focus on High-Risk Percutaneous Coronary Intervention, Journal of American College of Cardiology: Cardiovascular Interventions, vol 6, No 8, 2013 (p790-799) Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. This measure has been endorsed by the National Quality Forum

~~37. PCI in-hospital risk adjusted rate of bleeding events (all patients)~~
~~Description:~~ ~~The hospital risk adjusted rate of bleeding events for patients having PCI~~ *retired and replaced with Metric 40 Risk Standardized Bleeding*

40. PCI in-hospital risk standardized rate of bleeding events (all patients)

Description: The hospital risk adjusted rate of bleeding events for patients having PCI

Numerator	See risk model technical specifications – page 41
Denominator	
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Bleeding complications after PCI are associated with increased morbidity, mortality and costs. This measure is helpful in providing risk-adjusted feedback on bleeding complications, informing clinical decision-making, and directing the use of bleeding avoidance strategies to improve the safety of PCI procedures.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® - located on ncdr.com in the CathPCI Registry Resources/documents section. Rao SV, Ou FS, Wang TY et al. Trends in the prevalence and outcomes of radial and femoral approaches to percutaneous coronary intervention: a report from the national cardiovascular data registry. JACC Cardiovasc Interv 2008;1:379-86. Marso SP, Amin AP, House JA et al. Association between use of bleeding avoidance strategies and risk of periprocedural bleeding among patients undergoing percutaneous coronary intervention. JAMA 2010;303:2156-64. Mehta SK, Frutkin AD, Lindsey JB et al. Bleeding in patients undergoing percutaneous coronary intervention: The development of a clinical risk algorithm from the National Cardiovascular Data Registry. Circulation: Cardiovascular Interventions 2009;2:222-229. Mehran R, Rao SV, Bhatt DL et al. Standardized bleeding definitions for cardiovascular clinical trials: a consensus report from the Bleeding Academic Research Consortium. Circulation 2011;123:2736-47.

38. Composite: Discharge Medications in Eligible PCI Patients **Description:** Identifies PCI patients who received prescriptions for all medications (aspirin, P2Y12 Inhibitor and statin) for which they were eligible	
Numerator	Count of patients: Who had ASA, Statin *and* a P2Y12 prescribed, contraindicated or blinded at discharge when a *stent **was** placed* during PCI *OR* Who had ASA and Statin prescribed, contraindicated or blinded at discharge when a *stent was **not** placed* during PCI
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. Patients having PCI during admission
Exclusion Criteria	Discharge status of "deceased" Discharge location of "other acute care hospital", "hospice" or "against medical advice".
Timeframe	Four consecutive quarters
Clinical Rationale	See metrics 8, 9 and 10
Relevant Citations	See metrics 8, 9 and 10 This measure has been endorsed by the National Quality Forum

Note: PCI in-hospital risk adjusted mortality (all patients), PCI in-hospital risk adjusted bleeding (all patients), and Composite: Discharge Medications in Eligible PCI patients are three performance measures in the CathPCI Registry that have been endorsed by the National Quality Forum. Such performance measures meeting the requirement for approval are intended not only for clinical quality improvement, but also may be considered for purposes of public reporting.

The "Registry Metrics" on the subsequent pages of this report are those measures that have been developed to support self assessment and quality improvement at the provider, hospital, and/or health care system level. While these metrics have not been formally developed by the American College of Cardiology/American Heart Association Task Force for Performance Measures Task Force, they may be identified as evolving' measures worthy of consideration for further development into performance measures.

Section II: Quality Metrics *– to support self assessment and quality improvement at the provider, hospital, and/or health care system level.*

PCI Process Metrics

2. Proportion of elective PCIs with prior positive stress or imaging study **Description:** Identifies PCI procedures with a prior positive stress or imaging study or an FFR ratio <=0.8	
Numerator	Count of PCI procedures with a "Positive" stress or imaging study *or* a fractional flow reserve (FFR) ratio of <=0.8
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. Elective PCI Procedure
Exclusion Criteria	CAD Presentation of "Unstable Angina", "NSTEMI" or "STEMI" CCS IV Anginal Classification Staged PCI Cardiac Transplant Evaluation
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Several studies have established that for patients with stable CAD outcomes do not differ between PCI with medical therapy and medical therapy alone. Noninvasive testing prior to elective PCI for patients with stable CAD (without acute coronary syndrome) can help select patients that will benefit from PCI. The 2012 appropriateness criteria for coronary revascularization require that, for patients without acute coronary syndromes, results from non-invasive testing be either low-risk, intermediate risk, or high risk, or that results from FFR be <= 0.80 be used to validate the need for revascularization. A positive result on stress or imaging studies and/or FFR is suggestive of ischemia.
Relevant Citations	Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am CollCardiol 2011; 58:e44–122 Patel MR, et al. ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT 2012 appropriate use criteria for coronary revascularization focused update: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Association for Thoracic Surgery, American Heart Association, American Society of Nuclear Cardiology, and the Society of Cardiovascular Computed Tomography. J Am Coll Cardiol 2012;59:857– 81. Tonino, P.A., et al. Fractional Flow Reserve versus Angiography for Guiding

	Percutaneous Coronary Intervention. New England Journal of Medicine, vol 360, #3, January 15, 2009

3. Median time to immediate PCI for STEMI patients (in minutes) **Description:** Identifies the hospital median time to PCI in minutes for STEMI patients	
Median	Median time for STEMI PCI procedures *from* "Arrival date/time" *or* STEMI noted on "Subsequent ECG date/time" ***to*** "First Device Activation date/time"
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. PCI procedures with PCI Indication of "Immediate PCI for STEMI"
Exclusion Criteria	"Non-system reason for delay" ***and*** a time to "First Device Activation date/time" of >90 minutes Transferred In for Immediate PCI for STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	According the the ACC/AHA performance measures for STEMI/NSTEMI report, "Acute reperfusion therapy for patients with STEMI significantly reduces the risk of death and should be provided to all eligible patients." Hospital policies and procedures materially affect door-to-balloon time. This measure is insensitive to differences in case mix. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction recommends: "Primary PCI should be performed as quickly as possible with a goal of a medical contact–to-balloon or door-to-balloon interval of within 90 minutes."
Relevant Citations	Krumholz HM, Anderson JL, Bachelder BL, et al. ACC/AHA 2008 performance measures for adults with ST-elevation and non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Performance Measures (Writing Committee to Develop Performance Measures for ST-Elevation and Non–ST-Elevation Myocardial Infarction). J Am Coll Cardiol 2008;52:2046 –99.

4. Proportion of STEMI patients receiving immediate PCI w/in 90 minutes **Description:** Identifies STEMI patients with a time to PCI of <=90 minutes	
Numerator	Count of STEMI PCI procedures with "Arrival date/time" *or* STEMI noted on "Subsequent ECG date/time" ***to*** "First Device Activation date/time" of <=90 minutes
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. PCI procedures with PCI Indication of "Immediate PCI for STEMI"
Exclusion Criteria	"Non-system reason for delay" ***and*** a time to "First Device Activation date/time" of >90 minutes Transferred In for Immediate PCI for STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	See metric 3.
Relevant Citations	See metric 3.

5. Median time from ED arrival at STEMI transferring facility to ED arrival at STEMI receiving facility among transferred patients. **Description:** Identifies the hospital median time from transferring facility to arrival at PCI facility for STEMI patients	
Median	Median time for STEMI patients who are "Transferred In for Immediate PCI for STEMI" *from* "ED Presentation at Referring Facility date/time" *or* STEMI noted on "Subsequent ECG date/time" ***to*** "Arrival date/time"
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedures with PCI Indication of "Immediate PCI for STEMI" Transferred In for Immediate PCI for STEMI
Exclusion Criteria	Admit Source of 'Emergency department' or 'Other'
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Class I: 1. Patients with STEMI who have cardiogenic shock and are less than 75 years of age should be brought immediately or secondarily transferred to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG) if it can be performed within 18 hours of onset of shock. (Level of Evidence: A) 2. Patients with STEMI who have contraindications to fibrinolytic therapy should be brought immediately or secondarily transferred promptly (i.e., primary receiving hospital door-to-departure time less than 30 minutes) to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG). (Level of Evidence: B)
Relevant Citations	See metric 3.

6. Median time from ED arrival at STEMI transferring facility to immediate PCI at STEMI receiving facility among transferred patients (in minutes). **Description:** Identifies the hospital median time from transferring facility to PCI at receiving facility for STEMI patients	
Median	Median time for STEMI patients who are "Transferred In for Immediate PCI for STEMI" *from* "ED Presentation at Referring Facility date/time" *or* STEMI noted on "Subsequent ECG date/time" ***to*** "First Device Activation date/time"
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. PCI procedures with PCI Indication of "Immediate PCI for STEMI" Transferred In for Immediate PCI for STEMI
Exclusion Criteria	"Non-system reason for delay" ***and*** a time to "First Device Activation date/time" of >90 minutes Admit Source of 'Emergency department' or 'Other'
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	According to the ACC/AHA performance measures for STEMI/USTEMI report, "The benefits of timely acute reperfusion for STEMI with either fibrinolysis or primary percutaneous coronary intervention (PCI) are substantial. In centers where PCI is not available on-site, patients may be transferred to another facility for treatment. Because delayed PCI may not be as beneficial as timely fibrinolysis, opting for transfer for PCI rather than fibrinolysis requires that transfer be performed in a timely manner." Class I: 1. Patients with STEMI who have cardiogenic shock and are less than 75 years of age should be brought immediately or secondarily transferred to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG) if it can be performed within 18 hours of onset of shock. (Level of Evidence: A) 2. Patients with STEMI who have contraindications to fibrinolytic therapy should be brought immediately or secondarily transferred promptly (i.e., primaryreceiving hospital door-to-departure time less than 30 minutes) to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG). (Level of Evidence: B)
Relevant Citations	See metric 3

7. Median fluoro time (in minutes) **Description:** Identifies the median flouro time for PCI procedures	
Median	Flouro time
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedures (with or without diagnostic cath)
Exclusion Criteria	Prior CABG Other Procedure PCI of >1 vessel/lesion
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	2011 PCI Guidelines - 4.3. Radiation Safety - CLASS I Recommendation: Cardiac catheterization laboratories should routinely record relevant available patient procedural radiation dose data (e.g., total air kerma at the international reference point [Ka r], air kerma air product [PKA], fluoroscopy time, number of cine images), and should define thresholds with corresponding follow-up protocols for patients who receive a high procedural radiation dose. (Level of Evidence: C)
Relevant Citations	2011 PCI Guidelines (J Am Coll Cardiol 2011; 58:e44–122)

8. Proportion of patients with aspirin prescribed at discharge **Description:** Identifies PCI patients who were prescribed aspirin	
Numerator	Count of patients with ASA prescribed, contraindicated or blinded at discharge
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI during the Episode of Care
Exclusion Criteria	Discharge status of "deceased" Discharge location of "other acute care hospital", "hospice" or "against medical advice"
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	The 2011 PCI Guidelines - 5.7.2. Oral Antiplatelet Therapy Class I Recommendations: 3. After PCI, use of aspirin should be continued indefinitely. (Level of Evidence: A)
Relevant Citations	2011 PCI Guidelines (J Am Coll Cardiol 2011; 58:e44–122)

9. Proportion of patients with a P2Y12 inhibitor prescribed at discharge (patients with stents) **Description:** Identifies PCI patients with a stent implanted who were prescribed a Thienopyridine or $P2Y_{12}$ Inhibitor	
Numerator	Count of patients with a Thienopyridine or $P2Y_{12}$ Inhibitor (Clopidogrel, Prasugrel, Ticlopidine *or* Ticagrelor) prescribed, contraindicated or blinded at discharge
Denominator	Count of PCI admissions with stent implantation
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Patients having PCI during the Episode of Care Stent implanted
Exclusion Criteria	Discharge status of "deceased" Discharge location of "other acute care hospital", "hospice" or "against medical advice"
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	The 2011 PCI Guidelines - 5.7.2. Oral Antiplatelet Therapy Class I Recommendations: 7. The duration of P2Y12 inhibitor therapy after stent implantation should generally be as follows: a. In patients receiving a stent (BMS or DES) during PCI for ACS, P2Y12 inhibitor therapy should be given for at least 12 months. Options include clopidogrel 75 mg daily, prasugrel 10 mg daily, and ticagrelor 90 mg twice daily. (Level of Evidence: B) b. In patients receiving DES for a non-ACS indication, clopidogrel 75 mg daily should be given for at least 12 months if patients are not at high risk of bleeding. (Level of Evidence: B) c. In patients receiving BMS for a non-ACS indication, clopidogrel should be given for a minimum of 1 month and ideally up to 12 months (unless the patient is at increased risk of bleeding; then it should be given for a minimum of 2 weeks). (Level of Evidence: B)
Relevant Citations	2011 PCI Guidelines (J Am Coll Cardiol 2011; 58:e44–122)

10. Proportion of patients with a statin prescribed at discharge **Description:** Identifies PCI patients who were prescribed a statin	
Numerator	Count of patients with Statin prescribed, contraindicated or blinded at discharge
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. Patients having PCI during the Episode of Care
Exclusion Criteria	Discharge status of "deceased" Discharge location of "other acute care hospital", "hospice" or "against medical advice"
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Reducing LDL-c is associated with a decrease in mortality and morbidity for patients with coronary artery disease. Lipid-lowering therapy can reduce the risk of cardiovascular outcomes. 1. 2011 AHA/ACCF Secondary Prevention Guidelines class I recommendation for lipid management: 4. In addition to therapeutic lifestyle changes, statin therapy should be prescribed in the absence of contraindications or documented adverse effects (25–29). (Level of Evidence: A) 2. The ACC/AHA 2007 UA/NSTEMI Guidelines recommend: Class I Recommendation: Hydroxymethyl glutaryl-coenzyme A reductase inhibitors (**statins),** in the absence of contraindications, **regardless of baseline LDL**-C and diet modification, should be given to post-UA/NSTEMI patients, <u>including postrevascularization patients</u>. (*Level of Evidence: A*). For UA/NSTEMI patients with elevated LDL-C (greater than or equal to 100 mg per dL), cholesterol-lowering therapy should be initiated or intensified to achieve an LDL-C of less than 100 mg per dL (*Level of Evidence: A*).
Relevant Citations	1. AHA/ACCF Secondary Prevention and Risk Reduction Therapy for Patients With Coronary and Other Atherosclerotic Vascular Disease: 2011 Update (JACC 2011, Vol. 58, No. 23) 2. ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction:J Am Coll Cardiol, 2007; 50:1-157;

Quality Metrics – PCI Outcome Metrics:

~~**11. Proportion of patients with vascular access site injury requiring treatment or major bleeding**~~ **retired and replaced with risk adjusted bleeding metric (#37)**

12. Proportion of patients with emergency CABG post PCI **Description:** Identifies PCI patients who had post procedure emergency CABG	
Numerator	Count of patients with "Emergency" CABG *after* a PCI procedure
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedure
Exclusion Criteria	Emergency CABG date occurs prior to PCI procedure date
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Emergency CABG following PCI is considered one of the major complications that are associated with the PCI procedure and its success. Studies have demonstrated that patient and institutional characteristics, including competency and procedure volume, are related to rates of emergency CABG following PCI. The strongest patient predictors of the need for emergency CABG in several analyses are cardiogenic cardiogenic shock (OR: 11.4), acute MI or emergency PCI (OR: 3.2 to 3.8), multivessel disease (OR: 2.3 to 2.4), and type C lesion (OR: 2.6) (243, 245). In-hospital mortality for emergency CABG ranges from 7.8% to 14% (2011 PCI guidelines).
Relevant Citations	Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am Coll Cardiol 2011; 58:e44–122

13. Proportion of patients with post procedure Myocardial Infarction (among hospitals routinely collecting post-PCI biomarkers) **Description:** Identifies PCI patients who had an intra or post procedure MI	
Numerator	Count of patients with intra or post procedure MI
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Elective PCI procedures
Exclusion Criteria	Submissions with < 90% of patients with biomarkers (troponin and/or CK) coded post procedure LOS <1 day
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	MI following PCI is a major complication that is associated with the success of the PCI procedure. Studies debate the most accurate way to define post procedure MI (with or without routine collection of biomarkers). Post procedure MI increases patient morbidity and mortality, as well as health care resource use. --- There is evidence that hospitals that routinely collect biomarkers have a higher rate of periprocedural MI than those who don't. Thus this metric is reported separately, based on the routine collection of biomarkers (see metric 14 as well). "Hospitals that routinely performed marker testing had higher rates of periprocedural MI detection despite a trend toward lower mortality and greater adherence to recommended medications that suggest better overall quality of care for PCI patients at these hospitals. Therefore, in the absence of routine cardiac marker surveillance after PCI, the use of periprocedural MI as a quality metric for PCI will be misleading." [1]
Relevant Citations	Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am Coll Cardiol 2011; 58:e44–122 [1]Wang TY, Peterson ED, Dai D, et al. Patterns of cardiac marker surveillance after elective percutaneous coronary intervention and implications for the use of periprocedural myocardial infarction as a quality metric: a report from the National Cardiovascular Data Registry (NCDR). J Am Coll Cardiol. 2008;51:2068-74.

14. Proportion of patients with post procedure Myocardial Infarction (among hospitals who do not routinely collecting post-PCI biomarkers) **Description:** Identifies PCI patients who had an intra or post procedure MI	
Numerator	Count of patients with intra or post procedure MI
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. Elective PCI
Exclusion Criteria	Submissions with >=90% of patients with biomarkers (troponin and/or CK) coded post procedure LOS <1 day
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	See metric 13
Relevant Citations	Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am Coll Cardiol 2011; 58:e44–122 [1]Wang TY, Peterson ED, Dai D, et al. Patterns of cardiac marker surveillance after elective percutaneous coronary intervention and implications for the use of periprocedural myocardial infarction as a quality metric: a report from the National Cardiovascular Data Registry (NCDR). J Am Coll Cardiol. 2008;51:2068-74.

15. ~~Proportion of patients with acute kidney injury~~ retired and replaced with risk adjusted acute kidney injury metric (#39)

16. Proportion of patients with post procedure stroke **Description:** Identifies PCI patients who had a CVA/stroke post procedure	
Numerator	Count of patients with post procedure stroke
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	Patients with “CABG” or “other major surgery” during same admission
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Stroke is one of the major complications occurring after PCI
Relevant Citations	2011 PCI Guidelines (J Am Coll Cardiol 2011; 58:e44–122) Fuchs S, Stabile E, Kinnaird TD, et al. Stroke complicating percutaneous coronary interventions: incidence, predictors, and prognostic implications.

17. Composite: Proportion of patients with death, emergency CABG (post PCI), stroke or repeat target vessel revascularization

Description: Identifies PCI patients who had at least one of the following: death, emergency CABG, stroke or repeat target vessel revascularization[1]

[1]Target vessel revascularization is defined as a repeat PCI procedure on the same segment during the same Episode of Care

Numerator	Count of patients with a discharge status of deceased; an emergency CABG (post PCI), CVA/stroke *or* repeat target vessel revascularization
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedure
Exclusion Criteria	Patients with "CVA/Stroke" ***and*** "elective", "urgent" or "salvage" CABG
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	This measure represents a composite of major complications occurring after PCI.

18. PCI in-hospital risk adjusted mortality (patients with STEMI) **Description:** The hospital risk adjusted mortality rate for *with* ST-elevation MI patients having PCI	
Numerator	See risk model technical specifications
Denominator	
Inclusion Criteria	PCI admissions with STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	See measure #1
Relevant Citations	See measure #1

19. PCI in-hospital risk adjusted mortality (STEMI patients excluded) **Description:** The hospital risk adjusted mortality rate for patients *without* ST-elevation MI having PCI	
Numerator	See risk model technical specifications
Denominator	
Exclusion Criteria	PCI admissions with STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	See measure #1
Relevant Citations	See measure #1

25. Proportion of PCI procedures with transfusion of whole blood or red blood cells **Description:** Identifies PCI patients who received RBC/whole blood transfusion intra or post-procedure	
Numerator	Count of PCI procedures with RBC/whole blood transfusion
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedure
Exclusion Criteria	"CABG" or "other major surgery" during the same Episode of Care Transfusions administered for a pre-procedure hemoglobin of <=8g/dL
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	The purpose of this metric is to allow identification of potential overuse of transfusion after PCI procedures. In addition, it points out blood loss, which predicts poor outcomes.

39. PCI in-hospital Risk Adjusted Acute Kidney Injury (all patients) **Description:** The hospital risk adjusted rate of acute kidney injury for patients having PCI	
Numerator	See risk model technical specifications - page 44
Denominator	
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Acute Kidney Injury (AKI) is a serious complication after PCI and is associated with increased incidence of in-hospital and follow-up myocardial infarction, dialysis and death. Furthermore, small increases in serum creatinine have been associated with increased hospital length of stay and excess costs. This metric is helpful in providing risk-adjusted feedback on AKI, informing clinical decision-making, and directing the use of strategies to avoid AKI and improve the safety of PCI procedures.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® - located on ncdr.com in the CathPCI Registry Resources/documents section. Gurm, H, Seth, M, Kooiman, J and Share, D. A Novel Tool for Reliable and Accurate Prediction of Renal Complications in Patients Undergoing Percutaneous Coronary Intervention. JACC Vol. 61, No. 22, June 4 2013 Mehran R, Aymong ED, Nikolsky E, Lasic Z, Iakovou I, Fahy M, Mintz GS, Lansky AJ, Moses JW, Stone GW, Leon MB, Dangas G. A simple risk score for prediction of contrast-induced nephropathy after percutaneous coronary intervention: development and initial validation. J Am Coll Cardiol. 2004;44(7):1393-1399. Mehta RL, Kellum JA, Shah SV, Molitoris BA, Ronco C, Warnock DG, Levin A. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. Crit Care. 2007;11(2):R31.

Quality Metrics — Diagnostic Cath Process Metrics:

20. Incidence of non-obstructive CAD **Description:** Identifies patients with non-obstructive coronary artery disease	
Numerator	Count of diagnostic coronary angiography procedures with ***all*** coronary anatomy territories having <50% stenosis
Denominator	Diagnostic Coronary Angiography procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Elective diagnostic coronary angiography
Exclusion Criteria	Prior CABG Pre-operative evaluation before non-cardiac surgery Cardiac transplant evaluation type of " Donor for cardiac transplant" Rx recommendation after diagnostic cath of "Other cardiac therapy w/out CABG/PCI" Data submissions with Population Status 'A' (submitting PCI only)
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	This purpose of this metric is to identify diagnostic cath procedures with "normal" results. Because the constellation of findings characteristic of heart disease is non-specific, there will (and should) be patients who undergo diagnostic catheterization who have insignificant coronary artery disease. However, given the potential for physicians to vary with respect to their threshold for recommending diagnostic catheterization, it is important for hospitals to have a process that permits that variation to be recognized, discussed, and managed.

Quality Metrics – Diagnostic Cath Outcome Metrics:

21. Proportion of diagnostic catheterization procedures with vascular access site injury requiring treatment or major bleeding **Description:** Identifies patients having diagnostic cath that experienced access site related injury and/or bleeding	
Numerator	Count of diagnostic cath procedures *with* "Access Site", "Hematoma", Retroperitoneal Bleeding" *and/or* "Other Vascular Complications Requiring Treatment"
Denominator	Count of diagnostic cath procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Diagnostic coronary angiography
Exclusion Criteria	PCI procedure during the same Episode of Care. "CABG" or "other major surgery" during the same Episode of Care Bleeding specific to "GI", "GU" and/or "Other Bleed"
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Vascular complications can cause significant discomfort and disability for patients. While rates of complication will be sensitive to patient characteristics (and therefore case mix), there is evidence that hospitals can significantly influence overall complication rates. This can be accomplished through monitoring and analyzing the causes of complications, developing policies and procedures that minimize the risk of complications, and developing policies that assure operator and cath team competency.
Relevant Citations	Mehran R, Rao SV, Bhatt DL et al. Standardized bleeding definitions for cardiovascular clinical trials: a consensus report from the Bleeding Academic Research Consortium. Circulation 2011;123:2736-47.

Utilization Metrics:

22. Median post-procedure length of stay (in days) for PCI patients with STEMI **Description:** The hospital median post-procedure length of stay for STEMI patients	
Median	Median time in days from "Procedure Date" to " Discharge Date" for STEMI patients
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds PCI procedures for STEMI
Exclusion Criteria	Invalid values for "Admission Date", "Procedure Date" or "Discharge Date"
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Median LOS will be sensitive to patient characteristics (and therefore case mix). However, there is evidence that hospitals can influence total, pre and post procedure LOS, maximizing efficient resource usage.

~~**23. Median post-procedure length of stay (in days) for PCI patients with no STEMI**~~ ~~**Description:** Your hospital's median post-procedure length of stay (in days) for PCI patients with no STEMI~~. This metric was retired in the 2011 q1 report

Data Quality Metrics:

24. Proportion of PCI procedures with creatinine assessed pre and post PCI procedure **Description:** Identifies PCI patients with creatinine assessed pre and post procedure.	
Numerator	PCI procedures with creatinine assessed pre and post procedure
Denominator	PCI procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	Patients with "Death in Lab" LOS <1day Invalid value for "Pre or Post-procedure Creatinine" values
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Acute kidney injury, or "contrast induced nephropathy" is a major, procedure-related complication of PCI. The "risk, injury, failure, loss, end-stage" (RIFLE) classification requires pre and post procedure creatinine to classify acute kidney injury (AKI). The 2011 PCI Guidelines - 4.4. Contrast-Induced AKI Class I Recommendations: 1. Patients should be assessed for risk of contrast induced AKI before PCI. (Level of Evidence: C) 2. Patients undergoing cardiac catheterization with contrast media should receive adequate preparatory hydration. (Level of Evidence: B) 3. In patients with CKD (creatinine clearance <60 mL/min), the volume of contrast media should be minimized. (Level of Evidence: B)
Relevant Citations	Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am Coll Cardiol 2011; 58:e44–122 Biesen, Wim, et al. Defining Acute Renal Failure: RIFLE and Beyond. Clin J Am Soc Nephrol 1: 1314–1319, 2006

26. Proportion of PCI procedures with biomarkers assessed post-PCI for elective inpatients **Description:** Identifies PCI procedures where cardiac biomarkers were assessed post PCI.	
Numerator	PCI procedures with at least one cardiac biomarker (CK and/or troponin) assessed post procedure
Denominator	PCI procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds Elective PCI procedures with hospital status of "Inpatient"
Exclusion Criteria	Patients with "Death in Lab" LOS <1day
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	MI following PCI is a major complication that is associated with the success of the PCI procedure. Studies debate the most accurate way to define post procedure MI (with or without routine collection of biomarkers). Post procedure MI increases patient morbidity and mortality, as well as health care resource use. --- There is evidence that hospitals that routinely collect biomarkers have a higher rate of periprocedural MI than those who don't. Thus this metric is reported separately, based on the routine collection of biomarkers (see metric 14 as well). "Hospitals that routinely performed marker testing had higher rates of periprocedural MI detection despite a trend toward lower mortality and greater adherence to recommended medications that suggest better overall quality of care for PCI patients at these hospitals. Therefore, in the absence of routine cardiac marker surveillance after PCI, the use of periprocedural MI as a quality metric for PCI will be misleading." 1 Levine GN, et al. 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. J Am Coll Cardiol 2011; 58:e44–122
Relevant Citations	Wang TY, Peterson ED, Dai D, et al. Patterns of cardiac marker surveillance after elective percutaneous coronary intervention and implications for the use of periprocedural myocardial infarction as a quality metric: a report from the National Cardiovascular Data Registry (NCDR). J Am Coll Cardiol. 2008;51:2068-74.

Section III: PCI Appropriate Use Criteria (AUC) Metrics

Metrics 30-36 stratify patients with acute coronary syndrome and patients without acute coronary syndrome according to Appropriate Use Criteria guidelines

30. Proportion of PCI procedures not classifiable for AUC reporting **Description:** Identifies PCI procedures that were not able to be classified by the AUC	
Numerator	PCI Procedures that could not be mapped to an Appropriate Use Criteria Indication
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	There are no exclusions for this measure
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Variables associated with defining the patient's unique clinical scenario or PCI indication are either missing and/or indeterminant. An AUC indication cannot be identified to associate with the patient scenario.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

31. Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were appropriate **Description:** Identifies PCI procedures with ACS that were determined to be appropriate by the AUC	
Numerator	PCI Procedures evaluated as "Appropriate" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD Presentation of "No Sx/No Angina", "Sx unlikely to be ischemic" or "Stable Angina"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Coronary revascularization is appropriate when the expected benefits, in terms of survival or health outcomes (symptoms, functional status, and/or quality of life) exceed the expected negative consequences of the procedure. An 'appropriate' rating indicates that coronary revascularization is generally acceptable and is a reasonable approach for the indication and is likely to improve the patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

32. Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were of uncertain appropriateness **Description:** Identifies PCI procedures with ACS that were determined to be uncertain by the AUC	
Numerator	PCI Procedures evaluated as "Uncertain" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD Presentation of "No Sx, No Angina", "Sx unlikely to be ischemic" and "Stable Angina"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Uncertainty implies that more research and/or patient information is needed to classify the indication definitively. Revascularization may be reasonable, yet there is limited data on clinical benefit. An "Uncertain" rating indicates coronary revascularization may be acceptable and may be a reasonable approach for the indication. However, some degree of uncertainty exists, implying that more research and/or patient information is needed to determine whether the procedure would improve patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

33. Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were inappropriate **Description:** Identifies PCI procedures with ACS that were determined to be inappropriate by the AUC	
Numerator	PCI Procedures evaluated as "Inappropriate" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD Presentation of "No Sx, No Angina", "Sx unlikely to be ischemic" and "Stable Angina"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	A rating of "Inappropriate" indicates that the indication provided for the PCI is not generally acceptable and is not a reasonable approach. An "Inappropriate" rating indicates that coronary revascularization is not generally acceptable and is not a reasonable approach for the PCI indication and is unlikely to improve the patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

34. Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were appropriate **Description:** Identifies PCI procedures without ACS that were determined to be appropriate by the AUC	
Numerator	PCI Procedures evaluated as "Appropriate" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD presentation of "Unstable Angina", "NSTEMI" or "STEMI"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Coronary revascularization is appropriate when the expected benefits, in terms of survival or health outcomes (symptoms, functional status, and/or quality of life) exceed the expected negative consequences of the procedure. An 'appropriate' rating indicates that coronary revascularization is generally acceptable and is a reasonable approach for the indication and is likely to improve the patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

35. Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were of uncertain appropriateness **Description:** Identifies PCI procedures without ACS that were determined to be uncertain by the AUC	
Numerator	PCI Procedures evaluated as "Uncertain" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD presentation of "Unstable Angina", "NSTEMI" or "STEMI"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Uncertainty implies that more research and/or patient information is needed to classify the indication definitively. Revascularization may be reasonable, yet there is limited data on clinical benefit. An "Uncertain" rating indicates coronary revascularization may be acceptable and may be a reasonable approach for the indication. However, some degree of uncertainty exists, implying that more research and/or patient information is needed to determine whether the procedure would improve patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

36. Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were inappropriate **Description:** Identifies PCI procedures without ACS that were determined to be inappropriate by the AUC	
Numerator	PCI Procedures evaluated as "Inappropriate" according to Appropriate Use Criteria guidelines
Denominator	PCI Procedures
Inclusion Criteria	Data submissions that passed NCDR data inclusion thresholds PCI procedures
Exclusion Criteria	CAD presentation of "Unstable Angina", "NSTEMI" or "STEMI"
Exclusion Criteria at the Facility level	If more than 40% of a facility's PCIs are not classified or calculated using the AUC model, their data is not displayed in this metric. It is also not displayed in the "My Hospital R4Q" column, and is not included in the national benchmark (the "All Hospital Pts R4Q" column) for the detail lines that report AUC (starting on line 1572).
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	A rating of "Inappropriate" indicates that the indication provided for the PCI is not generally acceptable and is not a reasonable approach. An "Inappropriate" rating indicates that coronary revascularization is not generally acceptable and is not a reasonable approach for the PCI indication and is unlikely to improve the patients' health outcomes or survival.
Relevant Citations	Appropriate Use Criteria for Coronary Revascularization Focused Update developed by the ACC, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Heart Association, and other national societies and published in the Journal of the American College of Cardiology (*J Am Coll Cardiol* 2012;59: 857-81)

Risk Models

Risk Model #1 – Performance Measure #1: PCI in-hospital Risk Adjusted Mortality (all patients)

The most recent PCI risk-adjusted mortality model revision was developed using patients discharged between July 1, 2009 and June 30, 2011. A total of 1,216,756 admissions with patients undergoing PCI at 1,253 hospitals in the United States were included in the model development and validation cohort.

Outcome:

Mortality (discharge status of deceased)

Model Eligibility and Population Definition

- Model eligibility at the facility level:
    1. Data submissions that passed NCDR data inclusion thresholds
- Model eligibility at the patient level:
    1. Include patients with a PCI procedure performed during the Episode of Care.
    2. Include only index PCI procedures when patients have multiple PCI procedures (subsequent PCIs during a single Episode of Care are excluded).
    3. Exclude patients (patient variables) who transfer to another 'acute care facility' on discharge (9045).

Risk Adjusted Mortality detail line labels in the **Outcomes Report** and explanations:

• **Eligible Patients -** all patients who receive a predicted probability value from the model

• **Observed Mortality -** count of occurrences of mortality (number of deceased patients)

• **Expected Mortality -** predicted rate of mortality for the eligible patients (number of patients expected to die)

• The **Observed/Expected Mortality Ratio -** (O/E Ratio) provides feedback on the comparison between the observed to expected

• **Risk Adjusted Rate -** your hospital risk adjusted mortality rate

• The **Registry Aggregate Observed Mortality Rate -** the registry mortality rate and reflective of the patients included in the reporting period. It is therefore dynamic and changes based on these data from each quarter and R4Q

O/E Ratio x Registry Aggregate = Risk Adjusted Rate

Variables

VARIABLE	*VARIABLE TYPE*	*ELEMENTS*	*NOTES*
Age <=70	Discrete (yes or no)	DOB (2050); Arrival Date (3000)	
Age >70	Linear or continuous*	DOB (2050); Arrival Date (3000)	Coefficient changes in weight with an increase in age >70
Body Mass Index <=30	Discrete (yes or no)	Ht and Wt (4055 and 4060)	
Body Mass Index >30	Linear or continuous*	Ht and Wt (4055 and 4060)	Coefficient changes in weight with an increase in BMI >30
ST-segment elevation MI	Discrete (yes or no)	CAD presentation= STEMI (5000); or PCI indication=PCI for STEMI *(7020 with codes 1,2,3,4,5)*	
Shockstat1: Sustained shock (occurring within 24 hours AND at the start of PCI) and PCI status of salvage	Discrete (yes or no)	Shock within 24 hours prior to the procedure (5060) Shock at start of PCI (7030) PCI status (7020)	This variable that combines three elements to capture the presence and duration of shock, and the status of the procedure, resulting in a range of mortality from 0.2%-72%. The combination creates
Shockstat2: Sustained	Discrete (yes or no)		

shock (occurring within 24 hours AND at the start of PCI) alone or salvage alone		Note: Sustained shock is defined as shock within 24 hours prior to the procedure AND shock at start of PCI; Transient shock is defined as shock within 24 hours prior to the procedure OR shock at start of PCI	five ordinal categories (shockstat1-5).
Shockstat3: Transient shock (occurring within 24 hours OR at the start of PCI, but not both) without salvage	Discrete (yes or no)		
Shockstat4: Emergent PCI without cardiogenic shock shock	Discrete (yes or no)		
Shockstat5: Urgent PCI without shock.	Discrete (yes or no)		
Renal Failure (Glomerular filtration rate <30 or dialysis)	Discrete (yes or no)	Currently on Dialysis (4065); DOB (2050); Arrival Date (3000); Sex (2060), Race (2070-74), Pre-procedure Creatinine (7315)	
Glomerular filtration rate	Linear or continuous*	DOB (2050); Arrival Date (3000); Sex (2060), Race (2070-74), Pre-procedure Creatinine (7315)	Coefficient changes in weight with a decrease in GFR <=90
Cardiac arrest/in 24 hours	Discrete (yes or no)	Cardiac arrest (5065)	
Cerebrovascular disease	Discrete (yes or no)	Cerebrovascular disease (4070)	
Peripheral vascular disease	Discrete (yes or no)	Peripheral vascular disease (4075)	
Chronic lung disease	Discrete (yes or no)	Chronic Lung Disease (4080)	
Prior PCI	Discrete (yes or no)	Prior PCI (4035)	
Diabetes: insulin dependent	Discrete (yes or no)	Diabetes Mellitus and Diabetes Therapy (4085 and 4090)	
Diabetes: non-insulin dependent	Discrete (yes or no)	Diabetes Mellitus and Diabetes Therapy (4085 and 4090)	
Heart Failure NYHA class I, II, or III	Discrete (yes or no)	Heart Failure w/in 2 weeks and NYHA class within 2 weeks (5040 and 5045)	
Heart Failure NYHA class IV	Discrete (yes or no)	Heart Failure w/in 2 weeks and NYHA class within 2 weeks (5040 and 5045)	
Ejection fraction	Linear or continuous*	Pre-PCI LVEF (7025)	Coefficient changes in weight with a decrease in EF <=60%
Number of diseased vessels	Discrete (0-1 vessel disease vs 2-3 vessel disease)	Coronary Anatomy (6110-6211)	
PCI of proximal LAD	Discrete (yes or no)	Segment ID (7105)	At least one lesion treated has segment = pLAD and no lesions in LM.

PCI of left main	Discrete (yes or no)	Segment ID (7105)	At least one lesion treated = LM
Presence of chronic total occlusion	Discrete (yes or no)	Chronic Total Occlusion (7120)	
In- stent thrombosis (previously treated within 1 month)	Discrete (yes or no)	Previously Treated Lesion; Treated with Stent, Timeframe and In-stent thrombosis (7145, 7150, 7155, 7160 and 7165)	

***** Linear or continuous variables are typically variables that are numbers (weight, age, BMI). These variables have coefficients or weights that change based on the value of the variable.

Results

In-hospital mortality for the NCDR was 1.4% and ranged from 0.2% for elective cases (representing nearly half of all patients with PCI) to 71.8% among patients with shock and recent cardiac arrest (representing 0.2% of patients with PCI) when the model was developed. In predicting risk, the majority of patients (>95%) had a predicted mortality risk of <5%, and a small minority of patients (<1.5%) had a predicted risk of >20%.

In the CathPCI Registry Outcome Reports, risk-adjusted mortality is reported three ways:

1. All patients
2. Patients ***with*** ST-elevation myocardial infarction
3. Patients ***without*** ST-elevation myocardial infarction

Risk Model #2 – Metric 40 PCI in-hospital Risk Standardized Bleeding (all patients)

The PCI risk-adjusted bleeding model was updated in 2017 to a parsimonious hierarchical model. This means the risk model utilizes less patient variables (than the previous model) to determine individual patient risk of bleeding and the model will take into account the risk relationships within and amongst hospitals (not utilized by the previous model and a hierarchical model feature). Additionally, the hemoglobin parameter used to determine if a Post-PCI bleeding event has occurred, has been revised to assess an absolute hemoglobin (hgb) decrease from pre-PCI to post-PCI of ≥ 4g/dL (previously 3g/dL).

The Risk Adjusted Bleeding model provides accurate estimates of post-PCI bleeding risk and is helpful in providing risk-adjusted feedback on bleeding complications, informing clinical decision-making, and directing the use of bleeding avoidance strategies to improve the safety of PCI procedures.

Model Details

Outcome:

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

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>16g/dl *or* IABP (5330) = yes *or* MVSupport (5340) = yes)

Model Eligibility and Population Definition

- Model eligibility at the facility level:

    1. Data submissions that passed NCDR data inclusion thresholds

    2. Facilities must have at least one patient with a pre-PCI (7320) or post-PCI hgb (7345) value to be eligible for analysis

- Model eligibility at the patient level:

    1. Include patient's with a PCI procedure performed during the Episode of Care

    2. Include only index PCI procedures when patients have multiple PCI procedures (subsequent PCIs during a single Episode of Care are excluded).

    3. Include patient procedures with non-missing values for outcome variables of bleeding event w/in 72 hours (8050) AND transfusion (8040).

    4. Exclude patients who died on the same day of the procedure [Discharge date (9035)=procedure date (5300) AND discharge status=deceased (9040)]

    5. Exclude patients with CABG (9000)=yes

Risk Adjustment Variables

VARIABLE	*VARIABLE TYPE*	*ELEMENTS*	*NOTES*
IABP	Discrete (yes or no)	IABP (5330)=yes	
Other Mechanical Ventricular Support	Discrete (yes or no)	Other Mechanical Ventricular Support (5340)=yes	
Age <=70	Discrete (yes or no)	DOB (2050); Arrival Date (3000)	
Age >70	Linear or continuous*	DOB (2050); Arrival Date (3000)	Coefficient changes in weight with an increase in age >70
Female	Discrete (yes or no)	Sex (2060)	
Body Mass Index <=30	Discrete (yes or no)	Ht and Wt (4055 and 4060)	
Body Mass Index >30	Linear or continuous*	Ht and Wt (4055 and 4060)	Coefficient changes in weight with an increase in BMI >30
ST-segment elevation MI	Discrete (yes or no)	CAD presentation= STEMI (5000); or PCI indication=PCI for STEMI *(7020 with codes 1,2,3,4,5)*	
Pre-procedure hemoglobin <=13	Discrete (yes or no)	Pre-Procedure Hemoglobin (7320)	
Pre-procedure hemoglobin >13	Discrete (yes or no)	Pre-Procedure Hemoglobin (7320)	
Shock	Discrete (yes or no)	Shock w/in 24 hours (5060) or Shock at start of PCI (7030)	
Renal Failure	Discrete (yes or no)	Currently on Dialysis (4065);	
Glomerular filtration rate 30-45	Discrete (yes or no)	DOB (2050); Arrival Date (3000); Sex (2060), Race (2070-74), Pre-procedure Creatinine (7315)	
Glomerular filtration rate >45-60	Discrete (yes or no)	DOB (2050); Arrival Date (3000); Sex (2060), Race (2070-74), Pre-procedure Creatinine (7315)	
Prior PCI	Discrete (yes or no)	Prior PCI (4035)	

***** Linear or continuous variables are typically variables that are numbers (weight, age, BMI). These variables have coefficients or weights that change based on the value of the variable.

Measure Display

Note: Procedures refers to the first (index) procedure for a patient within a hospital admission.

Line	Label	Interpretation
1818	Risk Standardized Bleeding (RSB) - Pts with PCI	[Heading]
1819	Count of eligible procedures	Number of PCI procedures included in the measure for your facility.
1820	Procedures with an observed bleeding event	Number of PCI procedures which experienced a bleed among the procedures that were in the measure for your facility.
1821	Risk standardized bleeding ratio	Actual number of bleeds at your facility divided by the predicted number of bleeds at your facility given the patient mix. * SR Ratio <1: Site has fewer bleeds than the model predicted. (Relatively better performance) * SR Ratio >1: Site has more bleeds than the model predicted. (Relatively poorer performance) * SR Ratio =1: Site has same number of actual bleeds as the model predicted. (Expected performance)
1822	Risk adjusted bleeding rate (%)	Percent of PCI procedures that experienced a bleed for your facility, adjusted based on the patient case mix at your facility.
1823	Registry aggregate observed bleeding event rate (%)	Percent of PCI procedures (number of PCI procedures which experienced a bleed divided by the total number of PCI procedures in the measure) for ALL facilities in the registry.
1824	Lower 95% confidence interval of risk standardized adjusted bleeding rate	There is a 95% confidence that the true RSB rate for your facility is between the lower bound (this line) and upper bound (next line) specified.
1825	Upper 95% confidence interval of risk standardized adjusted bleeding rate	There is a 95% confidence that the true RSB rate for your facility is between the lower bound (previous line) and upper bound (this line) specified.

Risk Model #3 – Metric 39 PCI in-hospital Risk Adjusted Acute Kidney Injury (all patients)

The PCI risk-adjusted acute kidney injury model was developed using patients in the CathPCI Registry discharged between July 1, 2009 and March 31, 2010. A total of 1,028,811 patients undergoing PCI at 1,231 hospitals in the United States were included in the model development and validation cohort.

Outcome:

Acute kidney injury, defined as Acute Kidney Injury Network (AKIN) stage 1 **or** greater or a new requirement for dialysis (8030) following PCI

1. Stage 1 is defined as an absolute increase of ≥ 0.3 mg/dL or a relative increase of 50% in serum creatinine (Cr)
2. Stage 2 is defined as an increase in serum Cr to more than 200% to 300% (>2-to 3-fold) from baseline,
3. Stage 3 is defined as increase in serum Cr to more than 300% (>3-fold) from baseline (or serum Cr of more than or equal to 4.0 mg/dl with an acute increase of at least 0.5 mg/dl.

NOTE: The AKIN criteria were created in part to be more sensitive to even small changes in creatinine. Previous epidemiologic studies have shown poor outcomes with creatinine increases as small as 0.3 mg/dl, hence the addition of the 0.3 mg/dl cut off to the AKIN stage 1 criteria. Also, the AKIN criteria for AKI are becoming the accepted standardized definition of AKI currently adopted by nephrology and critical care literature.

*Mehta RL, Kellum JA, Shah SV, Molitoris BA, Ronco C, Warnock DG, Levin A. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. Crit Care. 2007;11(2):R31.

Model Eligibility and Population Definition

- Model eligibility at the facility level:
    1. Data submissions that passed NCDR data inclusion thresholds
- Model eligibility at the patient level:
    1. Include patient's with a PCI procedure performed during the Episode of Care
    2. Include only index PCI procedures when patients have multiple PCI procedures (subsequent PCIs during a single Episode of Care are excluded).
    3. Exclude patients with *either* a missing pre (7315) or a missing post procedure (7340) Creatinine value.
    4. Exclude patients 'Currently on Dialysis' (4065=Yes).
    5. Exclude patients with same day discharges. (Where 'Procedure Date' = 'Discharge Date')

Risk Adjusted Acute Kidney Injury (AKI) detail line labels in the **Outcomes Report** and explanations:

• **Eligible Patients -** all patients who receive a predicted probability value from the model

• **Observed AKI -** count of occurrences of AKI (number of patients who had AKI)

• **Expected AKI -** predicted rate of AKI for the eligible patients (number of patients expected to have AKI)

• The **Observed/Expected Mortality Ratio -** (O/E Ratio) provides feedback on the comparison between the observed to expected

• **Risk Adjusted Rate -** your hospital risk adjusted AKI rate

• The **Registry Aggregate Observed AKI Rate -** the registry AKI rate and reflective of the patients included in the reporting period. It is therefore dynamic and changes based on these data from each quarter and R4Q

O/E Ratio x Registry Aggregate = Risk Adjusted Rate

Variables

Variable	Variable type	CathPCI v4.5 Elements	Notes
IABP in place at start of procedure	Discrete (yes or no)	IABP (5330)=yes and Timing (5335)=In place at start of procedure	
Heart Failure within 2 weeks	Discrete (yes or no)	Heart failure w/in 2 weeks (5040)=yes	
Glomerular Filtration Rate=severe	Discrete (yes or no)	Variables: Birth Date (2050); Sex (2060); Race/Ethnicity (2070-2076) and Pre-procedure Cr (7315) Severe is defined as GFR <30 mL/min	
Glomerular Filtration Rate=moderate	Discrete (yes or no)	30 to <45 mL/min	
Glomerular Filtration Rate=mild	Discrete (yes or no)	45 to <=60 mL/min	
Diabetes	Discrete (yes or no)	Diabetes (4085)=yes	
Age	Linear or continuous*	Birth Date (2050)	
History of heart failure	Discrete (yes or no)	Prior Heart Failure (4025)=yes	
History of cerebrovascular disease	Discrete (yes or no)	Cerebrovascular Disease (4070)=yes	
Patient presentation of Non-STEMI or unstable angina	Discrete (yes or no)	CAD presentation (5000)=unstable angina or Non-STEMI	
Patient presentation of STEMI	Discrete (yes or no)	CAD presentation (5000)=STEMI	
Prior cardiogenic Shock	Discrete (yes or no)	Cardiogenic Shock w/in 24 Hours (5060)=yes	
Prior cardiac arrest	Discrete (yes or no)	Cardiac Arrest w/in 24 hours (5065)=yes	
History of anemia	Discrete (yes or no)	Pre-procedure Hemoglobin (7320)= <10 g/dL	

***** Linear or continuous variables are typically variables that are numbers (weight, age, BMI). These variables have coefficients or weights that change based on the value of the variable.

Appendix A – Elements in PCI Risk Models

Seq #	Element Name	Mortality Variables	Bleeding Variables	AKI Variables
2050	Birth Date	x (age, GFR)	x (age, GFR)	x (age, GFR)
2060	Sex	x (Sex, GFR)	x (Sex, GFR)	x (GFR)
2070	Race - White	x (GFR)	x (GFR)	x (GFR)
2071	Race - Black or African American	x (GFR)	x (GFR)	x (GFR)
2072	Race - Asian	x (GFR)	x (GFR)	x (GFR)
2073	Race - American Indian or Alaskan Native	x (GFR)	x (GFR)	x (GFR)
2074	Race - Native Hawaiian or Pacific Islander	x (GFR)	x (GFR)	x (GFR)
2076	Hispanic or Latino Ethnicity			
3000	Arrival Date	x (age)	x (age)	x (age)
4000	Current/Recent Smoker (w/in 1 year)			
4005	Hypertension			
4010	Dyslipidemia			
4015	Family History of Premature CAD			
4020	Prior MI			
4025	Prior Heart Failure			x
4030	Prior Valve Surgery/Procedure			
4035	Prior PCI	x	x	
4040	Most Recent PCI Date			
4045	Prior CABG			
4050	Most Recent CABG Date			
4055	Height	x	x	
4060	Weight	x	x	
4065	Currently on Dialysis	x		x
4070	Cerebrovascular Disease	x		x
4075	Peripheral Arterial Disease	x		
4080	Chronic Lung Disease	x		
4085	Diabetes Mellitus	x		x
4090	Diabetes Therapy	x		
5000	CAD Presentation	x	x	x
5005	Symptom Onset Date			
5006	Symptom Onset Time			
5007	Symptom Onset Time Estimated			
5008	Symptom Onset Time Not Available			
5010	Thrombolytics			
5015	Thrombolytic Therapy Date			

5016	Thrombolytic Therapy Time			
5020	Anginal Classification w/in 2 Weeks			
5025	Anti-Anginal Medication w/in 2 Weeks			
5026	Beta Blockers			
5027	Calcium Channel Blockers			
5028	Long Acting Nitrates			
5029	Ranolazine			
5030	Other Anti-Anginal Agent			
5040	Heart Failure w/in 2 Weeks	x		x
5045	NYHA Class w/in 2 Weeks	x		
5050	Cardiomyopathy or LVSystolic Dysfunction			
5055	Pre-operative Evaluation Before Non-Cardiac Surgery			
5060	Cardiogenic Shock w/in 24 Hours	x	x	x
5065	Cardiac Arrest w/in 24 Hours	x		x
5100	Stress or Imaging Studies			
5200	Standard Exercise Stress Test			
5201	Stress Test Results			
5202	Risk/Extent of Ischemia (Stress Test)			
5210	Stress Echocardiogram			
5211	Stress Echo Imaging Results			
5212	Risk/Extent of Ischemia			
5220	Stress Testing with SPECT			
5221	SPECT MPI Imaging Results			
5222	Risk/Extent of Ischemia (SPECT MPI)			
5230	Stress Test with CMR			
5231	CMR Imaging Results			
5232	Risk/Extent of Ischemia (Stress Test with CMR)			
5240	Cardiac CTA			
5241	Cardiac CTA Results			
5250	Coronary Calcium Score			
5251	Calcium Score			
5300	Date of Procedure	x		x
5301	Time of Procedure	x		x
5305	PCI	x		x
5310	Diagnostic Cath			
5315	Other Procedure (in conj w/Dx Cath or PCI)			
5320	Fluoroscopy Time			
5321	Fluoroscopy Dose Reference Air KERMA (mGy)			
5325	Contrast Volume			
5330	IABP		x	x
5335	IABP Timing			x
5340	MV Support		x	

5345	MV support timing			
5350	Arterial Access Site			
5355	Arterial Access Closure Method			
5356	Closure Method Not Documented			
5360	Closure Device Counter			
5400	Auxiliary 3			
5405	Auxiliary 4			
6000	Diagnostic Cath Operator Last Name			
6005	Diagnostic Cath Operator First Name			
6010	Diagnostic Cath Operator Middle Name			
6015	Diagnostic Cath Operator NPI			
6020	Diagnostic Coronary Angiography Procedure			
6025	Left Heart Cath Procedure			
6030	Cardiac Transplant Evaluation			
6035	Cardiac Transplant Type			
6040	Diagnostic Cath Status			
6045	Rx Recommendation			
6100	Dominance	x		
6110	Left Main Stenosis Percent	x		
6111	Left Main Not Available	x		
6120	Proximal LAD Stenosis Percent	x		
6121	Proximal LAD Not Available	x		
6130	Mid/Distal LAD, Diag Branches Stenosis Percent	x		
6131	Mid/Distal LAD, Diagonals Stenosis Not Available	x		
6140	CIRC, OMs, LPDA, LPL Branches Stenosis Percent	x		
6141	CIRC, OMs, LPDL, LPL Branches Stenosis Not Available	x		
6150	RCA, RPDA, RPL, AM Branches Stenosis Percent	x		
6151	RCA, RPDA, RPL, AM Branches Stenosis Not Available	x		
6160	Ramus Stenosis Percent	x		
6161	Ramus Stenosis Not Available	x		
6170	Proximal LAD Graft Stenosis Percent	x		
6171	Proximal LAD Graft Stenosis Not Available	x		
6180	Mid/Distal LAD, Diag Branches Graft Stenosis Percent	x		
6181	Mid/Distal LAD, Diag Branches Graft Stenosis Not Available	x		
6190	CIRC, OMs, LPDA, LPL Branches Graft Stenosis Percent	x		
6191	CIRC, OMs, LPDA, LPL Branches Graft Stenosis Not Available	x		

6200	RCA, RPDA, RPL, AM Branches Graft Stenosis Percent	x		
6201	RCA, RPDA, RPL, AM Branches Graft Stenosis Not Available	x		
6210	Ramus Graft Stenosis Percent	x		
6211	Ramus Graft Stenosis Not Available	x		
7000	PCI Operator Last Name			
7005	PCI Operator First Name			
7010	PCI Operator Middle Name			
7015	PCI Operator NPI			
7020	PCI Status	x		
7025	Pre-PCI Left Ventricular Ejection Fraction	x		
7026	Pre-PCI Left Ventricular EF Not Assessed	x		
7030	Cardiogenic Shock at Start of PCI	x	x	
7035	PCI Indication	x		
7040	STEMI or STEMI Equivalent First Noted			
7045	Subsequent ECG with STEMI or STEMI Equivalent Date			
7046	Subsequent ECG with STEMI or STEMI Equivalent Time			
7050	First Device Activation Date			
7051	First Device Activation Time			
7055	Patient Transferred in for Immediate PCI for STEMI			
7060	ED Presentation at Referring Facility Date			
7061	ED Presentation at Referring Facility Time			
7065	Non-system Reason for Delay in PCI			
7100	Lesion Counter			
7105	Segment Number	x		
7110	Culprit Lesion	x		
7115	Stenosis Immediately Prior to Rx	x		
7120	Chronic Total Occlusion	x		
7125	IVUS			
7130	Fractional Flow Reserve			
7135	Fractional Flow Reserve Ratio			
7140	Pre-Procedure TIMI Flow			
7145	Previously Treated Lesion	x		
7150	Previously Treated Lesion Timeframe	x		
7155	Treated with Stent	x		
7160	In-stent Restenosis	x		
7165	In-stent Thrombosis	x		
7170	Stent Type			
7175	Lesion In Graft			
7180	Location in Graft			
7185	Lesion Complexity			

7190	Lesion Length			
7195	Thrombus Present			
7200	Bifurcation Lesion			
7205	Guidewire Across Lesion			
7210	Stenosis Post-Procedure			
7215	Post-Procedure TIMI Flow			
7220	Device Deployed			
7225	Intracoronary Device(s) Used			
7230	Intracoronary Device Counter			
7235	Device Diameter			
7240	Device Length			
7245	Significant Dissection			
7250	Perforation			
7255	Auxiliary 5			
7260	Auxiliary 6			
7300	CK-MB Pre-Procedure			
7301	CK Pre-Procedure Not Applicable			
7302	CK Pre-Procedure Drawn and Normal			
7305	Troponin I Pre-Procedure			
7306	Troponin l Pre-Procedure Not Drawn			
7310	Troponin T Pre-Procedure			
7311	Troponin T Pre-Procedure Not Drawn			
7315	Pre-Procedure Creatinine	x		x
7316	Pre-Procedure Creatinine Not Drawn	x		x
7320	Pre-Procedure Hemoglobin		x	x
7321	Pre-Procedure Hemoglobin Not Drawn			x
7325	CK-MB Post-Procedure			
7326	CK Post-Procedure Not Applicable			
7327	CK Post-Procedure Drawn and Normal			
7330	Troponin I Post-Procedure			
7331	Troponin I Post-Procedure Not Drawn			
7335	Troponin T Post-Procedure			
7336	Troponin T Post-Procedure Not Drawn			
7340	Post-Procedure Creatinine (Highest)			x
7341	Post-Procedure Creatinine Not Drawn			x
7345	Post-Procedure Hemoglobin		x	
7346	Post-Procedure Hemoglobin Not Drawn			
8000	Myocardial Infarction (Biomarker Positive)			
8005	Cardiogenic Shock			
8010	Heart Failure (new or worsening)			
8015	CVA/Stroke			
8021	Hemorrhagic Stroke		x	

8025	Tamponade		x	
8030	New Requirement for Dialysis			x
8035	Other Vascular Complications Requiring Treatment			
8040	RBC/Whole Blood Transfusion		x	
8041	Hemoglobin Prior to Transfusion			
8050	Bleeding Event w/in 72 Hours		x	
8055	Bleeding at Access Site			
8060	Hematoma at Access Site			
8061	Hematoma Size			
8070	Retroperitoneal Bleeding			
8080	Gastrointestinal Bleeding			
8090	Genital-Urinary Bleeding			
8100	Other Bleeding			
9000	CABG		x	
9005	CABG Status			
9010	CABG Indication			
9015	CABG Location			
9020	CABG Date			
9021	CABG Time			
9025	Other Major Surgery			
9030	Left Ventricular Ejection Fraction			
9031	Left Ventricular Ejection Fraction Not Assessed			
9035	Discharge Date		x	
9040	Discharge Status	x	x	
9045	Discharge Location	x		