American College of Cardiology Foundation (ACCF)
American Heart Association (AHA)
American Medical Association (AMA)-convened
Physician Consortium for Performance Improvement® (PCPI®)

Chronic Stable Coronary Artery Disease
Performance Measurement Set

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* The majority of the introductory content is included as originally drafted in 2011 and may not be up to date.

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Chronic Stable Coronary Artery Disease
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* The composition and affiliations of the work group members are listed as originally convened in 2011 and are not up to date

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Executive Summary: Toward Improving Outcomes For Patients With Chronic Stable Coronary Artery Disease

Purpose of Measurement Set

The American College of Cardiology Foundation (ACCF), American Heart Association (AHA), and the Physician Consortium for Performance Improvement® (PCPI) formed a Chronic Stable Coronary Artery Disease Work Group to identify and define quality measures toward improving outcomes for outpatients with chronic stable coronary artery disease (see diagram at the end of this section). This work represents a formal periodic review and maintenance of an existing measure set and has resulted in significant changes for the majority of the measures included in this set.

Reasons for Prioritizing Improvement in Chronic Stable Coronary Artery Disease

High Impact Topic Area

- 16.3 million Americans are living with coronary heart disease – of that 16.3 million, 54% are men and 46% are women.[1]
- Coronary heart disease makes up more than half of all cardiovascular events in men and women less than 75 years of age.
- The lifetime risk of developing coronary heart disease after age 40 is 49% for men and 32% for women.
- The incidence of coronary heart disease in women lags behind men by 10 years for total coronary heart disease and by 20 years for more serious clinical events such as myocardial infarction and death.
- While death rates have fallen from 1968 to the present, coronary heart disease is the largest killer of men and women in the United States. It has been estimated that approximately 47% of this decrease is attributed to treatments (medical and surgical), while approximately 44% is attributed to changes in risk factors.
- The mortality rate for women age 35 to 44 has increased on average by 1.3% per year between 1997 and 2002.
- In 2007, the estimated direct and indirect cost for coronary heart disease in the United States is $177.5 billion.

Demonstrated Opportunity for Improvement

- According to a study analyzing the quality of care in the US, on average, patients with coronary artery disease received the recommended quality of care 68% of the time.[2]
- A study conducted by Ho, et al. found that nonadherence to cardioprotective medications was prevalent among outpatients with coronary artery disease and was associated with a broad range of adverse outcomes, including all-cause and cardiovascular mortality, cardiovascular hospitalizations, and the need for revascularization procedures.[3]
- Cardiac rehabilitation programs remain underused. In the US, only 10-20% of the 2 million eligible patients per year who experience myocardial infarction or underwent cardiac revascularization procedures participated in cardiac rehabilitation programs.[4]

Rigorous Clinical Evidence Base

Evidence-based clinical practice guidelines are available for the management of chronic stable coronary artery disease. This measurement set is based on guidelines from:

- American College of Cardiology Foundation/American Heart Association
- National Heart, Lung, & Blood Institute
- U.S. Department of Health & Human Services – Public Health Service

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These guidelines meet all of the required elements and many, if not all of the preferred elements outlined in a PCPI position statement[5] establishing a framework for consistent and objective selection of clinical practice guidelines from which PCPI work groups may derive clinical performance measures. The guideline principles with the strongest recommendations and often the highest level of evidence (well-designed randomized-controlled trials) served as a basis for measures in this set.

Chronic Stable Coronary Artery Disease Outcomes

Ideally, a set of performance measures for patients with chronic stable coronary artery disease will include both measures of outcomes as well as measures of processes that are known to positively influence desirable outcomes. Desired outcomes for chronic stable coronary artery disease include:

1. Reduce morbidity and mortality
2. Reduce hospitalizations
3. Reduction in patient harm
4. Reduction in redundant tests and procedures
5. Achievement of patient goals and preferences
6. Eliminate ischemic symptoms
7. Improved patient understanding of/adherence to treatment plan

Setting Targets for Success and Tracking Progress with Outcomes Measures

Several outcome measures with relevance to chronic stable coronary artery disease have been previously developed and are endorsed by the National Quality Forum (NQF), including:

Measure	Developer
Percentage of members with coronary artery disease who have optimally managed modifiable cardiovascular risk factors (LDL cholesterol, blood pressure control, daily aspirin use, documented non-tobacco use) *NQF-endorsed™*	HealthPartners
Percentage of patients with coronary artery disease who have a lipid profile determination at target (less than 100) and measured within the last year	Institute for Clinical Systems Improvement (ICSI)
Percentage of patients with a cardiovascular condition who had a low-density lipoprotein cholesterol (LDL-C) screening performed and percentage of patients who have documented LDL-C less than 100 mg/dL	National Committee for Quality Assurance (NCQA)
Percent of patients discharged with AMI, CABG, PTCA (inpatient or outpatient), or with ischemic vascular disease who have had a full lipid panel in the past year and LDL-C less than 100 on most recent test in past year	Veterans Health Administration (VHA)
Angina without procedure hospital admission rate	Agency for Healthcare Research and Quality (AHRQ)

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Chronic Stable Coronary Artery Disease Work Group Recommendations

Outcome measures: While the aforementioned outcome measures address important outcomes, the Chronic Stable Coronary Artery Disease Work Group recognized a significant gap in measures addressing critical patient-centric outcomes for chronic stable coronary artery disease care – effective management of ischemic symptoms. Additionally, the Work Group felt that management of specific secondary prevention aspects of care also required the creation of outcome measures. As a result, the following measures have been proposed:

Measures addressing patient-centered outcomes
Measure #4: Symptom Management
Measures addressing intermediate outcomes (management of risk factors/co-morbidities)
Measure #1: Blood Pressure Control
Measure #2: Lipid Control

Process measures: Several processes of care, demonstrated to improve outcomes for patients with chronic stable coronary artery disease, are recommended:

Measures addressing underuse of effective services (treatment strategies)
Measure #5: Tobacco Use: Screening and Cessation Intervention
Measure #6: Antiplatelet Therapy
Measure #7: Beta-Blocker Therapy—Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)
Measure #8: ACE Inhibitor or ARB Therapy—Diabetes or Left Ventricular Systolic Dysfunction (LVEF <40%)
Measure #9: Cardiac Rehabilitation Patient Referral from an Outpatient Setting
Measures addressing underuse of patient-centered care strategies
Measure #3: Symptom & Activity Assessment

Paired/Bundled measures: There is one set of paired measures included in the chronic stable coronary artery disease measure set. Paired measures are defined by the NQF as follows[6]: individual measures that should be measured concurrently in the same population; however, the results are not combined into a single score (eg, measuring mortality and readmission and displaying them together—but not calculating a joint score).

Measures addressing underuse of patient-centered care strategies & patient-centered outcomes
Measure #3: Symptom and Activity Assessment
Measure #4: Symptom Management

Please see individual measure documentation for additional information regarding the pairing of these measures.

These clinical performance measures are designed for practitioner and/or system level quality improvement to achieve better outcomes for patients with chronic stable coronary artery disease. Unless otherwise indicated,

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the measures are also appropriate for accountability if the appropriate methodological, statistical, and implementation rules are achieved.

Other Potential Measures
The Work Group considered other several other potential measures, though ultimately determined that they were not appropriate for inclusion in the measure set.

Measure Harmonization
When other measures are available for the same measurement topics, the PCPI attempts to harmonize the measures to the extent feasible.

Measure Specifications
There are several data sources available for collecting performance measures; generally different data sources require different sets of measure specifications, due to the structure of the systems storing the data.

Quality measure technical specifications for administrative data sources are developed with administrative code sets – ICD-9-CM, ICD-10-CM, CPT, for example. A measure intended for administrative data source use or reporting may have significant differences in the specifications due to the nature of the various data sources. In administrative data sources, administrative or billing codes are typically used to identify eligible populations and reported immediately following the provision of care.

Quality measure technical specifications for electronic data sources are developed in alignment with national standards for clinical quality measures. Based on a measure's intended data sources, coding terminology recommendations and tools are used to create specifications to allow for clinical quality measure reporting. In electronic clinical data sources, data can be aggregated over a specific time period and also allow for greater ability to express certain types of data through use of the recommended terminologies for electronic sources.

The Centers for Medicare and Medicaid Services (CMS) developed *A Blueprint for the Measures Management System*, which provides guidance related to the development, implementation, and maintenance of clinical quality measures. Specific to eCQMs, this resource includes the recommended vocabularies used to develop the value sets used in the measures. The Blueprint can be found at the following webpage: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/MeasuresManagementSystemBlueprint.html

When expressing clinical concepts found within a measure, specifically for those electronically specified, the Value Set Authority Center (VSAC) is used as a repository for the value sets. The VSAC serves as a repository for value sets in various stages of development, from draft to published, and allows for maintenance of value sets as updates are made to terminologies. It also allows measure developers to search for value sets currently in the VSAC and stewarded by another organization which could potentially be reused in a measure, as an effort

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towards harmonization with existing value sets so as not to duplicate value sets already in use with the same or similar clinical concepts. The VSAC can be accessed at the following webpage: https://vsac.nlm.nih.gov/

The Quality Data Model (QDM) is a framework used to categorize clinical concepts used in quality measures, as well as the relationships among them for electronic specification. The QDM allows for an Health Quality Measures Format (HQMF) rendering of logic using the Measure Authoring Tool (MAT) to express complex measure logic, and subsequently export measures in several formats, currently including a human-readable document, which can be viewed in a web browser, and the XML.
Links to these tools are found below:
QDM: https://ecqi.healthit.gov/qdm
MAT: https://www.emeasuretool.cms.gov/

CMS and the Office of the National Coordinator for Health IT (ONC) host a website, the Electronic Clinical Quality Information Resource Center (eCQI Resource Center), which is designed to serve as a one-stop shop for all resources related to eCQM development.
The eCQI Resource Center can be accessed at: https://ecqi.healthit.gov/ecqm

Measure Testing

The AMA-convened PCPI collaborated on several measure testing projects in 2004, 2009 and 2015.

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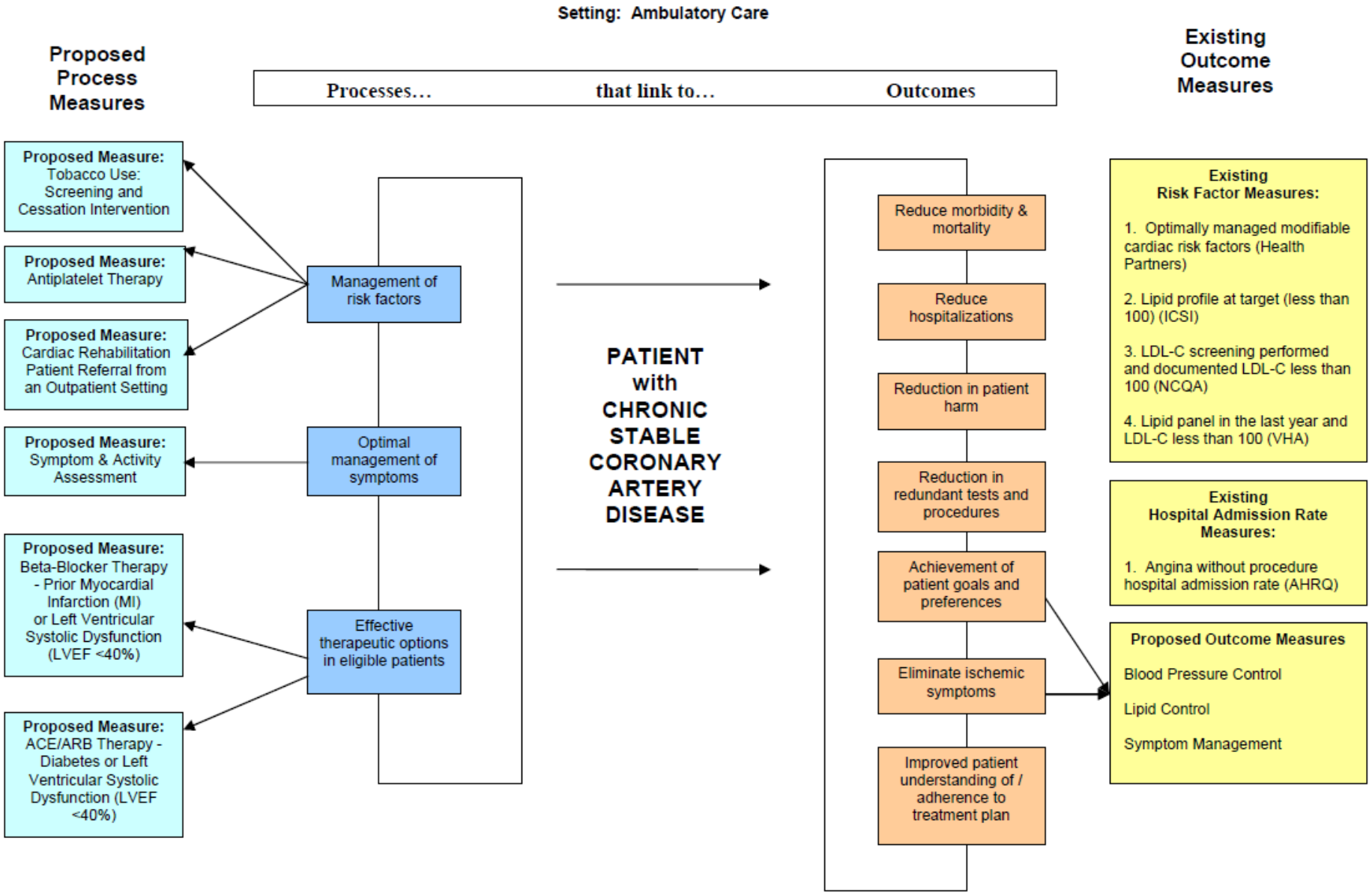
Link to Outcomes:



Measures to be considered and selected for applicability to defined episodes of care.

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Purpose of Measurement Set:

The American College of Cardiology Foundation (ACCF), American Heart Association (AHA), and the Physician Consortium for Performance Improvement® (PCPI) formed a Chronic Stable Coronary Artery Disease Work Group to identify and define quality measures toward improving outcomes for outpatients with chronic stable coronary artery disease. The Work Group aimed to develop a comprehensive set of measures that support the efficient delivery of high quality health care in each of the Institute of Medicine's (IOM) six domains for quality improvement (safe, effective, patient centered, timely, efficient, and equitable).

This work represents a formal periodic review and maintenance of an existing measurement set. The PCPI stipulates a regular review of measures (every 3-4 years) or when there is a major change in scientific evidence, results from testing, or other issues noted that materially affect the integrity of the measure. In 2003, the ACC, AHA, and PCPI developed the first set of measures for patients with chronic stable coronary artery disease receiving care in the outpatient setting. These measures were later updated in 2005 to incorporate new scientific evidence included in a guideline update regarding appropriate pharmacologic therapies for patients with chronic stable coronary artery disease. Many of these measures received endorsement from the National Quality Forum, have been tested in a variety of implementation and demonstration projects, and are in use at the national level.

The current measure development project aimed to review and update these existing outpatient chronic stable coronary artery disease measures to ensure they reflect the latest guideline recommendation, address areas in most need of performance improvement, and incorporate results from testing projects. The Work Group also looked to the development of new measures with particular attention to exploring the development of outcome, group or system-level, overuse measures, and composite or bundled measures. The resulting measurement set includes measures that focus on the management of risk factors, effective therapeutic options in eligible patients, and accurate and appropriate evaluation of symptoms to guide treatment.

Importance of Topic

Prevalence and Incidence

- 16.3 million Americans are living with coronary heart disease. Total coronary heart disease prevalence is 7.0% in adults aged 20 years and older in the United States. Prevalence of coronary heart disease for men is 8.3% and for women is 6.1%.

- Coronary heart disease makes up more than half of all cardiovascular events in men and women less than 75 years of age.

- The lifetime risk of developing coronary heart disease after age 40 is 49% for men and 32% for women.

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- The incidence of coronary heart disease in women lags behind men by 10 years for total coronary heart disease and by 20 years for more serious clinical events such as myocardial infarction and sudden death.

Mortality

- While death rates have fallen from 1968 to the present, coronary heart disease is the largest killer of men and women in the United States. It has been estimated that approximately 47% of this decrease is attributed to treatments (medical and surgical), while approximately 44% is attributed to changes in risk factors.
- Coronary heart disease caused approximately 1 of every 6 deaths in the United States in 2007.
- Approximately 81% of people who die of coronary heart disease are ≥65 years of age.
- The mortality rate for women age 35 to 44 increased on average by 1.3% per year between 1997 and 2002.
- Since 1984, the number of deaths for women has exceeded those for men; in 2005, women represented 52.6% of deaths from coronary heart disease.
- People who have had a myocardial infarction have a sudden death rate 4 to 6 times that of the general population.

Office Visits

- 2008 data found that the number of ambulatory care visits for coronary heart disease was 16,251,000. The majority of these visits (62.2%) were for coronary atherosclerosis.

Cost

- In 2007, the estimated direct and indirect cost for coronary heart disease in the United States is $177.5 billion.
- In 2006, coronary artery disease was the most expensive condition treated in US hospitals at a cost of $52.6 billion[7] and accounted for 5% of total hospitalization costs.[8]
- Thirty percent of Medicare's total expenditures are applied to cardiovascular disease.[9]
- In 2007, $5.2 billion was spent on outpatient visits related to chronic ischemic heart disease.[10]

Opportunity for Improvement:

According to a study analyzing the quality of care in the US, on average, patients with coronary artery disease received the recommended quality of care 68% of the time. Quality of care was assessed by analysis of clinician performance on thirty seven coronary artery disease quality indicators. Quality of care varied significantly by indicator with average rates of adherence ranging from 29.13% for

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counseling for smoking cessation at the time of coronary artery disease diagnosis to 100% for LVEF assessment of patients hospitalized with myocardial infarction (MI) either during hospitalization or within two weeks of hospital discharge.

A study conducted by Ho, et al. found that nonadherence to cardioprotective medications was prevalent among outpatients with coronary artery disease and was associated with a broad range of adverse outcomes, including all-cause and cardiovascular mortality, cardiovascular hospitalizations, and the need for revascularization procedures. Although there have been improvements in the prescription rates of secondary prevention medications for coronary artery disease patients, a gap persists between the benefits demonstrated with these medications in clinical trials and the effectiveness observed in clinical practice. One potential explanation for this discrepancy is suboptimal adherence to secondary prevention medications in practice compared with clinical trials, where adherence is often closely monitored.

- Over a median follow up of 4.1 years, medication nonadherence to statins, ACE inhibitors, and beta-blockers was common, occurring in approximately 1 in 4 patients.
- Among patients dispensed beta-blockers (n = 11,865), 28.8% were nonadherent.
- For patients dispensed ACE inhibitors or angiotensin-receptor blockers (n = 10,021), 21.6% were nonadherent.
- For patients taking statin medications (n = 13,596), 26.0% were nonadherent.

In another study conducted by Rabus and colleagues, 73 patients who were diagnosed to have coronary artery disease were followed up for 5 years. They concluded there was sub-optimal prescribing of secondary prevention drugs and absence of continuity of prescribing these secondary prevention drugs in the pharmaceutical care of coronary artery disease patients.

- The 'initial prescribing rate' at discharge was found to be 82% for aspirin, 49% for statins, 44% for ACE inhibitors and 55% for beta-blockers.
- 'Continuity of prescribing' for 5 years was 45% for aspirin, 26% for statins, 17% for ACE inhibitors and 20% for beta-blockers.[11]

Cardiac rehabilitation programs remain underused. In the US, only 10-20% of the 2 million eligible patients per year who experience myocardial infarction or underwent cardiac revascularization procedures participated in cardiac rehabilitation programs.

Clinical Evidence Base

Clinical practice guidelines serve as the foundation for the development of performance measures. Relevant guidelines from ACCF and AHA for the management of chronic stable coronary artery disease, published in 2002[12] (with a focused updated in 2007[13]), were reviewed during the development and maintenance process. Additional guidelines from the National Heart, Lung, and Blood Institute[14,15] and the United States Public Health Service[16] were also reviewed and used.

Relevant guidelines met all of the required elements and many, if not all, of the preferred elements outlined in a PCPI position statement establishing a framework for consistent and objective selection of clinical practice guidelines from which PCPI Work Groups may derive clinical performance measures.

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Performance measures, however, are not clinical practice guidelines and cannot capture the full spectrum of care for all patients with chronic stable coronary artery disease. The guideline principles with the strongest recommendations and often the highest level of evidence (well-designed randomized-controlled trials) served as the basis for measures in this set.

Chronic Stable Coronary Artery Disease Outcomes

Ideally, a set of performance measures for patients with chronic stable coronary artery disease will include both measures of outcomes as well as measures of processes that are known to positively influence desirable outcomes. Desired outcomes for chronic stable coronary artery disease include:

1. Reduce morbidity and mortality
2. Reduce hospitalizations
3. Reduction in patient harm
4. Reduction in redundant tests and procedures
5. Achievement of patient goals and preferences
6. Eliminate ischemic symptoms
7. Improved patient understanding of/adherence to treatment plan

Setting Targets for Success and Tracking Progress with Outcomes Measures

Several outcome measures with relevance to chronic stable coronary artery disease have been previously developed and are endorsed by the National Quality Forum (NQF), including:

Measure	Developer
Percentage of members with coronary artery disease who have optimally managed modifiable cardiovascular risk factors (LDL cholesterol, blood pressure control, daily aspirin use, documented non-tobacco use) *NQF-endorsed™*	HealthPartners
Percentage of patients with coronary artery disease who have a lipid profile determination at target (less than 100) and measured within the last year	Institute for Clinical Systems Improvement (ICSI)
Percentage of patients with a cardiovascular condition who had a low-density lipoprotein cholesterol (LDL-C) screening performed and percentage of patients who have documented LDL-C less than 100 mg/dL	National Committee for Quality Assurance (NCQA)
Percent of patients discharged with AMI, CABG, PTCA (inpatient or outpatient), or with ischemic vascular disease who have had a full lipid panel in the past year and LDL-C less than 100 on most recent test in past year	Veterans Health Administration (VHA)
Angina without procedure hospital admission rate	Agency for Healthcare Research and Quality (AHRQ)

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Intended Audience, Care Setting, and Patient Population

The PCPI encourages use of these measures by physicians, other health professionals, and healthcare systems, where appropriate, to manage the care for patients aged 18 years and older with chronic stable coronary artery disease.

Chronic Stable Coronary Artery Disease Work Group Recommendations

The measurement set includes measures that focus on the management of risk factors, effective therapeutic options in eligible patients, and accurate and appropriate evaluation of symptoms to guide treatment.

The Chronic Stable Coronary Artery Disease Work Group identified several desired outcomes for patients with chronic stable coronary artery disease (see "Link to Outcomes" diagram in preceding section). Current quality gaps in chronic stable coronary artery disease care emphasize the need to improve the use of therapies and interventions that have been demonstrated to improve chronic stable coronary artery disease outcomes. As a result, many of the measures in the chronic stable coronary artery disease set focus on the provision of effectiveness of care. The measure set also includes a measure pair that assesses an important patient-centered outcome—assessment and management of anginal symptoms.

These clinical performance measures are designed for practitioner and/or system level quality improvement to achieve better outcomes for patients with chronic stable coronary artery disease. Unless otherwise indicated, the measures are also appropriate for accountability if the appropriate methodological, statistical, and implementation rules are achieved.

The measures listed below may be used for quality improvement and accountability. Measures that are new to the 2011 chronic stable coronary artery disease measure set are identified with an asterisk:

Measures addressing patient-centered outcomes
Measure #4: Symptom Management*
Measures addressing intermediate outcomes (management of risk factors/co-morbidities)
Measure #1: Blood Pressure Control
Measure #2: Lipid Control
Measures addressing underuse of effective services (treatment strategies)
Measure #5: Tobacco Use: Screening and Cessation Intervention
Measure #6: Antiplatelet Therapy
Measure #7: Beta-Blocker Therapy—Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)
Measure #8: ACE Inhibitor or ARB Therapy—Diabetes or Left Ventricular Systolic Dysfunction (LVEF <40%)
Measure #9: Cardiac Rehabilitation Patient Referral from an Outpatient Setting*
Measures addressing underuse of patient-centered care strategies
Measure #3: Symptom & Activity Assessment

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These measures support the efficient delivery of high quality health care in each of the Institute of Medicine's (IOM) six aims for quality improvement as described in the following table:

IOM Domains of Health Care Quality		Safe	Effective		Patient-centered	Timely	Efficient	Equitable
			Underuse	Overuse				
Draft Measures								
1	Blood Pressure Control		√					√
2	Lipid Control		√					√
3	Symptom & Activity Assessment				√			√
4	Symptom Management				√			√
5	Tobacco Use: Screening and Cessation Intervention		√					√
6	Antiplatelet Therapy		√					√
7	Beta-Blocker Therapy—Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)		√					√
8	ACE Inhibitor or ARB Therapy—Diabetes or Left Ventricular Systolic Dysfunction (LVEF <40%)		√					√
9	Cardiac Rehabilitation Patient Referral from an Outpatient Setting		√					√

Retired Measures

During the Work Group's review of the existing measures, one measure was recommended for retirement. A number of circumstances might warrant the retirement of a measure from a measure set including, but not limited to, that the measure no longer remains clinically relevant/appropriate as determined by current guidelines and scientific evidence, high clinician performance implying that the measure no longer represents an opportunity for quality improvement, testing results demonstrating poor feasibility of data collection or weak correlation with improved health outcomes, and identification of significant unintended consequences of measurement. The rationale for retiring the measure from the previous chronic stable coronary artery disease set is provided below.

Retired ACC/AHA/AMA PCPI Measure	Rationale
Screening for Diabetes	While screening for diabetes in the chronic stable coronary artery disease patient population is important, the measure was

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	found to be difficult to implement due to the challenges of being able to follow a patient over time, and therefore was not widely used. Current diabetes screening recommendations call for repeat screening every three years for patients who screen negative for diabetes. In the given landscape of providing patient care, the ability to follow patients over time to ensure repeated screening every three years proves difficult. The Work Group will re-visit this issue as the adoption of fully functional EHRs becomes more widespread, as it is thought with reliable access to EHR data, this measure could be easier to implement.

Other Potential Measures

The Work Group considered several other potential measures, though ultimately determined that they were not appropriate for inclusion in the measurement set.

While each performance measure is intended to support quality improvement in one or more of the IOM domains (safe, effective, patient centered, timely, efficient, and equitable), the development of measures specifically designed to eliminate overuse of ineffective care and promote efficiency proved more challenging. The Work Group identified a few areas of potential overuse and considered one measure in particular to address the perceived overuse of stress testing in chronic stable coronary artery disease patients. The draft measure intended to assess the number of patients who had no documentation of acute myocardial infarction, unstable angina, or referral to cardiac rehabilitation who received 2 or more stress tests within a 12 month period. Although data indicate that utilization and spending for cardiovascular testing has increased in recent years, an analysis of the 5% standard analytic file of physician claims (5% sample of Medicare beneficiaries) found little evidence supporting the overuse of stress testing in the outpatient setting (see Appendix 1). Data indicated that only 1.4% of Medicare beneficiaries receiving stress tests in the outpatient setting had 2 or more stress tests; hence, at the aggregated patient level, the draft measure was met for 98.6% of patients. Upon review of this data, the Work Group determined that the measure was not appropriate for inclusion in the set given the minimal opportunity for improvement.

Additionally, the Work Group reviewed all measures in the set to determine if a composite measure for chronic stable coronary artery disease could be developed. As articulated in a recent position paper from the ACCF/AHA, any composite measure (and its component measures) needs to undergo empirical testing for validity and reliability before being put forward for implementation.[17] Given that testing data is currently unavailable for any preliminary composite measure and subsequently for any of the new measures of which it may be comprised, it seemed premature to think about developing a chronic stable coronary artery disease composite measure for accountability. Furthermore, any composite measure should add value beyond the individual measures of which it is comprised. Further research would be needed to determine the performance of any proposed composite measure and its value in improving the quality of care for chronic stable coronary artery disease patients.

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Measure Harmonization

When other measures are available for the same measurement topics, the PCPI attempts to harmonize the measures to the extent feasible.

Please see individual measure documentation for additional information regarding measure harmonization.

Measure Specifications

There are several data sources available for collecting performance measures; generally different data sources require different sets of measure specifications, due to the structure of the systems storing the data.

Quality measure technical specifications for administrative data sources are developed with administrative code sets – ICD-9-CM, ICD-10-CM, CPT, for example. A measure intended for administrative data source use or reporting may have significant differences in the specifications due to the nature of the various data sources. In administrative data sources, administrative or billing codes are typically used to identify eligible populations and reported immediately following the provision of care.

Quality measure technical specifications for electronic data sources are developed in alignment with national standards for clinical quality measures. Based on a measure's intended data sources, coding terminology recommendations and tools are used to create specifications to allow for clinical quality measure reporting. In electronic clinical data sources, data can be aggregated over a specific time period and also allow for greater ability to express certain types of data through use of the recommended terminologies for electronic sources.

The Centers for Medicare and Medicaid Services (CMS) developed *A Blueprint for the Measures Management System*, which provides guidance related to the development, implementation, and maintenance of clinical quality measures. Specific to eCQMs, this resource includes the recommended vocabularies used to develop the value sets used in the measures. The Blueprint can be found at the following webpage: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/MeasuresManagementSystemBlueprint.html

When expressing clinical concepts found within a measure, specifically for those electronically specified, the Value Set Authority Center (VSAC) is used as a repository for the value sets. The VSAC serves as a repository for value sets in various stages of development, from draft to published, and allows for maintenance of value sets as updates are made to terminologies. It also allows measure developers to search for value sets currently in the VSAC and stewarded by another organization which could potentially be reused in a measure, as an effort towards harmonization with existing value sets so as not to duplicate value sets already in use with the same or similar clinical concepts. The VSAC can be accessed at the following webpage: https://vsac.nlm.nih.gov/

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The Quality Data Model (QDM) is a framework used to categorize clinical concepts used in quality measures, as well as the relationships among them for electronic specification. The QDM allows for an Health Quality Measures Format (HQMF) rendering of logic using the Measure Authoring Tool (MAT) to express complex measure logic, and subsequently export measures in several formats, currently including a human-readable document, which can be viewed in a web browser, and the XML.
Links to these tools are found below:
QDM: https://ecqi.healthit.gov/qdm
MAT: https://www.emeasuretool.cms.gov/

CMS and the Office of the National Coordinator for Health IT (ONC) host a website, the Electronic Clinical Quality Information Resource Center (eCQI Resource Center), which is designed to serve as a one-stop shop for all resources related to eCQM development.
The eCQI Resource Center can be accessed at: https://ecqi.healthit.gov/ecqm

Measure Exclusions and Exceptions

Measure Exclusions
The PCPI distinguishes between measure exceptions and measure exclusions. Exclusions arise when the intervention required by the numerator is not appropriate for a group of patients who are otherwise included in the initial patient or eligible population of a measure (ie, the denominator). Exclusions are absolute and are to be removed from the denominator of a measure and therefore clinical judgment does not enter the decision.

Measure Exceptions
Exceptions are used to remove a patient from the denominator of a performance measure when the patient does not receive a therapy or service AND that therapy or service would not be appropriate due to patient-specific reasons. The patient would otherwise meet the denominator criteria. Exceptions are not absolute, and are based on clinical judgment, individual patient characteristics, or patient preferences.

For ***process measures***, the PCPI provides three categories of exception reasons for which a patient may be removed from the denominator of an individual measure.

- **Medical reasons**
  Includes:
  - not indicated (absence of organ/limb, already received/performed, other)
  - contraindicated (patient allergic history, potential adverse drug interaction, other)

- **Patient reasons**
  Includes:
  - patient declined
  - social or religious reasons
  - other patient reasons

- **System reasons**
  Includes:

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- resources to perform the services not available
- insurance coverage/payor-related limitations
- other reasons attributable to health care delivery system

These measure exception categories are not available uniformly across all measures; for each measure, there must be a clear rationale to permit an exception for a medical, patient, or system reason. For some measures, examples have been provided in the measure exception language of instances that would constitute an exception. Examples are intended to guide clinicians and are not all-inclusive lists of all possible reasons why a patient could be excluded from a measure. There are different approaches for reporting measure exceptions, depending on whether the measure is being reported from an electronic clinical data source or an administrative data source.

Electronic Clinical Data Sources:
Value sets are included in the electronic clinical data source specifications for Medical Reason, Patient Reason and System Reason. These have been specified in SNOMED-CT and include a broad list of reasons that pertain to each type of exception and cover various situations. The contents of these value sets are broad, and facilitate re-use of the Medical, Patient, and System Reason value sets across measurement sets.

Administrative Data Sources
Exceptions reported from administrative data sources can be reported using a Quality Data Code (QDC), which may be a CPT Category II code or a G-code.

Where CPT Category II codes are used, the exception of a patient may be reported by appending the appropriate modifier to the CPT Category II code designated for the measure:

- **Medical reasons**: modifier 1P
- **Patient reasons**: modifier 2P
- **System reasons**: modifier 3P

Although this methodology does not require the external reporting of more detailed exception data, the PCPI recommends that physicians document the *specific* reasons for exception in patients' medical records for purposes of optimal patient management and audit-readiness. The PCPI also advocates the systematic review and analysis of each physician's exceptions data to identify practice patterns and opportunities for quality improvement. For example, it is possible for implementers to calculate the percentage of patients that physicians have identified as meeting the criteria for exception.

Please refer to documentation for each individual measure for information on the acceptable exception categories and the codes and modifiers to be used for reporting.

Measure Testing

The AMA-convened PCPI collaborated on several measure testing projects in 2004, 2009 and 2015 to ensure the Coronary Artery Disease – Beta Blocker Therapy Prior to Myocardial Infarction (MI) or LVSD measure is reliable and evaluated for accuracy of the measure denominator, numerator and exception

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case identification. The testing projects were conducted utilizing electronic health record data and registry data. Parallel forms reliability and signal-to-noise reliability was tested.

One site participated in the parallel forms testing of the Coronary Artery Disease – Beta Blocker Therapy Prior to MI or LVSD measure. Site A was an academic general internal medicine clinic with several years of experience using a commercial EHR. The clinic employs 40 full or part-time internal medicine physicians and provides more than 41,000 patient visits annually.

Signal-to-noise reliability was assessed using 2013 data acquired from the Centers for Medicare & Medicaid Services Physician Quality Reporting System Group Practice Reporting Option (GPRO) database.

Measures Tested

- Coronary Artery Disease – Beta Blocker Therapy Prior to MI or LVSD

Reliability Testing

The purpose of reliability testing was to evaluate whether the measure definitions and specifications, as prepared by the PCPI, yield stable, consistent measures. Data abstracted from electronic health records were used to calculate parallel forms reliability for the measures and data acquired from the GPRO database were used to perform signal-to-noise reliability for the measures.

Reliability Testing Results

Coronary Artery Disease – Beta Blocker Therapy Prior to MI or LVSD

Parallel Forms Reliability Testing (Site A)

There were 134 observations from Site A included as part of the analysis. Of the 134 patients sampled via automated EHR review, 111 patients (82.8%) meeting the numerator criteria were detected. Performance on the measure was calculated to be 90.3% through comparison of automated and manual EHR review.

Discrepancies between performance measures based on EHR automated review alone and those based on automated review plus manual reviews were due to two types of misclassification: failure to correctly identify performance of quality measures among true, eligible patients; and failure to correctly exclude patients. Upon further analysis, the differences between automated review alone and automated plus manual reviews were 10 patients (7.5%).

Signal-to-Noise Reliability Testing

GPRO Registry

For this measure, the reliability at the minimum level of quality reporting events (10) was 0.65. The average number of quality reporting events for physicians included is 61.0. The reliability at the average number of quality reporting events was 0.92.

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This measure has moderate reliability when evaluated at the minimum level of quality reporting events and high reliability at the average number of quality events.

Measures #1 - #6 have been removed from this document

Chronic Stable Coronary Artery Disease

Measure # 1: Blood Pressure Control
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 2: Lipid Control
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 3: Symptom & Activity Assessment
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 4: Symptom Management
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 5: Tobacco Use: Screening and Cessation Intervention
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 6: Antiplatelet Therapy
This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

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Chronic Stable Coronary Artery Disease

Measure #7: Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)

Measure Description

Percentage of patients aged 18 years and older with a diagnosis of coronary artery disease seen within a 12 month period who also have a prior MI or a current or prior LVEF <40% who were prescribed beta-blocker therapy

Measure Components

Numerator Statement	Patients who were prescribed* beta-blocker therapy** *Prescribed may include prescription given to the patient for beta-blocker therapy at one or more visits in the measurement period OR patient already taking beta-blocker therapy as documented in current medication list. **Beta-blocker therapy: - For patients with prior MI, beta-blocker therapy includes any agent within the beta-blocker drug class. As of 2015, no recommendations or evidence are cited in current stable ischemic heart disease guidelines for preferential use of specific agents - For patients with prior LVEF <40%, beta-blocker therapy includes the following: bisoprolol, carvedilol, or sustained release metoprolol succinate
Denominator Statement	All patients aged 18 years and older with a diagnosis of coronary artery disease seen within a 12 month period who also have prior (within the past 3 years) MI or a current or prior LVEF <40% Prior Myocardial Infarction (MI) is limited to those occurring within the past 3 years.
Denominator Exclusions	None
Denominator Exceptions	Documentation of medical reason(s) for not prescribing beta-blocker therapy (eg, allergy, intolerance, other medical reasons) Documentation of patient reason(s) for not prescribing beta-blocker therapy (eg, patient declined, other patient reasons) Documentation of system reason(s) for not prescribing beta-blocker therapy (eg, other reasons attributable to the health care system)
Supporting Guidelines	The following clinical recommendation statements are quoted verbatim from the referenced clinical guidelines and represent the evidence base for the measure: Beta-blocker therapy should be started and continued for 3 years in all patients

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	with normal LV function after MI or ACS. (Class I, Level of Evidence: B) (ACCF/AHA/ACP/AATS/PCNA/SCAI/STS, 2012)[18] Beta-blocker therapy should be used in all patients with LV systolic dysfunction (EF ≤ 40%) with heart failure or prior MI, unless contraindicated. (Use should be limited to carvedilol, metoprolol succinate, or bisoprolol, which have been shown to reduce risk of death.) (Class I, Level of Evidence: A) (ACCF/AHA/ACP/AATS/PCNA/SCAI/STS, 2012)

Measure Importance

Relationship to desired outcome	For patients with coronary artery disease (CAD), beta-blockers are recommended for 3 years after myocardial infarction or acute coronary syndrome. Beta-blockers, particularly carvedilol, metoprolol succinate, or bisoprolol which have been shown to reduce risk of death, are recommended indefinitely for patients with CAD and LV systolic dysfunction. These agents have proven efficacy in reducing angina onset and improving the ischemic threshold during exercise. In patients who have suffered an MI, beta-blockers significantly reduce deaths and recurrent MIs.[18] Nonadherence to cardioprotective medications is prevalent among outpatients with CAD and can be associated with a broad range of adverse outcomes, including all-cause and cardiovascular mortality, cardiovascular hospitalizations, and the need for revascularization procedures. This measure is intended to promote beta-blocker usage in select patients with CAD.
Opportunity for Improvement	Suboptimal rates of beta-blocker prescriptions among patients with CAD are evidenced by several recent studies. Maddox and colleagues analyzed data from 2008 through 2010 from the NCDR® PINNACLE Registry®, a national outpatient cardiology practice registry, to assess practice variation of secondary prevention medication prescription among CAD patients. Among eligible patients, beta-blockers were prescribed in 73.3% (63,800/86,999) at their index clinic visit. After inclusion of all visits among eligible patients occurring within the year following the index visit, the rates increased to 77.3%. Among practices, the median prescription rate of beta-blockers for eligible patients at their index clinic visit was 78.4% (range 35.2-100%) and 79.4% (range 46.2-100%) after inclusion of all visits among eligible patients occurring within the year following the index visit.[19] An earlier study by Chan and colleagues analyzed 2008-9 data from the Pinnacle registry and found slightly higher rates (86.4%) of beta-blocker prescription among CAD patients following an MI.[20]

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	It's important to note that the Chan et al. study examined compliance rates with performance measures among the first 14,000 outpatients enrolled in the PINNACE program as compared to the Maddox et al study which included a larger and more heterogeneous patient and practice population.

Measure Designation

Measure purpose	Accountability Quality Improvement
Type of measure	Process
Level of Measurement	Clinician: Individual Clinician: Group/Practice
Care setting	Ambulatory Care: Clinician Office/Clinic, Home Health, Domiciliary Post Acute/Long Term Care Facility: Long Term Acute Care Hospital, Post Acute/Long Term Care Facility: Nursing Home/Skilled Nursing Facility
Data source	Electronic health record Registry

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Measures #8 - #9 have been removed from this document

Chronic Stable Coronary Artery Disease

Measure # 8: ACE Inhibitor or ARB Therapy—Diabetes or Left Ventricular Systolic Dysfunction (LVEF <40%)

This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

Measure # 9: Cardiac Rehabilitation Patient Referral from an Outpatient Setting

This measure is no longer stewarded by the AMA-PCPI. It has been removed from this document.

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Evidence Classification and Rating Schemes

ACC/AHA Classification of Recommendations and Levels of Evidence

Classification of Recommendations

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is beneficial, useful, and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy.

Class IIb: Usefulness/efficacy is less well established by evidence/opinion.

Class III: Conditions for which there is evidence and/or general agreement that a procedure/treatment is not useful/effective and in some cases may be harmful.

Level of Evidence

Level of Evidence A: Data derived from multiple randomized clinical trials or meta-analyses.

Level of Evidence B: Data derived from a single randomized trial, or nonrandomized studies.

Level of Evidence C: Only consensus opinion of experts, case studies, or standard-of-care.

U.S Department of Health and Human Services/Public Health Service Strength of Evidence Ratings

- A – Multiple well-designed randomized clinical trials, directly relevant to the recommendation, yielded a consistent pattern of findings.
- B – Some evidence from randomized clinical trials supported the recommendation, but the scientific support was not optimal. For instance, few randomized trials existed, the trials that did exist were somewhat inconsistent, or the trials were not directly relevant to the recommendation.
- C – Reserved for important clinical situations where the panel achieved consensus on the recommendation in the absence of relevant randomized controlled trials.

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Physician Consortium for Performance Improvement® (PCPI®)

APPENDIX A

Chronic Stable Coronary Artery Disease Performance Measurement Specifications

Specifications Reviewed and Updated: April, 2016

Physician Performance Measures (Measures) and related data specifications have been developed by the American Medical Association (AMA)-convened Physician Consortium for Performance Improvement® (PCPI®). These Measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications.

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Chronic Stable Coronary Artery Disease

Measure #7: Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)

A. Specifications for Administrative Data Sources

Denominator (Eligible Population)	All patients aged 18 years and older with a diagnosis of coronary artery disease seen within a 12 month period who also have prior (within the past 3 years) MI or a current or prior LVEF <40% Denominator Definition: Prior Myocardial Infarction (MI) is limited to those occurring within the past 3 years. Denominator, Reporting Criteria 1 Age >= 18 years **AND** Diagnosis for coronary artery disease (ICD-9-CM) [reportable through 9/30/2015]**:** 411.0, 411.1, 411.81, 411.89, 413.0, 413.1, 413.9, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.2, 414.3, 414.8, 414.9, V45.81, V45.82 Diagnosis for coronary artery disease (ICD-10-CM) [reportable beginning 10/1/2015]**:** I20.0, I20.1, I20.8, I20.9, I24.0, I24.1, I24.8, I24.9, I25.10, I25.110, I25.111, I25.118, I25.119, I25.5, I25.6, I25.700, I25.701, I25.708, I25.709, I25.710, I25.711, I25.718, I25.719, I25.720, I25.721, I25.728, I25.729, I25.730, I25.731, I25.738, I25.739, I25.750, I25.751, I25.758, I25.759, I25.760, I25.761, I25.768, I25.769, I25.790, I25.791, I25.798, I25.799, I25.810, I25.811, I25.812, I25.82, I25.83, I25.89, I25.9, Z95.1, Z95.5, Z98.61 **OR** History of cardiac surgery (CPT): 33140, 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536, 92920, 92924, 92928, 92933, 92937, 92941, 92943 **AND** CPT® Code for Encounter: 99201, 99202, 99203, 99204, 99205, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99304, 99305, 99306, 99307, 99308, 99309, 99310, 99324, 99325, 99326, 99327, 99328, 99334, 99335, 99336, 99337, 99341, 99342, 99343, 99344, 99345, 99347, 99348, 99349, 99350 **AND** Report Quality Data Code: G8694: Left ventricular ejection fraction (LVEF) < 40% Denominator, Reporting Criteria 2 Age >= 18 years **AND** Diagnosis for coronary artery disease (ICD-9-CM) [reportable through 9/30/2015]**:** 411.0, 411.1, 411.81, 411.89, 413.0, 413.1, 413.9, 414.00,

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	414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.2, 414.3, 414.8, 414.9, V45.81, V45.82 Diagnosis for coronary artery disease (ICD-10-CM) [reportable beginning 10/1/2015]**:** I20.0, I20.1, I20.8, I20.9, I24.0, I24.1, I24.8, I24.9, I25.10, I25.110, I25.111, I25.118, I25.119, I25.5, I25.6, I25.700, I25.701, I25.708, I25.709, I25.710, I25.711, I25.718, I25.719, I25.720, I25.721, I25.728, I25.729, I25.730, I25.731, I25.738, I25.739, I25.750, I25.751, I25.758, I25.759, I25.760, I25.761, I25.768, I25.769, I25.790, I25.791, I25.798, I25.799, I25.810, I25.811, I25.812, I25.82, I25.83, I25.89, I25.9, Z95.1, Z95.5, Z98.61 **OR** History of cardiac surgery (CPT): 33140, 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536, 92920, 92924, 92928, 92933, 92937, 92941, 92943 **AND** CPT® Code for Encounter: 99201, 99202, 99203, 99204, 99205, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99304, 99305, 99306, 99307, 99308, 99309, 99310, 99324, 99325, 99326, 99327, 99328, 99334, 99335, 99336, 99337, 99341, 99342, 99343, 99344, 99345, 99347, 99348, 99349, 99350 **AND** Diagnosis for myocardial infarction– includes patient that had a prior (within the past 3 years) myocardial infarction (ICD-9-CM) [reportable through 9/30/2015]: 410.00, 410.01, 410.02, 410.10, 410.11, 410.12, 410.20, 410.21, 410.22, 410.30, 410.31, 410.32, 410.40, 410.41, 410.42, 410.50, 410.51, 410.52, 410.60, 410.61, 410.62, 410.70, 410.71, 410.72, 410.80, 410.81, 410.82, 410.90, 410.91, 410.92, 412 Diagnosis for myocardial infarction– includes patient that had a prior (within the past 3 years) myocardial infarction (ICD-10-CM) [reportable beginning 10/1/2015]**:** I21.01, I21.02, I21.09, I21.11, I21.19, I21.21, I21.29, I21.3, I21.4, I22.0, I22.1, I22.2, I22.8, I22.9, I24.1, I25.2
Denominator Exclusions	None
Numerator	Patients who were prescribed beta-blocker therapy <u>Numerator Definition</u>: Prescribed may include prescription given to the patient for beta-blocker therapy at one or more visits in the measurement period OR patient already taking beta-blocker therapy as documented in current medication list. <u>Numerator Note:</u> Beta-blocker therapy: - For patients with prior MI, beta-blocker therapy includes any agent within the beta-blocker drug class. As of 2015, no recommendations or evidence are cited in current stable ischemic heart disease guidelines for preferential use of specific agents - For patients with prior LVEF <40%, beta-blocker therapy includes the following: bisoprolol, carvedilol, or sustained release metoprolol succinate

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	Numerator, Reporting Criteria 1: For patients who qualified for Denominator inclusion with LVEF < 40% (patients where G8694 was reported in the Denominator) and were prescribed beta-blocker therapy **Report Quality Data Code:** G9189: Beta-blocker therapy prescribed or currently being taken Numerator, Reporting Criteria 2: For patients who qualified for Denominator inclusion with an MI (patients where an MI diagnosis code was reported in the Denominator) were prescribed beta-blocker therapy **Report Quality Data Code:** 4008F: Beta-blocker therapy prescribed or currently being taken
Denominator Exceptions	Documentation of medical reason(s) for not prescribing beta-blocker therapy (eg, allergy, intolerance, other medical reasons) Documentation of patient reason(s) for not prescribing beta-blocker therapy (eg, patient declined, other patient reasons) Documentation of system reason(s) for not prescribing beta-blocker therapy (eg, other reasons attributable to the health care system) Denominator Exception, Reporting Criteria 1: **To report a denominator exception, report the corresponding quality data code**: G9190: Documentation of medical reason(s) for not prescribing beta-blocker therapy (eg, allergy, intolerance, other medical reasons) G9191: Documentation of patient reason(s) for not prescribing beta-blocker therapy (eg, patient declined, other patient reasons) G9192: Documentation of system reason(s) for not prescribing beta-blocker therapy (eg, other reasons attributable to the health care system) Denominator Exception, Reporting Criteria 2: **To report a denominator exception, append the corresponding modifier to the quality data code**: 4008F-1P: Documentation of medical reason(s) for not prescribing beta-blocker therapy (eg, allergy, intolerance, other medical reasons) 4008F-2P: Documentation of patient reason(s) for not prescribing beta-blocker therapy (eg, patient declined, other patient reasons) 4008F-3P: Documentation of system reason(s) for not prescribing beta-blocker therapy (eg, other reasons attributable to the health care system)

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B. Specifications for Electronic Clinical Data Sources

As of the date of the posting of this document, this measure is currently in use in CMS' EHR Incentive Program (Meaningful Use). The specifications are updated on a regular basis and published on the CMS website. To download the electronic specifications for this measure, visit CMS' eCQM Library and view the most recent publishing:
http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/eCQM_Library.html

Additional resources for eCQM implementation can also be found at the eCQI Resource Center webpage: https://ecqi.healthit.gov/

Accompanying value sets are available in the Value Set Authority Center (VSAC) found at the following webpage: https://vsac.nlm.nih.gov/

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