NCDR®
NATIONAL CARDIOVASCULAR DATA REGISTRY

CathPCI Registry®

Physician Dashboard

User Guide

National Cardiovascular Data Registry
800-257-4737
www.ncdr.com • ncdr@acc.org

Introduction

As part of our ongoing effort to provide meaningful data, improve cardiovascular care, and deliver value to our participants, the NCDR has created a Physician Dashboard where physician level data can be reviewed. This online reporting tool uses the physician NPI number to generate specific reports based on the procedures performed by the physician and submitted by the CathPCI Registry participating hospital.

This dashboard may be used for:

- Quality improvement purposes
- MOC IV self-directed Performance Improvement Modules (PIMs) for physicians
- Internal reporting

This guide is designed to assist you in becoming familiar with and using the Physician Dashboard. We hope that this reporting feature will be beneficial to you as well as advance the care of cardiac patients.

Please confer with the CathPCI Registry Site Manager at your hospital concerning the data reports.

If additional questions arise, please contact the NCDR Product Support Team at 800-257-4737 or via email at ncdr@acc.org Questions are answered on a first in, first out basis and your patience is appreciated as the CathPCI Registry Team works to address your query.

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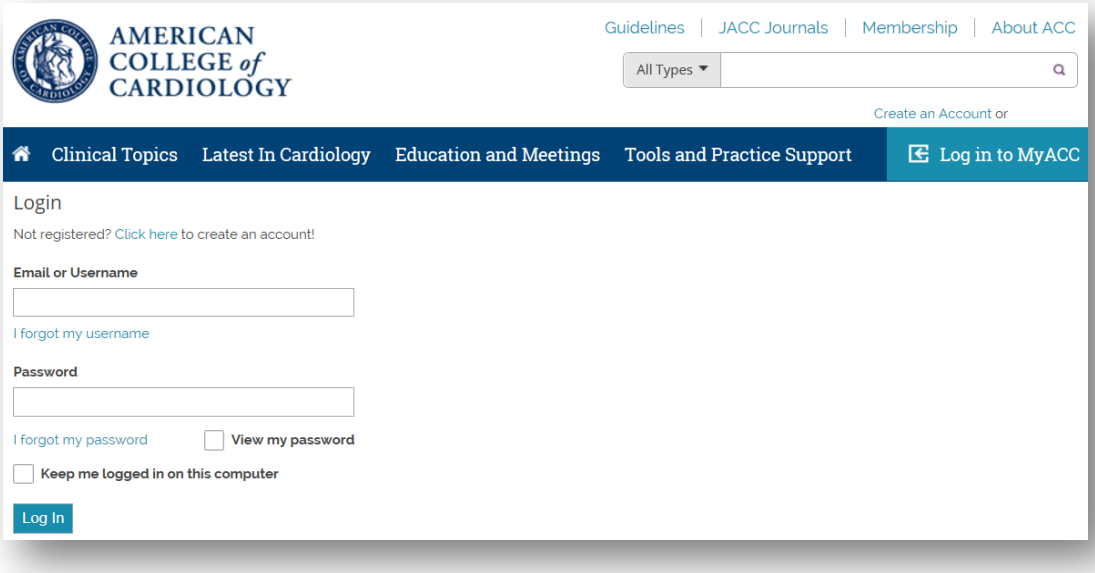
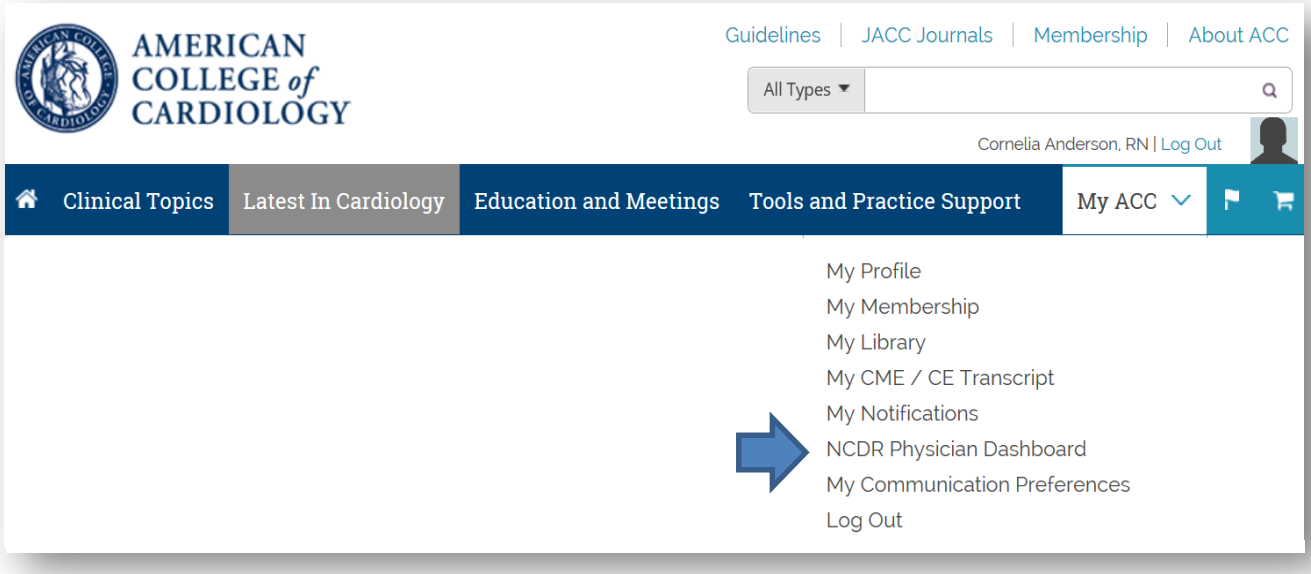
How to Access Your Physician Dashboard

1. Navigate to www.acc.org and select **Log in to MyACC** on the top right of the navigation bar, Log In



2. Next, click on **My ACC** on the top navigation bar and select **NCDR Physician Dashboard** from the dropdown menu



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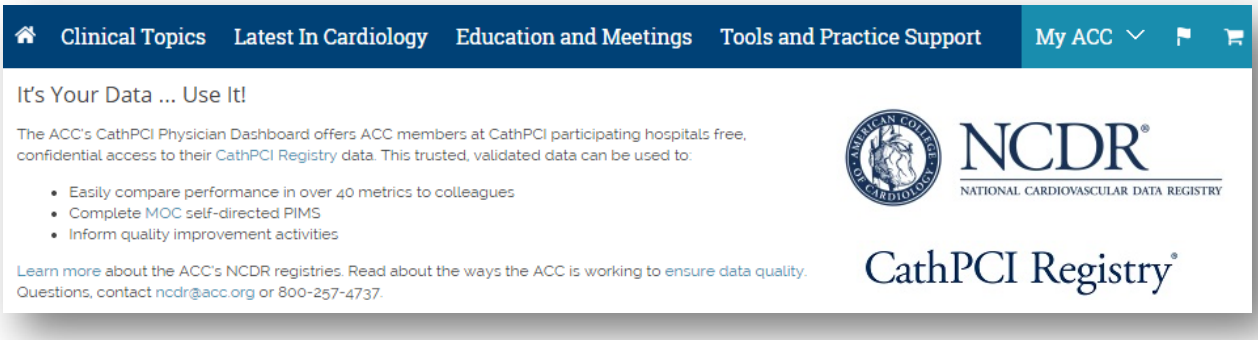
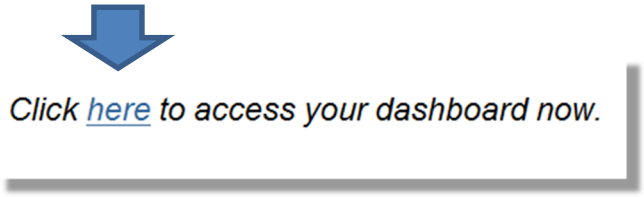
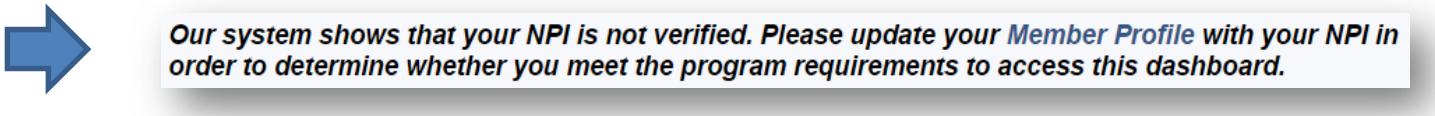
3. This will bring you to the Physician Dashboard homepage.



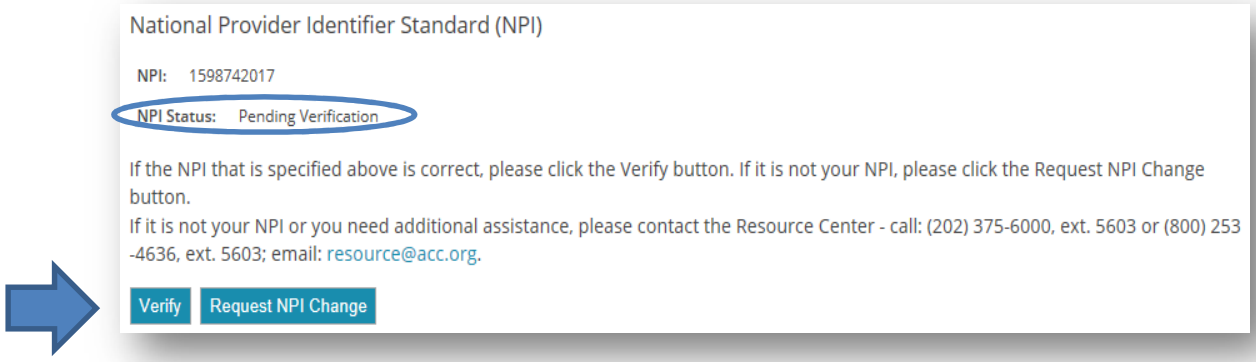
4. If your NPI number is correct and verified, the below message will display. Click on **here** to navigate to your Physician Dashboard. (Proceed to **step #6**)



5. If your NPI number is missing, incorrect or needs to be verified, the below message will display. Click on **Member Profile**.



This will bring you to your ACC Member Profile. Once there, scroll down and click on the **Professional Information** bar. If the NPI number is correct, but needs to be verified select **Verify**



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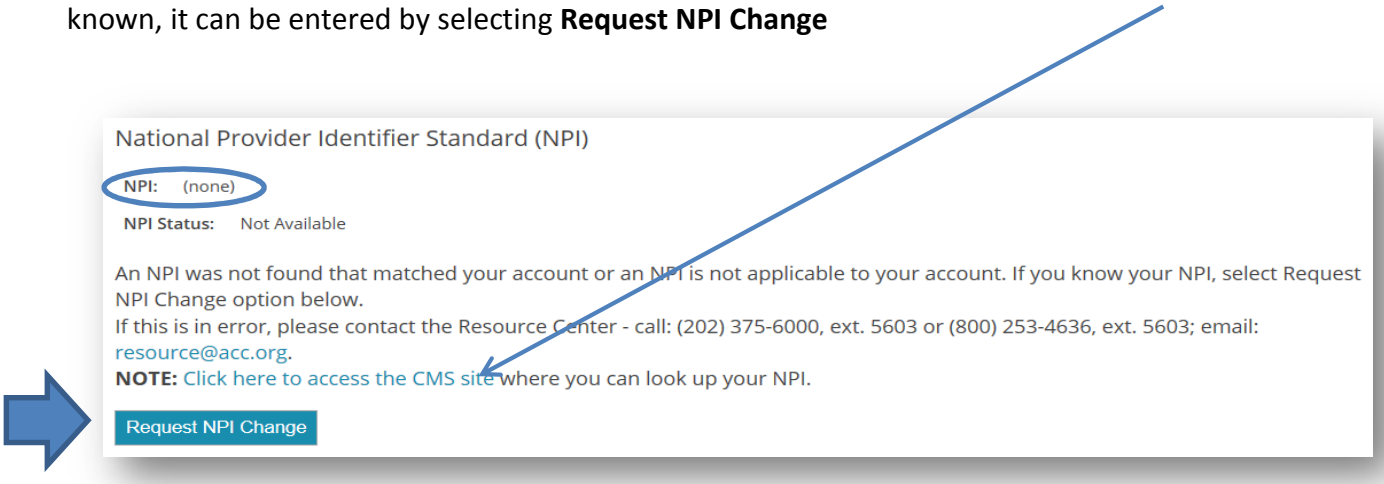
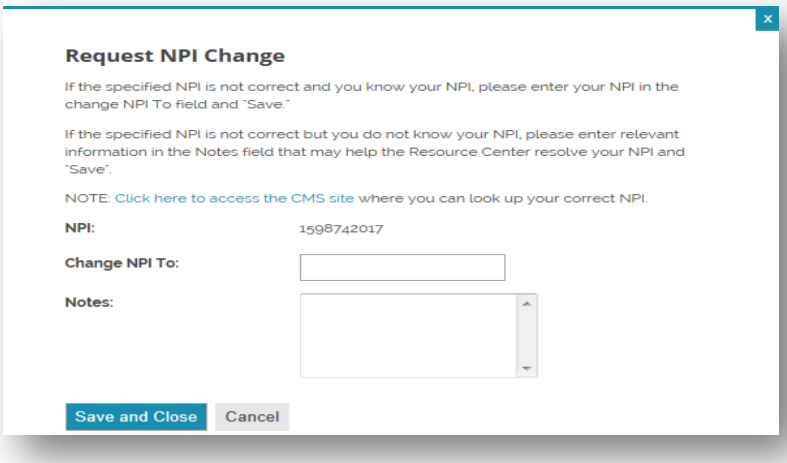
If the NPI number is missing or incorrect you can validate it by navigating to the CMS site *or* when it is known, it can be entered by selecting **Request NPI Change**



When Request NPI Change has been selected, enter your correct NPI number in the available field and select **Save and Close**



*Once you have verified your NPI number and/or entered it, you may need to log out and log back in to access your Physician Dashboard. Then follow steps 1-4 to locate and access the Physician Dashboard.

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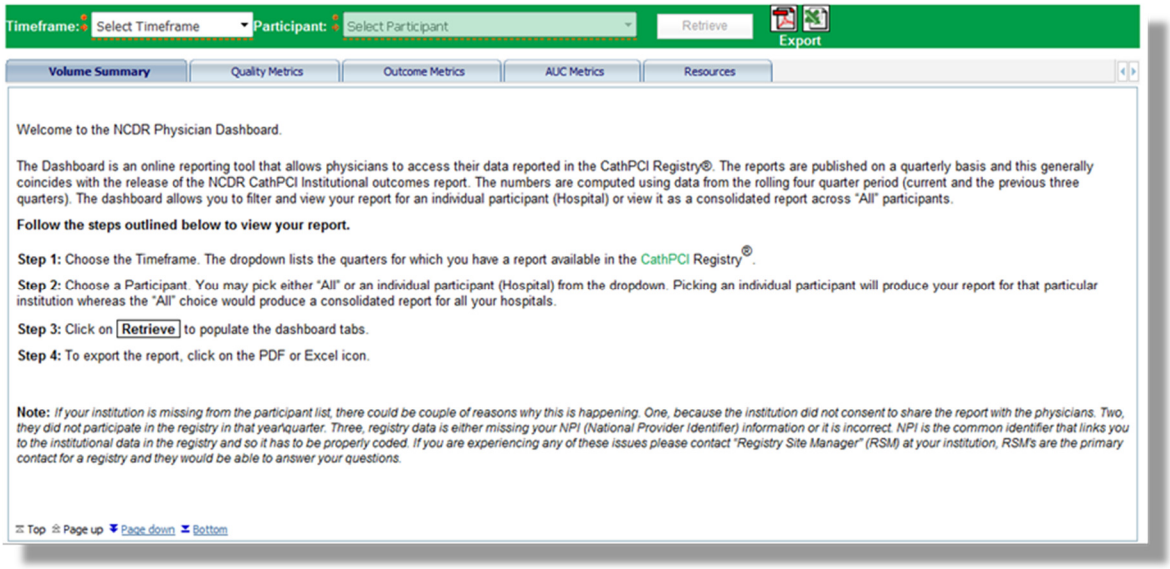
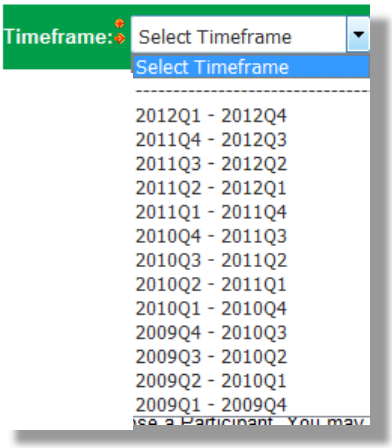
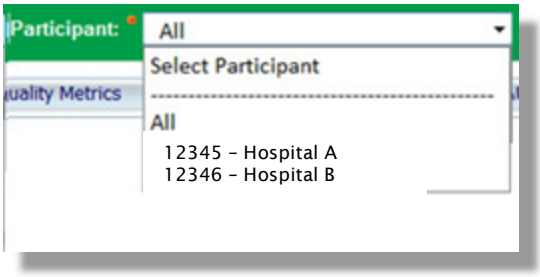
6. This brings you to the Physician Dashboard homepage.



7. Click on the down arrow, in the **Select Timeframe** window and select the 4 quarters of interest.



8. Next, click on the arrow to **Select Participant** and select one hospital or all the hospitals in which you practice.



9. Then click on **Retrieve** from the top navigation bar to display the information on the dashboard.

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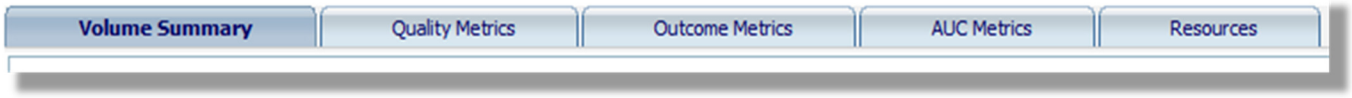
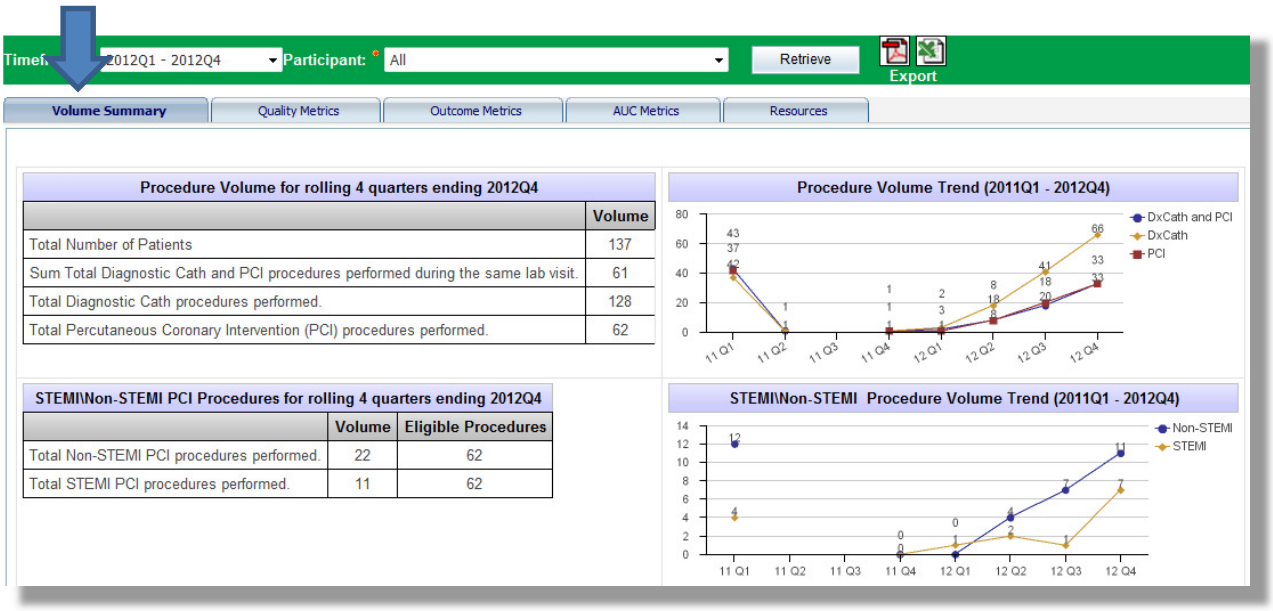
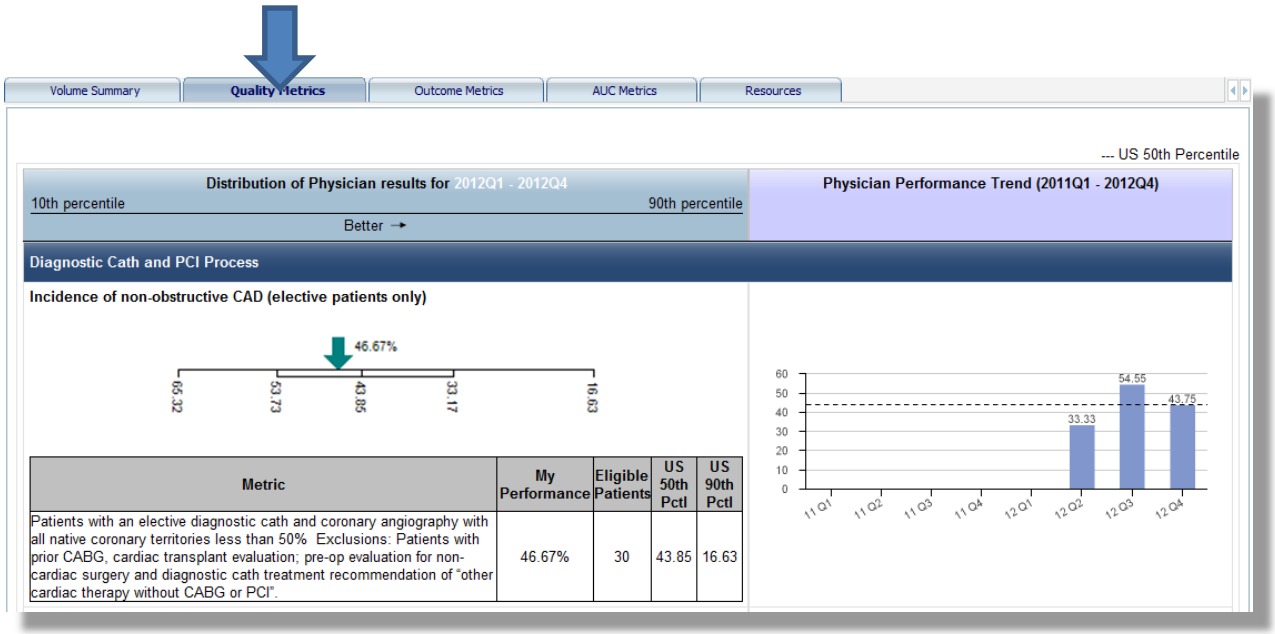
10. The Physician Dashboard is divided into 5 key areas as detailed below:



11. The **Volume Summary** tab displays data pertaining to volumes of patients, procedures, ACS type and procedure access type. The left side of the Physician Dashboard indicates your volume for the last 4 quarters of data while the right side of the Dashboard displays a trend of your volume for the past 8 quarters.



12. The **Quality Metrics** tab provides information pertaining to both Diagnostic Cath and PCI patients. These metrics support self-assessment and quality improvement.



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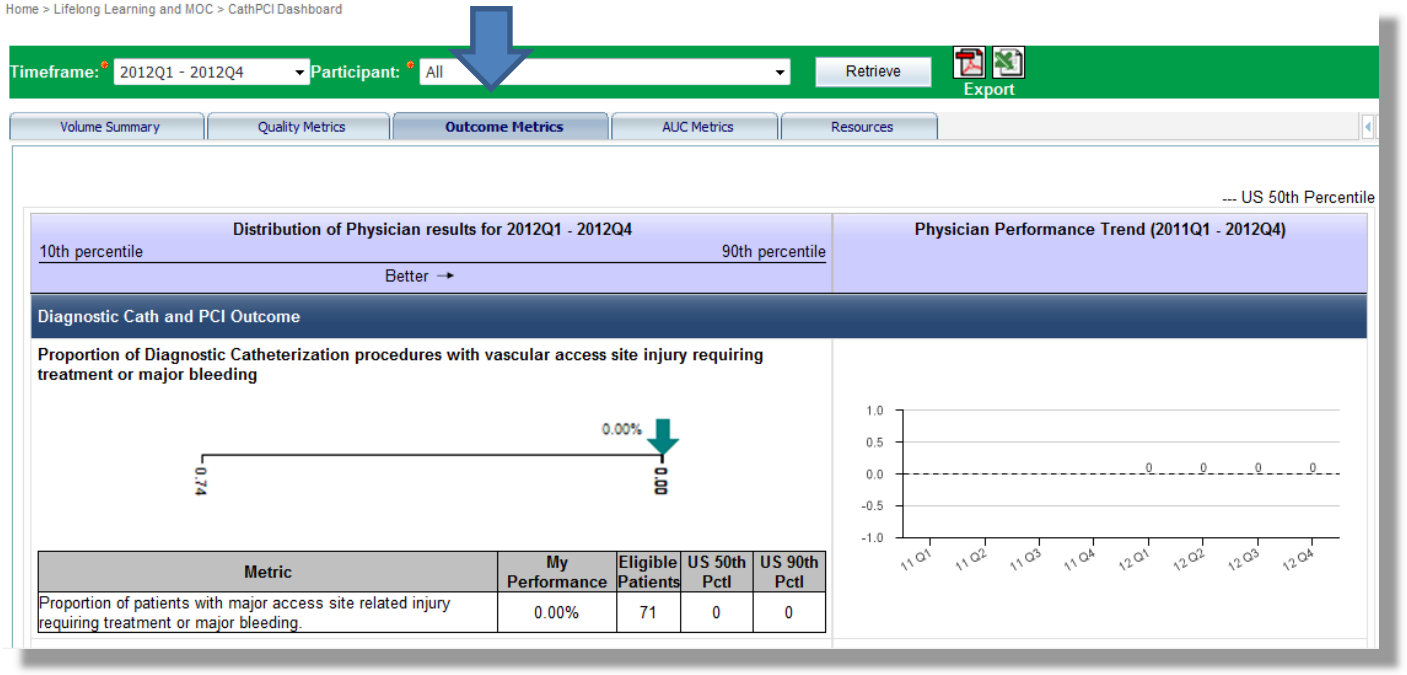
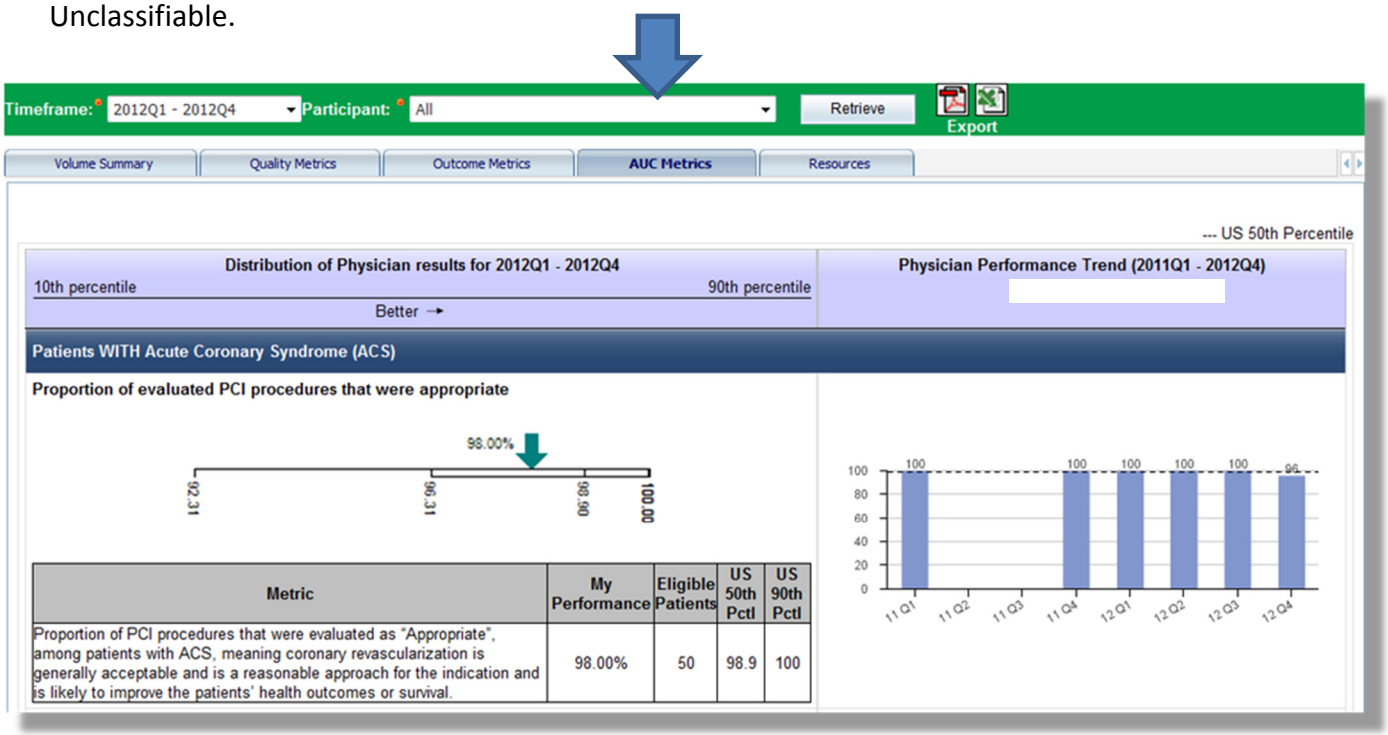
13. **Outcome Metrics** tab provides information pertaining to patient outcomes within the hospitalization.



14. The **AUC Metrics** tab provides the Appropriate Use Criteria (AUC) rating for each PCI procedure performed. The metrics divide the PCI procedures performed into two patient groups: those with ACS and those without ACS. Each PCI procedure in the patient group is evaluated to be Appropriate, Uncertain or Inappropriate. Procedures with indeterminate or incomplete data are viewed as Unclassifiable.



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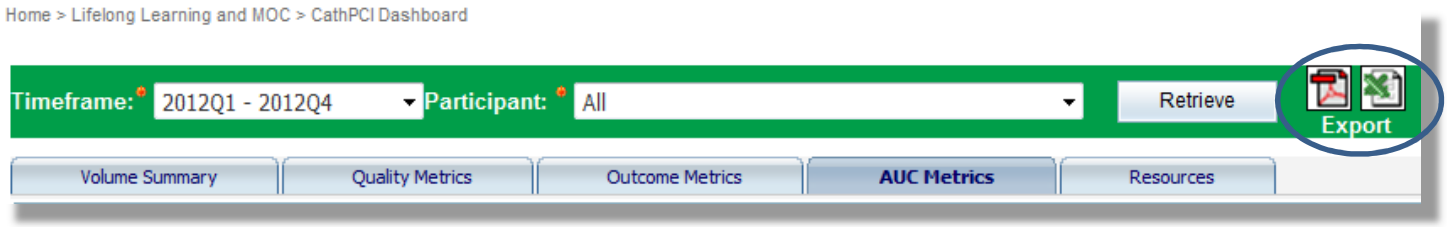
15. The **Resources** tab contains the following documents: Physician Dashboard: Guide for Physicians; Physician Dashboard: Guide for CathPCI Registry Participants; Trouble Shooting Ability to Download Physician Dashboard. Other resources will be added as needed.

16. The report can be exported to a PDF or Excel file by selecting either the PDF or Excel icon located in the upper right corner of the Physician Dashboard screen. These tools allow for further analysis and use of the information in presentations.



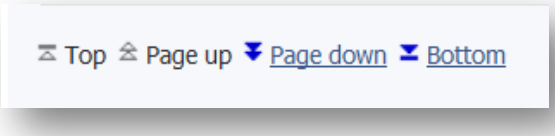
Please be aware that if many users are logged into the system, this step may take several seconds.

If selected, the entire Dashboard will be in the downloaded PDF file, and that each tab in the Physician Dashboard will have a separate tab in the Excel file.

If there is trouble downloading the Dashboard report, please make sure the Pop-up blocker is off.

See Troubleshooting Ability to Download Dashboard document under the Resources tab, if needed.

17. To visualize **all** physician dashboard metrics, scroll to the bottom of each tab and click the desired function.



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Frequently Asked Questions

1) What process is used to obtain NCDR data?

NCDR registries have been created under the leadership of clinical experts with critical input from NCDR participants regarding the feasibility of implementation and the burden of data collection. Data are collected, validated, and submitted under the responsibility of a designated Registry Site Manager (RSM) at each participating institution.

All data submissions are evaluated for errors and completeness and sent to the participant as a Data Quality Report (DQR). This automated process is based on a set of algorithms with predetermined thresholds to rate the submission using a color code: red, yellow and green.

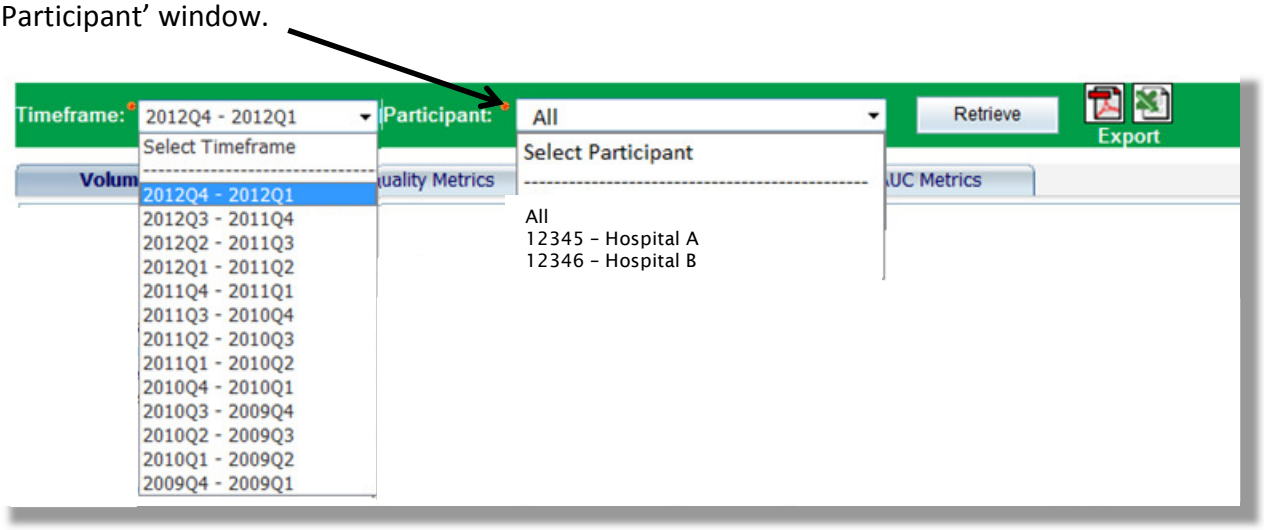
Red means that the data submission has failed and will not be entered into the NCDR data warehouse and will not be included in the report.

Yellow means that the data has passed the threshold for errors but not completeness. The data will be entered into the NCDR data warehouse, but will not be incorporated into the comparison reports.

Green means that the data passed both assessments, will be entered into the NCDR data warehouse, and will be included into any data computations and aggregated reports. Therefore, the DQR is used by NCDR participants to help prioritize data "cleaning" efforts.

2) What if I practice at more than one hospital?

Your National Provider Identifier (NPI) is linked to the hospital data that is entered into the CathPCI Registry. It is possible to view your cumulative data by selecting 'All' (see figure below) from the 'Participant' window. You may also view your data specific to one facility by selecting that facility from the 'Participant' window.



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3) Who has access to my data?

Access to the dashboard is secure and confidential via CardioSource login. Only you have access to your data via the CardioSource website. We do not share this data with anyone or any entity.

4) Does my hospital have access to my data?

Yes, the hospital where you practice has had access to your data since you joined the hospital. The Physician Dashboard will provide an easier, more meaningful way for both the facility and physicians to access the data.

5) Do you publicly report this data?

This data is not publicly reported.

6) Does my Physician Dashboard contain all of my cases?

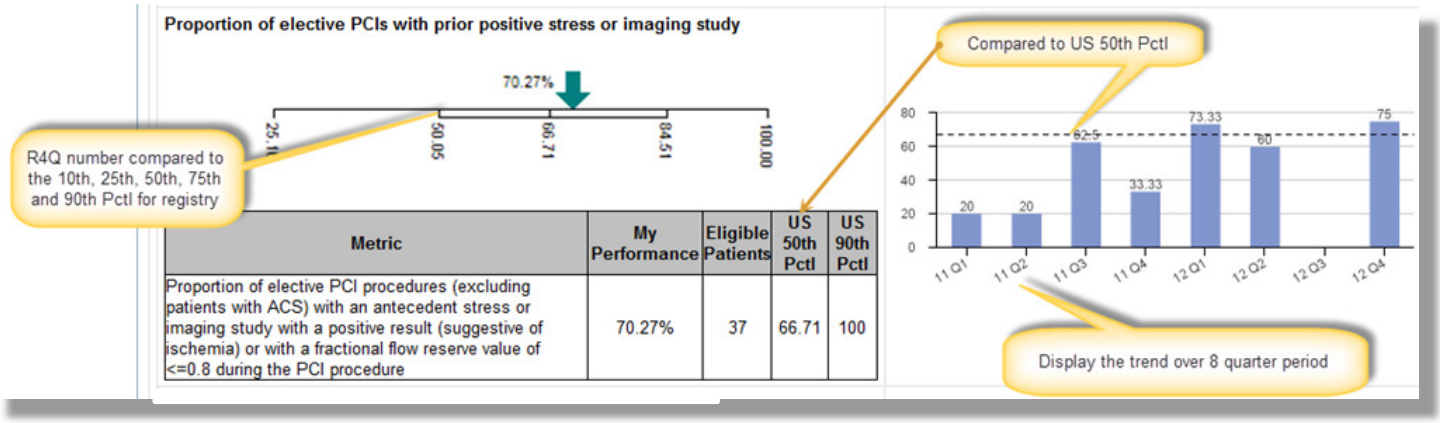
All cases that meet the specific Inclusion/Exclusion criteria for each measure (see Detailed Descriptions for Metrics document below) will be included if:

1.) The procedure occurred at a hospital that participates in the CathPCI Registry
2.) The hospital submits all diagnostic and/or PCI procedures
3.) Submitted data obtain a Green or Yellow Inclusion status on the DQR (See FAQ #1)
4.) The Hospital has correctly identified you by your NPI number

7) What if the physician dashboard does not contain data or all cases?

You may want to contact the RSM to discuss the possible reasons. If you cannot resolve the data discrepancy, then contact the NCDR at ncdr@acc.org or 1-800-257-4737.

8) How do I interpret the graph in the Dashboard?



Metric	My Performance	Eligible Patients	US 50th Pctl	US 90th Pctl
Proportion of elective PCI procedures (excluding patients with ACS) with an antecedent stress or imaging study with a positive result (suggestive of ischemia) or with a fractional flow reserve value of <=0.8 during the PCI procedure	70.27%	37	66.71	100

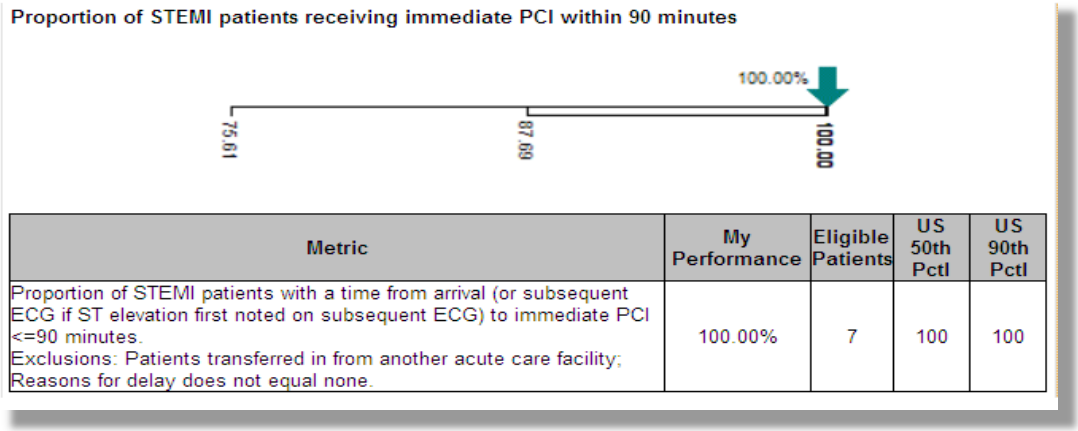
Figure 2: Report graphs

In the above graph on the left, the green arrow points to your results. The numbers underneath the arrow represent the results for all physicians for the 10th (25.16%), 25th (50.05%), 50th (66.71%), 75th (84.51%), and 90th (100%) percentiles. In this case, the arrow falls just above the 50th percentile. This means that slightly less than half the physicians perform better and slightly more than half perform worse than you in this metric.

If in subsequent results the arrow moves to the right, it would indicate an improvement in performance. Results in which the arrow falls at or below the 50th percentile, i.e., more to the left, may indicate an opportunity for improvement.

In the graph to the right, the bars represent the results from the last eight quarters and the dotted line represents the 50th percentile.

Note that if the range for the percentiles is small, you may see only part of the range. In the example below, the 10th percentile and 25th percentile are shown (75.61, 87.69 respectively). The 50th, 75th, and 90th percentiles are all wrapped into 100.



Metric	My Performance	Eligible Patients	US 50th Pctl	US 90th Pctl
Proportion of STEMI patients with a time from arrival (or subsequent ECG if ST elevation first noted on subsequent ECG) to immediate PCI <=90 minutes. Exclusions: Patients transferred in from another acute care facility; Reasons for delay does not equal none.	100.00%	7	100	100

Note that the numbers may represent the number of patients **or** the number of procedures so they may not be equal.

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Detailed Description of Metrics included in the Dashboard

Procedure Volume Information

Procedure Volume Data **Description:** Counts of the volume of patients and procedures that you have cared for by procedure type	
Total Number of Patients	Count of patients having a Diagnostic Cath or PCI
Total Diagnostic Cath and PCI procedures performed during the same lab visit	Count of procedures where Diagnostic cath=yes AND PCI procedure=yes
Total Dx Cath Procedures (includes coronary artery and/or LV assessment)	Count of procedures where Diagnostic Cath Procedure=yes
Total Percutaneous Coronary Intervention Procedures (PCI)	Count of procedures where PCI procedure=yes
Clinical Rationale/ Recommendation	According to the ACCF/AHA/SCAI 2013 Update of the Clinical Competence Statement on Coronary Artery Interventional Procedures the following are recommendations for provider competence; • Participate in PCI quality programs of the hospital, including review of major complications. • Participate in a hospital-based state, regional, or national database to measure risk-adjusted PCI outcomes of the laboratory and compare them to regional and national benchmarks for improving quality of care. • Based on available data and the judgment of the writing committee involving all of these considerations, the writing committee recommends interventional cardiologists perform a minimum of 50 coronary interventional procedures per year (averaged over a 2-year period) to maintain competency.
Relevant Citations	Harold, HG, et. al. ACCF/AHA/SCAI 2013 Update of the Clinical Competence Statement on Coronary Artery Interventional Procedures 10.1016/j.jacc.2013.05.002

Total STEMI \ NSTEMI PCI Procedures **Description:** Counts of PCI procedures by diagnosis of NSTEMI and STEMI	
Total Non-STEMI PCI procedures performed	Count of PCI procedures with a CAD presentation=non-STEMI
Total STEMI PCI procedures performed	Count of PCI procedures with a CAD presentation=STEMI
Clinical Rationale/ Recommendation	Patients presenting with STEMI/NSTEMI are at a higher risk of adverse events than elective PCI cases.
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.

Procedure Access Sites **Description:** Counts of PCI procedures based on arterial access for the procedure.	
Eligible Procedures	Count of procedures where diagnostic cath=yes OR PCI procedure=yes
Femoral	Count of procedures with Arterial Access Site = femoral
Brachial	Count of procedures with Arterial Access Site = brachial
Radial	Count of procedures with Arterial Access Site = radial
Other	Count of procedures with Arterial Access Site = other
Clinical Rationale/ Recommendation	Bleeding complications after PCI are associated with increased morbidity, mortality and costs. This measure is helpful in providing feedback on choice of arterial access site which may influence bleeding complications, clinical decision-making, and directing the use of bleeding avoidance strategies to improve the safety of PCI procedures.
Relevant Citations	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.

Incidence of non-obstructive CAD **Description:** Patients having coronary angiography where all major coronary branches have non-obstructive disease	
CathPCI QCDR Application measure #	14
Numerator	Count of diagnostic coronary angiography procedures with all coronary anatomy territories having <50% stenosis
Denominator	Count of Coronary Angiography procedures
Inclusion Criteria	Elective diagnostic coronary angiography procedures Data submissions that passed NCDR data inclusion thresholds
Exclusion Criteria	Prior CABG Pre-op evaluation for 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.

Stress testing with Spect MPI performed and the results were not available in the medical record **Description:** Percentage of patients with a Spect MPI performed prior to the PCI that did not have test results available within their medical record prior to the PCI.	
CathPCI QCDR Application measure #	12
Numerator	Patients with no Spect MPI results coded
Denominator	PCI patients with Spect MPI performed
Inclusion	PCI procedures Patients with Spect MPI performed prior to the intervention Data submissions that passed NCDR data inclusion thresholds
Exclusions	None
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation	Test results from these critical diagnostic studies are essential to have available for decision making surrounding ordering a PCI. A significant number of the indications for appropriate PCI procedures rely on the test results and estimation of risk for these patients. A measure evaluating the availability of the test results will encourage communication and care coordination.
Relevant Citations	Patel MR, Spertus JA, Brindis RG., et al. "ACCF proposed method for evaluating the appropriateness of cardiovascular imaging." J Am Coll Cardiol. 2005 Oct 18;46(8):1606-13. Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2012;60(24):e44-e164

Elective PCIs with prior positive stress or imaging study **Description:** Proportion of elective PCI procedures with an antecedent stress or imaging study with a positive result (suggestive of ischemia) or with a fractional flow reserve value of <=0.8 performed during the procedure.	
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	Elective PCI Data from submissions that pass NCDR data inclusion thresholds.
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.
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

Median time to immediate PCI for STEMI patients (in minutes) **Description:** Your patients' median time from hospital arrival to immediate PCI for STEMI patients in minutes.	
Median	Median time for STEMI PCI procedure *from* "Arrival date/time" or STEMI noted on "Subsequent ECG date/time" ***to*** "First Device Activation date/time"
Inclusion Criteria	PCI procedures with PCI indication of "Immediate PCI for STEMI" Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	"Non-system reason for delay" ***and*** a time to "First Device Activation date/time" of >90minutes Transferred In for Immediate PCI for STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	According to 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.

Proportion of STEMI patients receiving intermediate PCI w/in 90 minutes **Description:** Proportion of your STEMI patients with a time from the hospital arrival (or subsequent ECG if ST elevation first noted on subsequent ECG) to immediate PCI <=90 minutes	
CathPCI QCDR Application measure #	5
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	PCI procedures with PCI Indication of "Immediate PCI for STEMI" Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	"Non-system reason for delay" ***and*** a time to "First Device Activation date/time" of >90minutes Transferred In for Immediate PCI for STEMI
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	According to 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.

Median time from ED arrival at STEMI transferring facility to ED arrival at STEMI receiving facility among transferred patients. **Description:** Your patients' median time from arrival at transferring facility to ED arrival at STEMI receiving facility among transferred patients.	
Median	ED presentation at referring facility date/time and arrival at your facility date/time for patients with an admit source of "transfer in from another acute care facility"
Inclusion Criteria	-PCI procedures -PCI Indication = immediate -Transfer in for immediate PCI for STEMI=Yes -Non-system reason for delay =none -Non-system reason for delay AND a "time to immediate PCI" <=90" -Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	-Non-system reason for delay AND a "time to immediate PCI" >90"
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	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.

Median time from ED arrival at STEMI transferring facility to immediate PCI at STEMI receiving facility among transferred patients (in minutes). **Description:** Identifies the physician patient population 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	PCI procedures Transferred In for Immediate PCI for STEMI Data from submissions that pass NCDR data inclusion thresholds
Exclusion Criteria	Admit Source of "Emergency Department" or "Other"
Time period	Four consecutive quarters (ex. - the 2011 q4 report includes 2011 quarters 1-4).
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., 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	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.

Median fluoro time (in minutes) **Description:** Identifies the median fluoro time for PCI procedures	
Median	Fluoro time
Inclusion Criteria	PCI procedures (with or without diagnostic cath) Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Prior CABG An 'other'procedure during the same lab visit 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)

Patients with post procedure Myocardial Infarction (when routinely collecting post-PCI biomarkers) **Description:** Proportion of patients with an intra or post-procedure MI	
Numerator	Count of PCI procedures with post procedure MI
Denominator	Count of PCI procedures
Inclusion Criteria	Elective PCI procedures Data from submissions that pass NCDR data inclusion thresholds.
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

Patients with post procedure Myocardial Infarction (when not routinely collecting post-PCI biomarkers) **Description:** Proportion of patients with an intra or post-procedure MI	
Numerator	Count of PCI procedures with post procedure MI
Denominator	Count of PCI procedures
Inclusion Criteria	Elective PCI Data from submissions that pass NCDR data inclusion thresholds.
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

PCI procedures with creatinine assessed pre and post PCI procedure **Description:** Proportion of your PCI patients with creatinine assessed pre and post procedure	
Numerator	PCI procedures with creatinine assessed pre and post procedure
Denominator	PCI procedures
Inclusion Criteria	PCI procedures Data submissions that passed NCDR data inclusion thresholds
Exclusion Criteria	LOS <1 day Patients with "Death in Lab"
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

Median post-procedure length of stay (in days) for PCI patients with STEMI **Description:** Your median post-procedure length of stay (in days) STEMI patients with PCI	
Median	Median time in days from “Procedure Date” to “Discharge Date” for STEMI patients
Inclusion Criteria	Patients with PCI for STEMI Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Records with invalid values for Admission 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.

Median length of stay post PCI procedure for patients with STEMI and without CABG or without other major surgery during admission. **Description:** The median post PCI procedure length of stay for patients with a PCI indication of STEMI undergoing an isolated PCI procedure (defined by no CABG or other major surgery during episode of care) during the episode of care.	
CathPCI QCDR Application measure #	10
Median	Median time (in days) from "Procedure Date" to 'Discharge Date" for patients with STEMI
Inclusion Criteria	Patients with PCI for STEMI PCI Indications Data from submissions that pass NCDR data inclusion thresholds
Exclusion Criteria	Patients with CABG during admission Patients with Other Major Surgery during admission
Time Period	Consecutive four quarters
Clinical Rationale/ Recommendation	"… The 3 principles of medical ethics are beneficence, autonomy, and justice. Beneficence involves the physician's duty to act in the best interests of the patient and avoid maleficence, or harm (primum non nocere). Autonomy describes the physician's duty to help the patient maintain control over his or her medical treatments. Justice describes the physician's duty to treat the individual patient responsibly with due consideration of other patients and stakeholders in the healthcare system. Ethical considerations specific to PCI have been previously discussed and are highlighted below: •Place the patient's best interest first and foremost when making clinical decisions (beneficence). •Ensure that patients actively participate in decisions affecting their care (autonomy). •Consider how decisions regarding one patient may also affect other patients and providers (justice). •Plan and perform procedures and provide care with the intention of improving the patient's quality of life and/or decreasing the risk of mortality, independent of reimbursement considerations and without inappropriate bias or influence from industry, administrators, referring physicians, or other sources" (Levine, 2011, e.63).

Median length of stay (in days) for PCI patients without STEMI and without CABG or without other major surgery during admission. **Description:** The median post PCI procedure length of stay for patients with a PCI indication that is not STEMI undergoing an isolated PCI procedure (defined by no CABG or other major surgery during episode of care) during the episode of care.	
CathPCI QCDR Application measure #	11
Median	Median time (in days) from "Procedure Date" to 'Discharge Date" for patients with non-STEMI PCI Indications
Inclusion Criteria	Patients with PCI for non-STEMI PCI Indications Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Patients with CABG during admission Patients with Other Major Surgery during admission
Time Period	Consecutive four quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) to mechanically revascularize the coronary arteries, is performed during more than 1 million episodes of care annually among Medicare recipients. The risks associated with PCI are highest within the first 24 to 48 hours after the procedure and include periprocedural myocardial infarction (MI), acute stent thrombosis, bleeding, or renal failure. Previous studies of Medicare beneficiaries show that up to 9.5% of patients experience at least 1 PCI-related complication (Rao, 2011). Fortunately, short- and long-term outcomes after PCI have improved because of the evolution in device technology and pharmacotherapy. Despite this improvement, patients are usually observed overnight in the hospital after elective PCI to monitor for PCI-related complications. In some hospitals, these patients are observed overnight in short-stay units, while in others, they are observed on traditional

Composite: Discharge Medications in Eligible PCI Patients Description: Patients undergoing PCI who received prescriptions for all medications (aspirin, P2Y12 and statins) for which they were eligible	
CathPCI QCDR Application measure #	8
Numerator	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, prasurgel, 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	All patients surviving hospitalization who are eligible to receive any one of the three medication classes: 1) Eligibility for aspirin (ASA): Patients undergoing PCI who do not have a contraindication to aspirin documented ***or*** 2) Eligibility for P2Y12 agent (clopidogrel, prasugrel, ticlopidine, ticagrelor): Patients undergoing PCI with stenting who do not have a contraindication to P2Y12 agent documented ***or*** 3) Eligibility for statin therapy: Patients undergoing PCI who do not have a contraindication to statin therapy.
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Discharge status of “deceased” Discharge location of “other acute care hospital”, “hospice” or “against medical advice”.
Timeframe	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) AND 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) **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, including post revascularization patients. (*Level of Evidence: A*).
Relevant Citations	2011 PCI Guidelines (J Am Coll Cardiol 2011; 58:e44–122) 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) 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; This measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

Patients with aspirin prescribed at discharge **Description:** Proportion of patients with aspirin prescribed at discharge.	
Numerator	Count of patients having PCI with ASA prescribed at discharge
Denominator	Count of PCI admissions
Inclusion Criteria	PCI during the Episode of Care Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Aspirin coded as “contraindicated” or “blinded” 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)

Patients with a statin prescribed at discharge **Description:** Proportion of patients with a statin prescribed at discharge.	
Numerator	Count of patients having PCI with a Statin prescribed at discharge
Denominator	Count of PCI admissions
Inclusion Criteria	Patients having PCI during the Episode of Care Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Statin coded as "contraindicated" or "blinded" 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. 3. 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) 4. 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 post revascularization 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;

Patients with a P2Y12 inhibitor prescribed at discharge **Description:** Proportion of patients with a stent implanted that had a thienopyridine/P2Y12 Inhibitor prescribed at discharge.	
Numerator	Count of patients with a Thienopyridine or P2Y12 Inhibitor (Clopidogrel, Prasugrel, Ticlopidine or Ticagrelor) prescribed, blinded or contraindicated at discharge
Denominator	Count of PCI admissions with a stent implanted
Inclusion Criteria	PCI admissions with a stent implanted Data from submissions that pass NCDR data inclusion thresholds.
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)

ACE-I or ARB prescribed at discharge for patients with an ejection fraction < 40% who had a PCI during the episode of care **Description:** Percentage of patients with a left ventricular ejection fraction (LVEF) < 40% who were prescribed ACE inhibitor or ARB at hospital discharge.	
CathPCI QCDR Application measure #	6
Numerator	Patients with an ACE Inhibitor or an ARB prescribed, blinded or contraindicated at discharge
Denominator	Patients with PCI who had an EF < 40%
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds. Patients with PCI who had an EF <40%
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	ACE inhibitors are recommended in patients with Heart Failure reduced Ejection Fraction (HFrEF) and current or prior symptoms, unless contraindicated, to reduce morbidity and mortality (Class 1, Level of Evidence: A). ARBs are reasonable to reduce morbidity and mortality as alternatives to ACE inhibitors as first-line therapy for patients with Heart Failure reduced Ejection Fraction (HFrEF), especially for patients already taking ARBs for other indications, unless contraindicated (Class IIa, Level of Evidence: A).
Relevant Citations	Pfeffer MA, Braunwald E, MoyéLA, Basta L, Brown EJ Jr, Cuddy TE, Davis BR, Geltman EM, Goldman S, Flaker GC. Effect of captopril on mortality and morbidity in patients with left ventricular dysfunction after myocardial infarction. Results of the survival and ventricular enlargement trial. The SAVE Investigators. N Engl J Med. 1992;327(10):669. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013;62(16):e147-e239.

Beta-blockers prescribed at discharge for AMI patients who had a PCI during admission **Description:** Percentage of patients with acute myocardial infarction (AMI) who were prescribed a beta-blocker at hospital discharge. This metric evaluates the process of care associated with the multi-society guidelines recommendations.	
CathPCI QCDR Application measure #	7
Numerator	Patients with a Beta-blocker prescribed, contraindicated or blinded at discharge
Denominator	AMI patients who had a PCI during the admission
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Patients having PCI during admission
Exclusion Criteria	Transferred to another hospital Deceased at discharge Left against medical advice Discharged with hospice care
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation & Relevant Citations	For patients with acute myocardial infarction (MI), beta blocker therapy reduces infarct size and early mortality when started early and lowers the risk of death when continued long term. The evidence supporting the benefit of beta blockers has been obtained primarily from randomized trials that included predominantly patients with ST-elevation MI (STEMI). Multi-society guidelines recommend the use of beta blockers in the AMI patient population. This measure reflects the clinical care process of prescribing beta blockers at discharge for AMI patients who were treated with a PCI during the admission. This process is directly linked with practice guidelines for both AMI patients (O'Gara, 2013). <u>Source:</u> 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) Developed in Collaboration With the American Academy of Family Physicians and American College of Emergency Physicians Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, Society for

Cardiac Rehabilitation Patient Referral from an Inpatient Setting **Description:** Percentage of patients admitted to a hospital with a primary diagnosis of an acute myocardial infarction or chronic stable angina or who during hospitalization have undergone a percutaneous coronary intervention (PCI), who are referred to an early outpatient cardiac rehabilitation/secondary prevention program.	
CathPCI QCDR Application measure #	13
Numerator	Number of patients who have been referred to an outpatient Cardiac Rehabilitation/Secondary Prevention (CR/SP) program prior to hospital discharge or have a documented medical or patient- centered reason why such a referral was not made.
Denominator	All patients who had a PCI during the admission.
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Patients having PCI during admission
Exclusion Criteria	Patients who expired before discharge. Patients who leave against medical advice. Patients who are Ineligible for cardiac rehab referral
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation	Hospitalization offers a unique opportunity to initiate referral to outpatient cardiac rehabilitation. If this has not occurred, the outpatient provider is responsible to ensure patient referral. Many insurers allow cardiac rehabilitation services to begin up to 6 to 12 months following a cardiac event. Therefore, referral is not only the responsibility of the hospital staff but also outpatient physicians with responsibility for the care of patients on an ambulatory basis. The need for increased awareness and referral for patients to a cardiac rehab program spans the multiple specialties

Diagnostic Cath and PCI Outcome

Diagnostic catheterization procedures with vascular access site injury requiring treatment or major bleeding **Description:** Proportion of your patients having a diagnostic cath that experienced access site related injury and/or bleeding	
CathPCI QCDR Application measure #	3
Numerator	Count of diagnostic cath procedures *with* "Bleeding at Access Site", "Hematoma at Access Site", "Retroperitoneal Bleeding" ***or*** "Other Vascular Complications Requiring Rx"
Denominator	Count of diagnostic cath procedures
Inclusion Criteria	Diagnostic cath only procedures Data submissions that passed NCDR data inclusion thresholds
Exclusion Criteria	PCI during the same lab visit. "CABG" or "other major surgery" during the Episode of Care "GI", "GU" and/or "Other" bleeding events
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.

Composite: Proportion of patients with death, emergency CABG, stroke or repeat target vessel revascularization **Description:** Your proportion of patients with (unadjusted) death, emergency CABG, stroke or repeat target vessel revascularization[1] post procedure up to hospital discharge. [1]Target vessel revascularization is defined as a repeat PCI procedure on the same segment during the same admission	
Numerator	Count of PCI admissions with a discharge status of expired; an emergency CABG, stroke or repeat target vessel revascularization prior to discharge.
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Patients with a stroke AND an elective, urgent or salvage CABG during the same admission.
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation	This measure represents a composite of major complications occurring after PCI.

Patients with post procedure stroke **Description:** Proportion of your patients with stroke post procedure (excluding patients with CABG during same admission).	
CathPCI QCDR Application measure #	1
Numerator	Count of PCI procedures with post procedure stroke
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds.
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. Circulation. 2002;106:86-91.

New requirement for dialysis post PCI in patients without CABG or other major surgeries during admission. **Description:** Percent of patients undergoing isolated PCI procedure (defined by no CABG or other major surgery during episode of care) who have a new requirement for renal dialysis intra or post PCI procedure. This measure evaluates the occurrence of the new need for dialysis as an outcome of a percutaneous coronary intervention (PCI) during a patient's episode of care.	
CathPCI QCDR	2
Numerator	Number of patients who have a new need for dialysis intra or post PCI procedure
Denominator	All patients who had a PCI during the admission
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Patients having PCI during admission
Exclusion Criteria	Patients with CABG or Other Major Surgery during admission
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation	In contemporary studies, contrast induced – acute kidney injury (CI-AKI) requiring dialysis developed in almost 4% of patients with underlying renal impairment and 3% of patients undergoing primary percutaneous coronary interventions (PCI) for acute coronary syndrome. However, only a small proportion of patients continued on chronic dialysis. Although CI-AKI requiring dialysis is relatively rare, the impact on patient prognosis is considerable, with high hospital and 1 year mortality rates (KDIGO, 2012). One study reported the incidence of new CKD Stage 4–5 (eGFR < 30 ml/min) following PCI and found that this occurred in 0.3% of patients (Vuurmans, 2010). Most challenging, however, are patients that present with acute coronary syndromes or myocardial infarction, particularly if complicated by hypotension or cardiogenic shock. Emergency angiography and treatment are usually required. In these circumstances, operators may be forced to use large CM doses without having sufficient time for adequate patient preparation, and in almost all studies patients with acute myocardial infarction have a high risk of CIAKI (McCullough, 2008). All laboratories that use contrast media should have adequate protocols for risk prediction, hydration, and prevention of CI - AKI. While no randomized controlled trials exist for dialysis for life-threatening indications, it is widely accepted that patients with severe hyperkalemia, severe acidosis, pulmonary edema, and uremic complications should be dialyzed emergently. The treatment of acute kidney injury (AKI) with renal replacement therapy (RRT) has the following goals: i) to maintain fluid and electrolyte, acid- base, and solute homeostasis; ii) to prevent further insults to the kidney; iii) to permit renal recovery; and iv) to allow other supportive measures (e.g., antibiotics, nutrition support) to proceed without limitation or complication. Ideally, therapeutic

	interventions should be designed to achieve the above goals and a systematic assessment of all these factors is key to determining the optimal timing for initiating dialysis (KDIGO, 2012). Source: Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2 : 1–138 Vuurmans T, Byrne J, Fretz E, et al. Chronic kidney injury in patients after cardiac catheterization or percutaneous coronary intervention: a comparison of radial and femoral approaches (from the British Columbia Cardiac and Renal Registries). Heart 2010; 96: 1538–1542. McCullough PA. Radiocontrast-induced acute kidney injury. Nephron Physiol 2008; 109: pp 61–72.
Relevant Citations	Initiate renal replacement therapy (RRT) emergently when life threatening changes in fluid, electrolyte, and acid-base balance exist. (Not Graded). Consider the broader clinical context, the presence of conditions that can be modified with renal replacement therapy (RRT), and trends in laboratory tests – rather than single BUN and creatinine thresholds alone – when making the decision to start RRT. (Not Graded) In individuals who develop changes in kidney function after administration of intravascular contrast media, evaluate for CI-AKI as well as for other possible causes of AKI. (Not Graded) Assess the risk for CI-AKI and, in particular, screen for pre-existing impairment of kidney function in all patients who are considered for a procedure that requires intravascular (i.v. or i.a.) administration of iodinated contrast medium. (Not Graded) We suggest not using prophylactic intermittent hemodialysis (IHD) or hemofiltration (HF) for contrast-media removal in patients at increased risk for CI- AKI. (2C) Source: Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2 : 1–138

Cardiac tamponade post PCI in patients without CABG or other major surgery during admission. **Description:** The number of patients undergoing isolated PCI procedure (defined by no CABG or other major surgery during episode of care) who have a cardiac tamponade intra or post procedure.	
CathPCI QCDR Application measure #	4
Numerator	The number of patients age 18 and older undergoing an isolated PCI with a cardiac tamponade intra or post PCI procedure.
Denominator	All patients undergoing isolated (defined by no CABG or other major surgery during episode of care) percutaneous coronary intervention (PCI).
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds Patients having PCI during admission
Exclusion Criteria	Patients with CABG or Other Major Surgery during admission
Time Period	Four consecutive quarters
Clinical Rationale/ Recommendation	The risk associated with intra procedure coronary perforation is approximately 0.2%, and is most commonly caused by wire perforation, during PCI for CTO or by ablative or oversized devices during PCI of heavily diseased or tortuous coronary arteries (Ellis, 1994). Cardiac tamponade results after a coronary perforation from the accumulation of pericardial fluid under pressure, leading to impaired cardiac filling and hemodynamic compromise. Very little fluid needs to accumulate to produce cardiac tamponade once the pericardium can no longer stretch (Spodick, 2003). Acute cardiac tamponade occurs within minutes, due to trauma, rupture of the heart or aorta, or as a complication of an invasive diagnostic or therapeutic procedure. This generally results in a picture resembling cardiogenic shock that requires urgent reduction in pericardial pressure (Reddy, 1990). In patients with a documented pericardial effusion and clinical evidence of hemodynamic compromise (ie, tachycardia and hypotension producing a picture of cardiogenic shock) consistent with cardiac tamponade, urgent drainage of the pericardial effusion should be performed. Drainage of the effusion can be performed percutaneously using catheter drainage or surgically. Following either percutaneous or surgical drainage of a pericardial effusion in a patient with cardiac tamponade, the patient should be monitored with continuous telemetry and frequent vital signs for at least 24 to 48 hours. Subsequent monitoring with two- dimensional and Doppler echocardiography prior to discharge from the hospital is warranted to confirm adequate fluid removal and to detect possible recurrent fluid accumulation (Maisch, 2004). Source:

	Ellis SG, Ajluni S, Arnold AZ, et al. Increased coronary perforation in the new device era. Incidence, classification, management, and outcome. Circulation. 1994;90:2725–30 Spodick D. Acute cardiac tamponade. N Engl J Med. 2003;349(7):684. Reddy PS, Curtiss EI, Uretsky BF. Spectrum of hemodynamic changes in cardiac tamponade. Am J Cardiol. 1990;66(20):1487. Maisch B, Seferović P, Ristić A, Erbel R, Rienmüller R, Adler Y, Tomkowski WZ, Thiene G, Yacoub MH, Task Force on the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology. Guidelines on the diagnosis and management of pericardial diseases executive summary; The Task force on the diagnosis and management of pericardial diseases of the European society of cardiology. Eur Heart J. 2004;25(7):587.
Relevant Citations	Management of cardiac tamponade can be challenging because of the lack of the validated criteria for the risk stratification that should guide clinicians in the decision-making process. Current guidelines do not cover these issues and no additional guidelines are available from major medical and cardiology societies (Ristic,2014). Ristic A, Imazio M, Adler Y, et al., Triage strategy for urgent management of cardiac tamponade: a position statement of the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases. European Heart Journal. European Heart Journal Advance Access published July 7, 2014. doi:10.1093/eurheartj/ehu217 Retrieved on January 9, 2015 from http://eurheartj.oxfordjournals.org/content/ehj/early/2014/06/20/eurheartj.ehu217.full.pdf.

PCI procedures with transfusion of whole blood or red blood cells **Description:** Proportion of your patients who received a transfusion of whole blood or red blood cells after a PCI procedure.	
Numerator	Count of PCI procedures with a RBC/whole blood transfusion
Denominator	Count of PCI procedures
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds.
Exclusion Criteria	Patients having CABG or other major surgery during the same admission Patients who have a pre-procedure hgb level of <=8
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.

Patients with emergency CABG **Description:** Proportion of your patients having emergency CABG or transferred for emergency CABG during the same episode of care.	
Numerator	Count of your PCI admissions with Emergency CABG at this facility or transferred to another facility for emergency CABG.
Denominator	Count of PCI admissions
Inclusion Criteria	Data from submissions that pass NCDR data inclusion thresholds.
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 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

Mortality

PCI in-hospital Observed Mortality (among eligible) **Description:** Your PCI in-hospital observed mortality for all patients using the NCDR® risk adjustment model.	
Numerator	Count of patients with a discharge status=deceased (unadjusted or actual rates of mortality)
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Expected Mortality (among eligible) **Description:** Your PCI in-hospital expected mortality for all patients using the NCDR® risk adjustment model.	
Numerator	Cumulative sum of the predicted or expected probability of death of all patients in the reporting timeframe (alive or dead) based on the variables and coefficients in the NCDR risk model (expressed as a decimal).
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Observed/Expected Mortality Ratio **Description:** Your PCI in-hospital observed to expected mortality ratio for all patients using the NCDR® risk adjustment model.	
	Ratio of Observed compared to Expected mortalities for PCI patients
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate expected mortality based on zero deaths.
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PCI in-hospital Observed mortality (patients with STEMI) **Description:** Your PCI in-hospital observed mortality for patients with STEMI adjusted using the NCDR® risk adjustment model.	
Numerator	Count of patients with a discharge status=deceased (unadjusted or actual rates of mortality)
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI for STEMI
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Expected mortality (patients with STEMI) **Description:** Your PCI in-hospital expected mortality for patients with STEMI adjusted using the NCDR® risk adjustment model.	
Numerator	Cumulative sum of the predicted or expected probability of death of all patients in the reporting timeframe (alive or dead) based on the variables and coefficients in the NCDR risk model (expressed as a decimal).
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI for STEMI
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate expected mortality based on zero deaths.
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PCI in-hospital Observed/Expected Mortality Ratio (patients with STEMI) **Description:** Your PCI in-hospital observed to expected mortality ratio for all patients with STEMI using the NCDR® risk adjustment model.	
	Ratio of Observed compared to Expected mortalities for PCI patients
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI for STEMI
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge.
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Observed mortality (patients without STEMI) **Description:** Your PCI in-hospital observed mortality for patients without STEMI adjusted using the NCDR® risk adjustment model.	
Numerator	Count of patients with a discharge status=deceased (unadjusted or actual rates of mortality)
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge Patients with PCI for STEMI
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Expected mortality (patients without STEMI) **Description:** Your PCI in-hospital expected mortality rate for patients without STEMI adjusted using the NCDR® risk adjustment model.	
Numerator	Cumulative sum of the predicted or expected probability of death of all patients in the reporting timeframe (alive or dead) based on the variables and coefficients in the NCDR risk model (expressed as a decimal).
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge Patients with PCI for STEMI
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

PCI in-hospital Observed/Expected Mortality Ratio (patients without STEMI) **Description:** Your PCI in-hospital observed to expected mortality ratio for all patients without STEMI using the NCDR® risk adjustment model.	
	Ratio of Observed compared to Expected mortalities for PCI patients
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed
Exclusion Criteria	Patient admissions with PCI who transferred to another facility on discharge Patients with PCI for STEMI
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. The current algorithm does not calculate expected mortality based on zero deaths.
Relevant Citations	Risk adjusted outcomes interpretation and specifications in the CathPCI Registry® https://www.ncdr.com/WebNCDR/NCDRDocuments/CathPCIV4_RiskAdjustmentTechNotes.pdf Peterson, E, et al. Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention, Journal of the American College of Cardiology, vol 55, #18, 2010. The NCDR PCI In-Hospital Risk Adjusted Mortality measure has been endorsed by the National Quality Forum, measure 964 (http://www.qualityforum.org/Measures_List.aspx?#k=)

Adverse Events

PCI in-hospital Observed rate of bleeding events (all patients) **Description:** The hospital Observed of bleeding events for patients with PCI procedures using the NCDR® PCI bleeding risk adjustment model.	
Numerator	Count of patients with a bleeding event defined as any of the following (unadjusted or actual rates of bleeding) following the index PCI: 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 no CABG and pre-procedure hgb not missing; *OR* 5. Absolute hgb decrease (7320 and 7345) from pre-PCI to post-PCI of >= 3 g/dl AND pre-procedure hgb <16 g/dL AND pre-procedure hgb not missing.
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients who die on the same day as the procedure Patients with CABG
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	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.

PCI in-hospital Expected rate of bleeding events (all patients) **Description:** The hospital Expected of bleeding events for patients with PCI procedures using the NCDR® PCI bleeding risk adjustment model.	
Numerator	Cumulative sum of the predicted or expected probability of a bleeding event of all patients during the reported timeframe based on the variables and coefficients in the NCDR risk model (expressed as a decimal).
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients who die on the same day as the procedure Patients with CABG
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	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.

PCI in-hospital Observed/Expected rate of bleeding events (all patients) **Description:** The PCI in-hospital observed to expected ratio of bleeding events for patients with PCI procedures using the NCDR® PCI bleeding risk adjustment model.	
	Ratio of Observed compared to Expected bleeding events for PCI patients
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients who die on the same day as the procedure Patients with CABG
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	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.

PCI in-hospital Acute Kidney Injury (among eligible) **Description:** The PCI in-hospital observed acute kidney injury (AKI) for all patients using the NCDR® risk adjustment model.	
Numerator	Count of patients with observed acute kidney injury (unadjusted or actual rates of AKI) defined as acute kidney injury network (AKIN) stage 1 or greater or new requirement for dialysis following the index PCI: 1. Stage 1 – an absolute increase of ≥0.3mg/dL or a relative increase of 50% in serum creatinine (CR) 2. Stage 2 – an increase in serum Cr to more than 200% to 300% (>2-to3-fold) from baseline 3. Stage 3 – an increase in serum Cr to more than 300% (>3-fold) from baseline (or serum Cr of more than or equal to 4.0mg/dL with an acute increase of at least 0.5mg/dL.
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients currently on dialysis Patients with same day as procedure discharges Patients with either a missing pre or missing post-procedure creatinine value
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Acute kidney injury after PCI is associated with increased morbidity, mortality and costs. All laboratories that use contrast media should have adequate protocols for risk prediction, hydration and prevention of CI-AKI The NCDR™ risk adjustment model analyzes multiple elements to account for patient risk factors that are present prior to PCI.
Relevant Citations	Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2 : 1–138 Vuurmans T, Byrne J, Fretz E, et al. Chronic kidney injury in patients after cardiac catheterization or percutaneous coronary intervention: a comparison of radial and femoral approaches (from the British Columbia Cardiac and Renal Registries). Heart 2010; 96: 1538–1542. McCullough PA. Radiocontrast-induced acute kidney injury. Nephron Physiol 2008; 109: pp 61–72.

PCI in-hospital Expected rate of Acute Kidney Injury (all patients) **Description:** The hospital Expected rate of acute kidney injury events for patients with PCI procedures using the NCDR® PCI AKI risk adjustment model.	
Numerator	Cumulative sum of the predicted or expected probability of an acute kidney injury event of all patients during the reported timeframe based on the variables and coefficients in the NCDR risk model (expressed as a decimal).
Denominator	Number of eligible patients who had a PCI
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients currently on dialysis Patients with same day as procedure discharges Patients with either a missing pre or missing post-procedure creatinine value
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Acute kidney injury after PCI is associated with increased morbidity, mortality and costs. All laboratories that use contrast media should have adequate protocols for risk prediction, hydration and prevention of CI-AKI The NCDR™ risk adjustment model analyzes multiple elements to account for patient risk factors that are present prior to PCI.
Relevant Citations	Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2 : 1–138 Vuurmans T, Byrne J, Fretz E, et al. Chronic kidney injury in patients after cardiac catheterization or percutaneous coronary intervention: a comparison of radial and femoral approaches (from the British Columbia Cardiac and Renal Registries). Heart 2010; 96: 1538–1542. McCullough PA. Radiocontrast-induced acute kidney injury. Nephron Physiol 2008; 109: pp 61–72.

PCI in-hospital Observed/Expected rate of Acute Kidney Injury (all patients) **Description:** The PCI in-hospital observed to expected ratio of acute kidney injury events for patients with PCI procedures using the NCDR® PCI AKI risk adjustment model.	
	Ratio of Observed compared to Expected acute kidney injury events for PCI patients
Inclusion Criteria	Data submissions that passed the data quality completeness checks Patient admissions with a PCI procedure performed during admission
Exclusion Criteria	Patients currently on dialysis Patients with same day as procedure discharges Patients with either a missing pre or missing post-procedure creatinine value
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Acute kidney injury after PCI is associated with increased morbidity, mortality and costs. All laboratories that use contrast media should have adequate protocols for risk prediction, hydration and prevention of CI-AKI The NCDR™ risk adjustment model analyzes multiple elements to account for patient risk factors that are present prior to PCI.
Relevant Citations	Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2 : 1–138 Vuurmans T, Byrne J, Fretz E, et al. Chronic kidney injury in patients after cardiac catheterization or percutaneous coronary intervention: a comparison of radial and femoral approaches (from the British Columbia Cardiac and Renal Registries). Heart 2010; 96: 1538–1542. McCullough PA. Radiocontrast-induced acute kidney injury. Nephron Physiol 2008; 109: pp 61–72.

Appropriate Use Criteria for Coronary Revascularization

Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were appropriate **Description:** Proportion of PCI procedures (for patients with ACS) that were evaluated as "appropriate", meaning coronary revascularization is generally acceptable and is a reasonable approach for the indication and is likely to improve the patients' health outcomes or survival.	
Numerator	PCI Procedures evaluated as "appropriate" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were inappropriate **Description:** Proportion of PCI procedures (for patients with ACS) that were evaluated as "Inappropriate", meaning coronary revascularization is not generally acceptable and is not a reasonable approach for the indication and is unlikely to improve the patients' health outcomes or survival.	
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Numerator	PCI Procedures evaluated as "inappropriate" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Patients WITH Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were of uncertain appropriateness **Description:** Proportion of PCI procedures (for patients with ACS) that were evaluated as "Uncertain", meaning 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.	
Numerator	PCI Procedures evaluated as "uncertain" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were appropriate **Description:** Proportion of PCI procedures (for patients without ACS) that were evaluated as "appropriate", meaning coronary revascularization is generally acceptable and is a reasonable approach for the indication and is likely to improve the patients' health outcomes or survival.	
Numerator	PCI Procedures evaluated as "appropriate" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were inappropriate **Description:** Proportion of PCI procedures (for patients without ACS) that were evaluated as "Inappropriate", meaning coronary revascularization is not generally acceptable and is not a reasonable approach for the indication and is unlikely to improve the patients' health outcomes or survival.	
Numerator	PCI Procedures evaluated as "inappropriate" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Patients WITHOUT Acute Coronary Syndrome: Proportion of evaluated PCI procedures that were of uncertain appropriateness **Description:** Proportion of PCI procedures (for patients without ACS) that were evaluated as "Uncertain", meaning 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.	
Numerator	PCI Procedures evaluated as "uncertain" according to AUC 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, your data will not be displayed in this metric.
Time period	Four consecutive quarters
Clinical Rationale/ Recommendation	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)

Proportion of PCI procedures not classifiable for AUC reporting **Description:** Proportion of PCI procedures that were not classifiable / evaluated for PCI AUC reporting due to incomplete or missing data.	
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	Percutaneous coronary intervention (PCI) Appropriate Use Criteria (AUC) metrics give you feedback on self-assessment of the appropriateness of PCI procedures.
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)