

PERFORMANCE MEASURES

## ACCF/AHA/AMA–PCPI 2011 Performance Measures for Adults With Coronary Artery Disease and Hypertension

A Report of the American College of Cardiology Foundation/  
American Heart Association Task Force on Performance Measures and the  
American Medical Association–Physician Consortium for Performance Improvement

*Developed in Collaboration With the American Academy of Family Physicians, American Association of Cardiovascular and Pulmonary Rehabilitation, American Association of Clinical Endocrinologists, American College of Emergency Physicians, American College of Radiology, American Nurses Association, American Society of Health-System Pharmacists, Society of Hospital Medicine, and Society of Thoracic Surgeons*

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**Preamble**

Over the past decade, there has been an increasing awareness that the quality of medical care delivered in the United States, defined as the delivery of effective, timely, safe, equitable, efficient, and patient-centered medical care, has the potential for improvement (1).

Consistent with this focus on healthcare quality, the American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA) have taken a leadership role in defining “what works in medicine” with their ACCF/AHA guidelines statements, as well as in developing performance measures that define what should or should not be done in the care of patients with cardiovascular disease (Table 1).

The ACCF/AHA Task Force on Performance Measures was originally formed in February 2000 and was charged with identifying the clinical topics appropriate for the development of performance measures and with assembling writing committees composed of clinical and methodological experts. When appropriate, these writing committees have included representation from other organizations involved in the care of patients with the condition of focus. The writing committees are informed about the methodology of performance measure development (2) and are instructed to construct measures for broad use that meet these criteria. The writing committees also are directed to strive to create

measures that minimize responder burdens and that are aligned with national standards so as to promote harmony among measures.

Performance measures can include structural, process, or outcome measures (11). Although implementation of measures of outcomes and efficiency is currently not as well established as that of process measures, it is expected that such measures will become more pervasive over time.

Performance measures also vary in the degree of evidence supporting their use and in the information available about how their implementation may affect provider behaviors. Therefore, it is within the scope of the writing committee's task to comment, when appropriate, on the strengths and limitations of external reporting for a particular cardiovascular disease state or patient population. Thus, the metrics contained within this document are categorized as either "performance measures" or "quality measures." Performance measures are those metrics that the writing committee designates as appropriate for use for both quality improvement and external reporting. In contrast, quality measures are those appropriate for the purposes of quality improvement but not for external reporting until further validation and testing are performed.

All measures have limitations and pose challenges to implementation that could result in unintended consequences. The manner in which these issues are addressed is dependent on several factors, including the data collection method, performance attribution, baseline performance rates, incentives, reporting methods used, and the incentives linked to these reports. The ACCF/AHA encourages those interested in implementing these measures for purposes beyond quality improvement to work with the ACCF/AHA to consider these complex issues in pilot implementation projects, to assess limitations and confounding factors, and to guide refinements of the measures to enhance their utility for these additional purposes.

By facilitating measurements of cardiovascular healthcare quality, ACCF/AHA performance measurement sets may serve as vehicles to accelerate appropriate translation of scientific evidence into clinical practice. These documents are intended to provide practitioners and institutions that deliver care with tools to measure the quality of their care and identify opportunities for improvement. It is our hope that application of these performance measures will provide a mechanism through which the quality of medical care can be measured and improved.

The present set of measures breaks important ground for performance measurement: First, as opposed to many measures focused on acute disease treatment in the hospital setting, these are focused on primary and secondary prevention in the ambulatory setting. Second, the present measures address not only whether important cardiac risk factors such as hypertension and lipids are "treated" but whether these are "controlled" to target goals. Achieving such control requires both clinicians and their patients to fulfill their respective roles. The clinician must identify a risk, implement appropriate intervention, monitor the response, and then further modify care to reach target goals. The patient too has an important part in reaching success, including keeping appointments, modifying his or her lifestyle, and adher-

ing to prescribed therapies. Finally, these performance measures emphasize patient-focused functional outcomes. They stress the need to assess patient angina and functional symptoms but also to develop treatment plans to improve these outcomes.

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## 1. Introduction

The ACCF/AHA/American Medical Association–Physician Consortium for Performance Improvement (AMA–PCPI) Coronary Artery Disease and Hypertension Performance Measures Writing Committee (the writing committee) was charged with revising the ACCF/AHA/AMA–PCPI Chronic Coronary Artery Disease and Hypertension performance measures sets, which were published in 2005 (4,5). The purpose of the present effort is to provide updated measures that can be used to improve care for patients with coronary artery disease (CAD) and hypertension.

Recognizing that each measure may impose a burden on providers, the writing committee sought to focus on those areas with the most potential for impact, where there was the strongest consensus about the best practice, and where the likelihood for unintended harm was lowest. Moreover, the group sought as much as possible to keep the measures straightforward, aligned when appropriate with measures developed by others, and clinically sensible, giving the clinician the latitude for judgment about the appropriateness of an intervention when such latitude is justified. Finally, the writing committee sought to adhere to the organizations' previously published methodology for creating performance measures (2,12).

This updated measure set addresses care in the outpatient setting exclusive of the emergency department. Many guideline-recommended processes were not translated into measures. Decisions about measures to include were based on many factors. Common considerations were the complexity of the guideline recommendations on which the measures were based (potentially making translation difficult) and the feasibility of collecting the required data. This document is intended to supersede the prior CAD and hypertension performance measures set (4,5).

The members of the writing committee included clinicians specializing in cardiology, internal medicine, family medicine, hospital medicine, and advanced practice nursing, as well as individuals with expertise in performance measure development, implementation, and testing. The writing committee also included patient/consumer representatives and a payer representative. The writing committee had representation from the American Academy of Clinical Endocrinologists, the American Association of Cardiovascular and Pulmonary Rehabilitation, American Academy of Family Physicians, the American College of Emergency Physicians, the American College of Radiology, the American Geriatrics Society, the American Nurses Association, the American Society of Health-System Pharmacists, the Society of Hospital Medicine, and the Society for Thoracic Surgeons.

**Table 1. ACCF/AHA Performance Measure Sets**

Topic	Original Publication Date	Partnering Organizations	Status
Chronic heart failure (3)	2005	ACC/AHA—inpatient measures	Currently undergoing update
		ACC/AHA/PCPI—outpatient measures	Currently undergoing update
Chronic stable coronary artery disease (4)	2005	ACC/AHA/PCPI	Updated 2011 (4a)
Hypertension (5)	2005	ACC/AHA/PCPI	Updated 2011 (5a)
ST-elevation and non–ST-elevation myocardial infarction (6)	2006	ACC/AHA	Updated 2008 (6a)
Cardiac rehabilitation (7)	2007	AACVPR/ACC/AHA	Updated 2010 (referral measures only) (7a)
Atrial fibrillation (8)	2008	ACC/AHA/PCPI	...
Primary prevention of CVD (9)	2009	ACCF/AHA	...
Peripheral artery disease (10)	2010	ACCF/AHA/ACR/SCAI/SIR/SVM/SVN/SVS	...
Percutaneous coronary intervention	2012*	ACCF/AHA/SCAI/PCPI/NCQA	...
Cardiac imaging	2012*	ACCF/AHA/ACR/PCPI/NCQA	...

AACVPR indicates American Association of Cardiovascular and Pulmonary Rehabilitation; ACC, American College of Cardiology; ACCF, American College of Cardiology Foundation; ACR, American College of Radiology; AHA, American Heart Association; NCQA, National Committee for Quality Assurance; PCPI, American Medical Association–Physician Consortium for Performance Improvement; SCAI, Society for Cardiac Angiography and Interventions; SIR, Society for Interventional Radiology; SVM, Society for Vascular Medicine; SVN, Society for Vascular Nursing; and SVS, Society for Vascular Surgery.

\*Planned publication date.

In this updated measure set, the writing committee presents 10 measures, including 2 new measures and 5 revised measures, all of which are intended only for the ambulatory (outpatient) setting. A summary of the new measures set is presented in Table 2.

### 1.1. Scope of the Problem

CAD and hypertension are major and growing public health problems in the United States. See the ACCF/AHA/AMA–PCPI 2011 chronic stable coronary artery disease (4a) and hypertension (5a) performance measurement sets, which are both available on the PCPI Web site at <http://www.ama-assn.org/apps/listserv/x-check/qmeasure.cgi?submit=PCPI>, for a detailed discussion of the scope of the problem and opportunities for improving the quality of care provided to patients with these conditions.

### 1.2. Disclosure of Relationships With Industry and Other Entities

The work of the writing committee was sponsored exclusively by the ACCF, the AHA, and the AMA–PCPI, without commercial support. Writing committee members volunteered their time for this effort. Meetings of the writing committee were confidential and attended only by committee members and staff from the ACCF, AHA, AMA–PCPI, The Joint Commission, and the National Committee on Quality Assurance (NCQA) to promote harmonization across similar measure sets, as described further in later sections. Writing committee members were required to declare in writing all relationships with industry relevant to this topic. Less than 50% of the writing committee membership has relationships with industry relevant to this topic, in accordance with standard requirements of the ACCF and AHA. Please see Appendix A for relevant writing committee relationships with industry. In addition, Appendix B includes relevant relationships with industry for all peer reviewers of this document.

### 1.3. Review and Endorsement

Between February 9, 2010, and March 13, 2010, the ACCF/AHA/AMA–PCPI 2011 Performance Measures for Adults With Coronary Artery Disease and the 2011 Performance Measures for Adults With Hypertension underwent a 30-day public comment period. During this time, ACCF, AHA, and AMA–PCPI members, as well as other health professionals and members of the general public, had an opportunity to review and comment on the draft document in advance of its final approval and publication. An official peer and content review of the full document was also conducted, with 2 peer reviewers nominated by the ACCF and 1 reviewer nominated by the AHA. Additional comments were sought from clinical content experts and performance measurement experts.

The ACCF/AHA/AMA–PCPI 2011 Performance Measures for Adults With Coronary Artery Disease and Hypertension was adopted by the respective boards of the ACCF and AHA and approved by the AMA–PCPI in January 2011. These measures will be reviewed for currency once annually and updated as needed. They should be considered valid until either updated or rescinded by the ACCF/AHA Task Force on Performance Measures and the AMA–PCPI.

## 2. Methodology

The development of performance measures involves identification of a set of measures targeted toward a particular patient population, observed over a particular time period. To achieve this goal, the ACCF/AHA Task Force on Performance Measures has outlined and published a methodology of sequential tasks required for the development of process-of-care measures as well as for outcomes measures suitable for public reporting (2,11). In addition, the AMA–PCPI has developed a Work Group Charge that outlines the process steps that should be followed by writing committees developing performance measures (13). The following sections

**Table 2. 2011 ACCF/AHA/AMA–PCPI Coronary Artery Disease and Hypertension Measurement**

Measure	Description*
<b>Coronary artery disease</b>	
1. Blood pressure control	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who have a blood pressure <140/90 mm Hg, OR who have a blood pressure ≥140/90 mm Hg and were prescribed ≥2 antihypertensive medications during the most recent office visit
2. Lipid control	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who have an LDL cholesterol result <100 mg/dL, OR who have an LDL cholesterol result ≥100 mg/dL and have a documented plan of care to achieve LDL cholesterol <100 mg/dL, including, at a minimum, the prescription of a statin
3. Symptom and activity assessment	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period for whom there are documented results of an evaluation of level of activity AND an evaluation of presence or absence of anginal symptoms‡ in the medical record
4. Symptom management†	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period and with results of an evaluation of level of activity, AND with an evaluation of presence or absence of anginal symptoms‡, with appropriate management of anginal symptoms (evaluation of level of activity and symptoms includes no report of anginal symptoms, OR evaluation of level of activity and symptoms includes report of anginal symptoms, and a plan of care is documented to achieve control of anginal symptoms)
5. Tobacco use: screening, cessation, and intervention	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who were screened for tobacco use AND received tobacco-cessation counseling if identified as tobacco users
6. Antiplatelet therapy	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who were prescribed aspirin or clopidogrel
7. Beta-blocker therapy: prior myocardial infarction or left ventricular systolic dysfunction	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who also have prior myocardial infarction or a current or prior LVEF <40% who were prescribed beta-blocker therapy
8. ACE inhibitor/ARB therapy: diabetes or left ventricular systolic dysfunction (LVEF <40%)	Percentage of patients aged ≥18 years with a diagnosis of coronary artery disease seen within a 12-month period who also have diabetes or a current or prior LVEF <40% and who were prescribed ACE-inhibitor or ARB therapy
9. Cardiac rehabilitation patient referral from an outpatient setting (7,12)†	All patients evaluated in an outpatient setting who within the previous 12 months have experienced an acute myocardial infarction, coronary artery bypass graft surgery, PCI, cardiac valve surgery, or cardiac transplantation, or who have chronic stable angina and have not already participated in an early outpatient CR or secondary prevention program for the qualifying event/diagnosis and are referred to such a program
<b>Hypertension</b>	
1. Blood pressure control	Percentage of patients aged ≥18 years with a diagnosis of hypertension seen within a 12-month period who have a blood pressure <140/90 mm Hg, OR who have a blood pressure ≥140/90 mm Hg and were prescribed ≥2 antihypertensive medications during their most recent office visit

\*Please refer to the complete measures for comprehensive information, including measure exceptions (4a,5a).

†New measure.

‡Includes assessment of anginal equivalents.

ACCF indicates American College of Cardiology Foundation; ACE, angiotensin-converting enzyme; AHA, American Heart Association; AMA–PCPI, American Medical Association–Physician Consortium for Performance Improvement; ARB, angiotensin II receptor blocker; CAD, coronary artery disease; CR, cardiac rehabilitation; LDL, low-density lipoprotein; LVEF, left ventricular ejection fraction; and PCI, percutaneous coronary intervention.

outline how these methodologies were applied by the present writing committee.

### 2.1. Identifying Clinically Important Outcomes

To guide the selection of measures for inclusion in the measure set, the writing committee sought to identify outcomes that are meaningful to patients with CAD or hypertension and the structures or processes recommended by practice guidelines that are most strongly associated with those outcomes. The processes on which measures were based include management of risk factors, identification of effective therapeutic options in eligible patients, and accurate and appropriate evaluation of symptoms to guide treatments. A complete list of the desirable outcomes

identified by the writing committee and how they relate to the proposed process measures is included in the measure specifications, which are available on the PCPI Web site at <http://www.ama-assn.org/apps/listserv/x-check/qmeasure.cgi?submit=PCPI> (4a,5a).

### 2.2. Dimensions of Care

Given the multiple measurable domains of providing care, the writing committee identified and explicitly articulated the relevant dimensions of care that should be evaluated. As part of the methodology, each potential performance measure was categorized into its relevant dimension of care (Table 3). Classification into dimensions of care facilitated identifica-

**Table 3. 2011 ACCF/AHA/AMA–PCPI Coronary Artery Disease and Hypertension Performance Measurement Sets: Dimensions of Care Measures Matrix**

Measure Name	Diagnostics	Patient Education*	Treatment	Self-Management*	Monitoring of Disease Status
<b>Coronary artery disease</b>					
1. Blood pressure control	✓		✓		
2. Lipid control	✓		✓		
3. Symptom and activity assessment					✓
4. Symptom management			✓		✓
5. Tobacco use: screening, cessation, and intervention	✓	✓	✓	✓	
6. Antiplatelet therapy			✓		
7. Beta-blocker therapy: prior myocardial infarction			✓		
8. ACE inhibitor/ARB therapy: diabetes or left ventricular systolic dysfunction (LVEF <40%)			✓		
9. Cardiac rehabilitation patient referral from an outpatient setting			✓	✓	
<b>Hypertension</b>					
1. Blood pressure control	✓		✓		

\*Although no current measures exist for this dimension, future development will examine how to address this dimension of care.

ACCF indicates American College of Cardiology Foundation; ACE, angiotensin-converting enzyme; AHA, American Heart Association; AMA–PCPI, American Medical Association–Physician Consortium for Performance Improvement; ARB, angiotensin II receptor blockers; and LVEF, left ventricular ejection fraction.

tion of areas in which evidence was lacking and prevented duplication of measures within the set. Diagnostics, patient education (including prognosis and etiology), treatment, self-management, and monitoring of disease status were selected as the relevant dimensions of care for CAD and hypertension performance measures.

In addition, to ensure the measure set is as comprehensive as possible, the writing committee also evaluated the potential measures against the Institute of Medicine domains of health-care quality (safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity) (1). While focusing primarily on processes of care, the writing committee also considered measures of structures of care and outcomes for CAD (e.g., symptom management and lipid management) and for hypertension (e.g., blood pressure control). Although the writing committee does not endorse any particular measure developed by others and believes that all measures should be used to quantify the full spectrum of relevant healthcare dimensions, the measures proposed in this set are intended to complement existing National Quality Forum (NQF)–endorsed CAD outcome measures, such as the HealthPartners optimally managed modifiable cardiac risk factor measure (14), and NQF-endorsed hypertension outcome measures, such as the NCQA hypertension control measure (15,16).

### 2.3. Literature Review

The writing committee developed this revised measurement set on the basis of several clinical practice guidelines and did not perform an independent assessment of the evidence itself. Furthermore, the writing committee followed the methodology specified in the ACC/AHA document on developing process measures (2) and in the PCPI position statement on the evidence base required for measures development (17). The practice guidelines and statements that provided the basis for these measures can be seen in Table 4.

To avoid duplication of efforts and to harmonize with other national measures as much as possible, the writing committee also reviewed existing CAD measures, including those developed by HealthPartners, the Agency for Health Research and Quality (30), the Institute for Clinical Systems Improvement (16,31), and the Veterans Health Administration (32), as well as hypertension outcome measures developed by Institute for Clinical Systems Improvement (33), NCQA (15,16), and the Veterans Health Administration (32).

### 2.4. Definition and Selection of Measures

Explicit criteria exist for the development of process performance measures so that they accurately reflect the quality of care, including a strong evidence base; quantification of the numerator and denominators of potential measures; and evaluation of the interpretability, applicability, and feasibility of the proposed measure (2). The writing committee sought to identify measures for which there was strong evidence for and clear consensus about their importance in the care of CAD and hypertension patients and that is linked to improved outcomes.

In addition to analyzing the updated guideline recommendations, the writing committee reviewed other clinical guidance documents, as detailed below, as well as all available information on gaps in care and unexplained variations in care for CAD and hypertension patients. The writing committee also reviewed data on feasibility, reliability, and exception reporting available from implementation of a subset of the 2005 measures (34–38). The writing committee applied a patient-centric approach to identify areas where new measures or revisions to the 2005 measures might be needed. As part of this process, the writing committee also considered whether any of the 2005 measures should be retired. After extensive discussion and additional literature review, consensus was reached on revisions to be made to the

**Table 4. Associated Guidelines and Statements**

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Third Report of the National Cholesterol Education Program (NCEP), Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) (18)

The National Institutes of Health: National Heart, Lung, and Blood Institute: National High Blood Pressure Education Program (19)

ACC/AHA 2002 Guideline Update for the Management of Patients With Chronic Stable Angina (20)

Public Health Service: Treating Tobacco Use and Dependence Clinical Practice Guideline 2008 Update (21)

ACC/AHA 2004 Guideline Update for Coronary Artery Bypass Graft Surgery (22)

ACC/AHA 2007 Focused Update of the Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction (23)

ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina and Non-ST-Segment-Elevation Myocardial Infarction (24)

AHA Evidence-Based Guidelines for Cardiovascular Disease Prevention in Women: 2007 Update (25)

AHA/SCAI 2007 Focused Update of the Guidelines for Percutaneous Coronary Intervention (26)

ACCF/ASE/ACEP/AHA/ASNC/SCAI/SCCT/SCMR 2008 Appropriateness Criteria for Stress Echocardiography (27)

ACCF/ASNC Appropriateness Criteria for Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging (28)

ACCF/ACR/SCCT/SCMR/ASNC/NASCI/SCAI/SIR Appropriateness Criteria for Cardiac Computed Tomography and Cardiac Magnetic Resonance Imaging (29)

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ACC indicates American College of Cardiology; ACCF, American College of Cardiology Foundation; ACEP, American College of Emergency Physicians; ACR, American College of Radiology; AHA, American Heart Association; ASE, American Society of Echocardiography; ASNC, American Society of Nuclear Cardiology; NASCI, North American Society for Cardiovascular Imaging; SCAI, Society for Cardiac Angiography and Interventions; SCCT, Society of Cardiovascular Computer Tomography; SCMR, Society for Cardiovascular Magnetic Resonance; and SIR, Society for Interventional Radiology.

measures included in the 2005 CAD and hypertension outpatient measure sets. The comparison of the 2005 and 2011 measures is shown in [Table 5](#).

All measures were designed to assess quality of care in appropriate patients across a variety of outpatient care settings and care teams and to support achievement of the desirable outcomes identified. The measures also were designed to allow for the exclusion of patients with contraindications to the process of care or other valid reasons for not including them in the measure. In defining the measure exceptions, the writing committee was guided by the AMA-PCPI Recommendations for Specification and Categorization of Measure Exclusions (17), as discussed further below.

The writing committee evaluated the potential new and revised measures against the ACCF/AHA attributes of performance measures ([Table 6](#)) to reach consensus on which measures should advance for inclusion in the final measure set and whether to designate any of the measures as test measures (appropriate for internal quality improvement only) in the final set (2). After the peer review and public comment period, the writing committee reviewed and discussed the comments received, and further refinements were made in the measure set.

### 3. ACCF/AHA/AMA-PCPI 2011 Coronary Artery Disease and Hypertension Performance Measures

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#### 3.1. Target Population and Care Period

The target population for the outpatient measures consists of patients with diagnoses of either CAD or hypertension. For purposes of this document, the outpatient care period is defined as the care provided in an outpatient setting within the time period under evaluation—usually 1 year. These measures are intended to assess the management of the care for patients with CAD or hypertension at the practitioner level in an ambulatory-care setting for the primary purpose of quality improvement.

#### 3.2. Alignment With Existing Measure Sets and National Guidelines

The writing committee made every effort to harmonize these performance measures with similar metrics in other ACCF/AHA/AMA-PCPI performance measures sets. An example of this is the harmonization of the lipid-lowering measure in this set with that in the ST-elevation myocardial infarction/non-ST-elevation myocardial infarction set that specifies the use of statin drugs as opposed to any lipid-lowering agent (6a). In addition, the writing committee was aware that the 3 clinical practice guidelines on which these measures are largely based were also at various stages of being updated, but the writing committee decided to proceed with this revised measures set without waiting for the final release of the guideline updates. The guidelines in question are the Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8), a forthcoming ACCF/AHA practice guideline on stable ischemic heart disease, and the guidelines of the Cholesterol Education Project's Adult Treatment Panel IV. The writing committee's decision to proceed was based on the following considerations:

- The CAD and hypertension performance measures set originally was developed in 2005 and was due for updating in 2008. Because the ACCF/AHA stable ischemic heart disease practice guideline, the Cholesterol Education Project's Adult Treatment Panel IV, and the JNC 8 guidelines are projected to be published in late 2011 or early 2012, the writing committee felt that waiting would result in an undue delay in the release of the present update. The writing committee believed that a pragmatic approach to this situation was needed, even though the more linear approach of waiting for the guidelines to be published before developing the measures had methodological appeal.
- Members of the writing committees, who are developing the guideline updates, were selected as members of this writing committee to informally facilitate alignment of the guidelines and the measures. These members are Eduardo Ortiz (JNC 8), John Spertus (ACCF/AHA stable ischemic heart disease practice guideline), and David Goff (Cholesterol Education Project's Adult Treatment Panel IV).

**Table 5. Comparison of 2005 and 2011 Coronary Artery Disease and Hypertension Performance Measures**

	2011 Measure	2005 Measure	Change	Rationale
<b>Coronary artery disease</b>				
1.	Blood pressure control	Blood pressure measurement	It is now an intermediate outcome measure.	The writing committee believed that the original measure, which relied on a plan of care, failed to account for an adequate "intensity" of effort to control blood pressure. The current measure therefore targets established goals and makes accommodations for patients with refractory hypertension by specifying that $\geq 2$ medications be used. The management plan may include the prescription of $\geq 2$ antihypertensive medications, referral for consideration of coronary revascularization, or referral for additional evaluation or treatment of anginal symptoms.
2.	Lipid control	<ul style="list-style-type: none"> <li>• Lipid profile</li> <li>• Drug therapy for lowering LDL cholesterol</li> </ul>	New measure combines lipid profile with drug therapy for lowering LDL cholesterol.	The writing committee believed that the evidence favoring the use of statins as a specific intervention was sufficient to explicitly recommend this treatment. This was based on the higher risk associated with this population and the demonstrated effectiveness of statins in reducing risk of adverse outcomes.
3.	Symptom and activity assessment	Symptom and activity assessment	This measure now requires simultaneous assessment.	The control of symptoms at patients' desired level of activity is the primary reason patients with chronic stable angina often seek care and is a highly relevant outcome. Simultaneous assessment of symptoms and activity provides a more comprehensive view of patient status and improves on the previous version of the measure(s) in that it requires the evaluation of both level of activity and presence of anginal symptoms, because patients may accommodate increasing angina by decreasing their physical activities.
4.	Symptom management	No measure for 2005	This is a new measure.	The writing committee recognized a significant gap in measures addressing critical patient-centric outcomes for chronic stable CAD care and effective management of ischemic symptoms.
5.	Tobacco cessation and intervention	Smoking cessation (assessment)	The new measure requires 2 actions: assessment and an intervention.	There is good evidence that tobacco screening and brief cessation intervention (including counseling and pharmacotherapy) in the primary-care setting is successful in helping tobacco users quit.
6.	Antiplatelet therapy	Antiplatelet therapy	The description and numerator have been modified.	Use of antiplatelet therapy has been shown to reduce the occurrence of vascular events in patients with CAD, including MI and death.
7.	Beta-blocker therapy: prior MI	Beta-blocker therapy: prior MI	The description and denominator have been modified.	ACCF/AHA guidelines have shown that for hospitalized patients with reduced ejection fraction, ACE inhibitors or ARBs and beta-blocker therapy should be continued.
8.	ACE inhibitor/ARB therapy: diabetes or left ventricular systolic dysfunction (LVEF <40%)	ACE inhibitor/ARB therapy	The description and denominator have been modified.	Recent national registry data indicate that the use of ACE inhibitors or ARBs in eligible patients without documented contraindications or intolerance remains suboptimal, especially in the outpatient setting.
9.	Cardiac rehabilitation patient referral from an outpatient setting	No measure for 2005	This is a new measure.	Cardiac rehabilitation programs remain underused. The writing committee recognized a significant gap in this area.
		Screening for diabetes	This measure was retired.	Although screening for diabetes in the chronic stable CAD patient population is important, the measure was found to be difficult to implement and therefore was not widely used. Additionally, new screening guidelines are forthcoming, in which the recommendations for screening may change significantly. The Diabetes Work Group met in 2009, and the Chronic Stable Coronary Artery Disease Writing Committee defers this measure to that group for their consideration.
<b>Hypertension</b>				
1.	Blood pressure control	<ul style="list-style-type: none"> <li>• Plan of care</li> <li>• Blood pressure measurement</li> </ul>	Both original measures were combined into a single measure to become an intermediate outcome measure.	The measures were combined to capture both patients who have their blood pressure controlled and those who do not have their blood pressure controlled but have their treatment regimen adjusted as a result. The management plan may include either the prescription of $\geq 2$ antihypertensive medications, referral for consideration of coronary revascularization, or referral for additional evaluation or treatment of anginal symptoms.

ACE indicates angiotensin-converting enzyme; ARB, angiotensin II receptor blockers; CAD, coronary artery disease; LDL, low-density lipoprotein; LVEF, left ventricular ejection fraction; and MI, myocardial infarction.

- The writing committee focused on developing measures in areas where the level of evidence was the strongest, thus minimizing the risk that the measures would be out of alignment with updated guidelines.

### 3.3. Measures Related to Medication Use

The writing committee gave careful consideration to the types of medication use measures that would be developed for the

measures set. The discussion centered on whether to include only measures of prescription of medications or to develop measures of optimal dosing and patient adherence as well.

#### 3.3.1. Prescription Alone Versus Optimal Dosing

In developing its blood pressure measures, the writing committee recognized the need to strike a balance between assessing the adequacy of blood pressure control and mini-

**Table 6. ACCF/AHA Attributes of Performance Measures**

Consideration	Attribute
Useful in improving patient outcomes	Evidence based Interpretable Actionable
Measure design	Denominator precisely defined Numerator precisely defined Validity type <ul style="list-style-type: none"> <li>• Face*</li> <li>• Content†</li> <li>• Construct‡</li> </ul> Reliability
Measure implementation	Feasibility <ul style="list-style-type: none"> <li>• Reasonable effort</li> <li>• Reasonable cost</li> <li>• Reasonable time period for collection</li> </ul>
Overall assessment	Overall assessment of measure for inclusion in measurement set

\*The measure intuitively seems to capture what it is intended to capture.  
 †The extent to which the items comprehensively capture the domain they are intended to measure.  
 ‡The extent to which the measures correlate with other methods of quantifying the underlying construct.  
 Adapted from Normand et al. (39).

mizing the likelihood that promoting a strict standard for optimal dosing would lead to adverse, unintended consequences related to overtreatment. Overtreatment can result in episodes of hypotension with associated orthostatic symptoms, frank syncope, and injuries from falls. The writing committee also considered the difficulties of capturing specific doses of medications and of assessing whether dosing was optimal. The writing committee also was concerned about broadly implementing measures of medication dosing because of the challenges of capturing large numbers of potential contraindications and adverse effects of individual medications.

In addition, requiring optimal dosing could decrease some patients' access to care and create or worsen healthcare disparities. With the requirement that only patients attaining blood pressure targets would successfully meet the measure, physicians would have an incentive not to accept into their practices patients with refractory blood pressure or with difficult-to-control CAD symptoms. This was a concern because the resulting "lower scores" would reflect poorly on the physician, causing some to dismiss such patients from their practices. The writing committee also recognized that using medication prescription alone, as opposed to patients' filling their prescriptions, as a performance measure could potentially be viewed as condoning undertreatment. Nevertheless, current healthcare records, which often do not link to pharmacy data, render data on patient pharmacy refills impractical to collect. Finally, the writing committee recognized that physicians could use multiple medications at suboptimal doses and that the current measure would give those physicians "credit" for meeting the measure, even if patients' blood pressures remained elevated. Nevertheless, balancing these considerations with concerns about feasibility, unintended consequences such as adverse selection, and methodological difficulties, the writing committee ultimately

decided to measure the medication prescription but not optimal dosing.

### 3.3.2. Medication Adherence

The writing committee debated whether physician quality was better assessed through measures of medication prescription or patient adherence to prescribed medication. The major objection to the use of patient adherence as a measure of physician quality is that, although prescribing physicians have some influence on patient choices, adherence is largely not in the individual physician's locus of control. Health insurance pharmacy benefit designs, including formularies and copays, play important roles in patient decisions to adhere to prescribed drug regimens (40,41). Ultimately, because patient autonomy is the overriding ethical and pragmatic principle governing the patient-physician relationship, the patient is free to decide whether to take medications as prescribed. Similar to the above concern with optimal dosing, a measure of patient adherence could cause physicians to avoid caring for patients with a history of nonadherence or a perceived likelihood of being nonadherent. This, in turn, could reduce access to care for such patients, with vulnerable populations being at particular risk.

Another major concern is that reliable information on patient adherence is often difficult and expensive to obtain. Newer methods of electronic transfer of information from pharmacies may make measurement of adherence more feasible in the future. Once these linkages are standard practice, adherence measurement may become a valuable quality-improvement and patient-management tool for the physician, but, because of the difficulty of capturing medication sampling and low-cost, generic prescriptions that are filled outside of a pharmacy benefit plan, the data may never achieve the level of quality required for a publicly reported measure.

Although the writing committee decided that medication adherence would not be included as a measure of individual physician performance, it believed that measures of adherence, such as those included in HEDIS (Healthcare Effectiveness Data and Information Set), could be used at the health plan, employer, or health system levels as effective quality-improvement tools. The writing committee believed that health plans and employers have more potential influence on adherence, through improved mechanisms to follow up on unfilled prescriptions and through economic incentives—for example, removing copays for antihypertensive medications. In addition, these larger organizations have the resources to create effective disease management and case management programs (40,42–44), which have appeared to improve medication adherence.

### 3.4. Outcome Measures

The outcome measures selected were the subject of intense debate within the writing committee, which sought to advance the utility of the measures and to maintain consistency with our existing standards for public reporting (2,11). Measures were selected by writing committee consensus and were carefully judged, with the goals of moving toward more clinically important outcomes (e.g., symptom control for

CAD) and adding process measures (e.g., referral to cardiac rehabilitation [CR]), given that evidence of the relationship of process measures to important clinical outcomes has accrued. The writing committee was also sensitive to the pitfalls of using “intermediate outcomes,” such as blood pressure and low-density lipoprotein cholesterol goals, in isolation, as measures of quality (45–47). The writing committee evaluated the inclusion of measures related to death, cerebrovascular accident, and other life-altering events but believed that their low incidence, variability, or uncertain relationship to preexisting risk factors (i.e., inadequate risk adjustment) precluded their inclusion at this time (48). The measures selected are based on existing guidelines, and the majority are associated with Class I recommendations (e.g., CR, antiplatelet therapy) and with Level A evidence (e.g., angiotensin-converting enzyme inhibitor/angiotensin II receptor blocker therapy, beta-blocker therapy).

The writing committee designed individual measures to capture unique information that allows independent analysis but developed combined measures when independent reporting of outcomes could lead to misinterpretation given the current state of understanding of the impact on these outcomes of variables such as risk factors, case mix, and evidence. It is hoped that the current set of measures will provide contemporaneous information as the evidence base develops and thus permit future measure enhancement in this area. The writing committee continued to support denominator exceptions for many of the measures with appropriately categorized documentation of the reason for the exception. The development of large databases of appropriate exceptions is essential and will be promoted by use of these measures as designed. This information will be critically important, when used with risk-adjustment models, to enable public reporting of independent, clinically important outcome measures that provide an interpretable and accurate description of individual practice.

## 4. Discussion of Changes to the 2005 Measures Set

The current measures sets (Table 2) represent significant departures from the first ACC/AHA/AMA–PCPI CAD/hypertension performance measures. The writing committee examined the 9 CAD measures and 2 hypertension measures in the original 2005 set and considered updated guideline recommendations, field-testing data, and implementation experiences to determine whether any of the measures should be revised or retired. The writing committee also discussed whether measures with very high rates of compliance should remain in the measure set to emphasize their clinical importance, even though provider performance on them appears to have “topped out.”

Changes in the current measures set include both revisions of prior measures and the addition of new measures. In addition, one measure from the CAD set is being retired. The writing committee’s rationale for making these changes and for not adding certain measures of perceived importance will be discussed in the following sections of this document.

### 4.1. Retirement of 2005 Coronary Artery Disease and Hypertension Measures

Only one measure (the CAD measure “screening for diabetes”) from the CAD and hypertension measures set is being retired, and none was believed to have topped out.

#### 4.1.1. Retirement of Coronary Artery Disease Measure: Screening for Diabetes

The writing committee decided to retire the CAD measure “screening for diabetes” because of several factors:

- The logistical difficulty in screening for diabetes, requiring the patient to return for laboratory testing for either a fasting blood glucose test or a postchallenge 2-hour glucose tolerance test
- Lack of clarity about the evidence supporting a 1-year interval for testing for diabetes in patients with CAD, with the American Association of Clinical Endocrinologists guideline in diabetes (2007) rating the evidence as Level C
- User reports of challenges in implementing the diabetes screening measure

The writing committee recognized the significance of diabetes as a comorbidity in patients with CAD and also recognized that the validity of the diabetes-related measure in the current set (angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker therapy—diabetes or left ventricular systolic dysfunction) depends on the accurate identification of the prevalence of diabetes in the denominator population. Additionally, the writing committee noted that the 2010 American Diabetes Association “Standards of Medical Care in Diabetes” addressed the difficulty in screening for diabetes in that they now state that a properly validated hemoglobin A1c assay can be used to diagnose diabetes at a value  $\geq 6.5\%$  (49). The use of the hemoglobin A1c as a screening test for diabetes could also be expected to make it significantly easier to identify such screening in the medical record—a major challenge faced during efforts to implement the original measure.

After a thorough discussion of all of these considerations, the writing committee decided to remove this measure from the CAD set and to defer further discussion of diabetes screening measures to the NCQA/AMA–PCPI Joint Diabetes Expert Panel.

### 4.2. New Performance Measures in This Update

New performance measures were created to reflect the newest guideline recommendations and address significant gaps in care. In addition, the writing committee explored the development of outcome, group- or system-level, overuse, composite, and bundled measures.

#### 4.2.1. Coronary Artery Disease: Symptom Management

Treatment of CAD has 2 complementary objectives: to reduce the risk of death and to control anginal symptoms. Clinical events such as death or myocardial infarction are rare relative to the frequency of daily symptoms and functional limitations experienced by many patients. Because of the relationship between symptoms of ischemic heart disease and

the level of patient activity, the writing committee required simultaneous activity and angina assessment as a patient-centered process measure that is directly related to a meaningful outcome. This pairing of symptom and activity assessment is necessary because patients may modify their activity to lessen anginal symptoms. Thus, a worsening in symptom control might manifest itself as more angina at a similar amount of activity, similar or less angina at a lower level of activity, or both. Moreover, patients' CAD can change over time, and the sequential evaluation of symptoms is a necessary means of optimizing patients' treatment plans. The writing committee considered the challenges inherent in measuring patient-reported outcomes, including the limited inter-rater reliability of physician-performed functional assessments such as the Canadian Cardiovascular Society Classification. Patient-centered, disease-specific health status questionnaires can overcome this problem, but such methods are not used routinely in patient care because of the redesign in patient workflow that would be required and the fact that the current reimbursement system does not incentivize such efforts. Nevertheless, systems for administration and scoring exist and could be further refined to meet a perceived need for the systematic collection of these data. Several commonly used and validated tools are provided as examples of how angina could be evaluated and documented. A narrative assessment of symptom and activity status documented in the chart can also satisfy the numerator for this measure but will make extraction from electronic medical records systems difficult.

Extensive discussion of the frequency of assessment was also undertaken by the writing committee, and, although it is clear that it might be appropriate to assess symptoms and activity for every visit in which a CAD diagnosis was billed, the writing committee felt most comfortable requiring that this be reported at least once within a 12-month period.

The writing committee recognized a significant gap in measures addressing patient-centered outcomes of chronic stable CAD care. The symptom management measure helps to close this gap by requiring the collection of information necessary to assess the patient's functional status and by promoting intensification of therapeutic interventions when symptoms are not adequately controlled. In choosing this measure, the writing committee recognized that patients who have frequent anginal symptoms report worse quality of life, have worse survival rates, incur higher costs, and are more dissatisfied with their care than those with less severe symptoms (50–56). Given the challenges in documentation related to the measure, the writing committee considered making symptom management a quality-improvement-only measure. The writing committee believed this was not appropriate, however, because of the importance of effective management of ischemic symptoms. Accordingly, when symptom changes are identified during a visit, a plan to address the change in status should be documented. That management plan may include the prescription of  $\geq 2$  anti-hypertensive medications, referral for consideration of coronary revascularization, or referral for additional evaluation or treatment of anginal symptoms. If a plan for control of angina cannot be implemented, then a medical-, system-, or patient-

related reason should be noted as outlined in the PCPI's exceptions methodology (17). The writing committee realizes that complete elimination of symptoms is not always possible, so this measure prioritizes symptom management and the patient's experience as the primary goal of the therapeutic encounter. In addition, there was discussion of other aspects of managing chronic CAD patients who report a change in symptoms, including lifestyle interventions, assessment of medication adherence, patient education, and evaluation for cardiac or noncardiac contributors (arrhythmias, depression, and heart failure). The writing committee believed, however, that these other aspects of care, though important parts of the therapeutic approach, are so broad or complex as to preclude inclusion as measures for the chronic management of CAD.

#### 4.2.2. Coronary Artery Disease: Cardiac Rehabilitation Patient Referral From an Outpatient Setting

CR is underutilized, despite evidence that it improves quality of life, reduces modifiable cardiovascular risk factors, enhances adherence to preventive medications, and lowers the risks of morbidity and mortality (57–74). Suaya et al (70) analyzed outcomes from 601,099 Medicare beneficiaries and found that only 13.9% of eligible patients enrolled in CR after myocardial infarction, noting significant geographic variation in referral rates and lower use in women, nonwhites, older patients, and those also receiving Medicaid, despite a 21% to 31% reduction in 5-year mortality rate in those who participated when compared with nonparticipants (71). More recently, the PINNACLE Program of the American College of Cardiology's National Cardiovascular Data Registry (NCDR) found that only 18.1% of eligible patients were referred to CR (37). For these many reasons, the writing committee recognized a significant opportunity for improvement and included the NQF-endorsed referral to CR measure in this set.

During the public comment period, reviewers asked that the writing committee consider adding an accompanying measure that captures whether the referral to CR is followed by enrollment in CR, the ultimate desired outcome. The writing committee recognized that factors affecting enrollment and completion of CR are complex and involve issues beyond the control of referring practitioners, such as inadequate insurance coverage (including benefit design features such as high copayments), lack of available programs in many urban and rural areas, transportation problems, and limited patient education and motivation to participate. Performance measures tracking enrollment and completion of CR are included in the 2007 American Association of Cardiovascular Pulmonary Rehabilitation/AHA Performance Measures on Cardiac Rehabilitation (7) and were written to encourage performance-improvement activities by CR programs. In addition, during the NQF endorsement process, the numerator statement for the CR measure was revised to expand standards of practice for CR programs (7a). Important among these is care coordination, which recognizes that CR programs should communicate with referring providers not only about medical issues, but also about completion of the CR program. Future iterations of CR performance measures should include enrollment and completion measures, after

further studies have clarified responsibilities, defined exceptions, and evaluated feasibility.

### 4.3. Revised Measures in This Update

Four measures from the CAD set and 1 measure from the hypertension set were modified to incorporate results from field-testing projects and to address inadequacies in the original measures.

#### 4.3.1. Combining Hypertension Measures: Blood Pressure Measurement and Plan of Care

The writing committee concluded that the ACCF/AHA/AMA–PCPI hypertension measures should be modified and combined into one measure that would reflect not only blood pressure measurement, but also an evidence-based, clinically important intermediate outcome that would be correlated with future reductions of clinical morbidity, complication, hospitalization, and mortality rates. This intermediate outcome reflects the writing committee’s recognition that blood pressure targets for specific populations are still being refined (45). For the hypertension measure set, the writing committee chose a denominator statement of all patients aged  $\geq 18$  years with hypertension; for the CAD set, the denominator is all patients aged  $\geq 18$  years with a diagnosis of CAD. The numerator was defined as all patients with a blood pressure  $< 140/90$  mm Hg, or all patients with a blood pressure of  $\geq 140/90$  mm Hg who were prescribed  $\geq 2$  antihypertensive medications during the most recent office visit during the treatment period. The writing committee considered modifying the target blood pressure for patients with diabetes. Although earlier guidelines—JNC 7 2004 (19), American Association of Clinical Endocrinologists 2007 (75), and American Diabetes Association 2010 (49)—have suggested a blood pressure target  $< 140/90$  mm Hg for patients with diabetes, evidence from the ACCORD (Action to Control Cardiovascular Risk in Diabetes) trial (45) and INVEST (International Verapamil SR/Trandolapril Study) (76) indicates that a blood pressure target  $< 140/90$  mm Hg may provide a less favorable benefit-risk ratio in patients with diabetes than had been previously thought. The writing committee defers further consideration of blood pressure targets in patients with diabetes to the NCQA/AMA–PCPI Joint Diabetes Expert Panel for further clarification.

The writing committee emphasizes the importance of the quality of the data used to make clinical decisions. In the case of the hypertension performance measure, proper technique and preparation for obtaining the blood pressure value used in the measure are most important. Validated blood pressure monitors, whether used for home monitoring or in the medical office setting, and when used with proper technique, including an appropriate period of rest beforehand (5 to 10 min), will yield blood pressure readings that correlate well with the standard manual technique.

#### 4.3.2. Coronary Artery Disease: Smoking Cessation

The writing committee agreed that tobacco use remains a significant modifiable risk factor for CAD and that evidence shows that screening and brief cessation intervention (counseling, pharmacotherapy, or both) at the point of care can

increase overall tobacco abstinence rates (21,77,78). Furthermore, an opportunity exists to improve present levels of screening and intervention. The writing committee discussed the frequency of measurement, with some advocating that screening and intervention be treated as a vital sign and be performed at every visit, whereas others were concerned that excessive documentation requirements would minimize the importance of screening and intervention, with tobacco screening devolving to just another activity for the physician to check off in the medical record (21,78). The writing committee also recognized the difficulty of measuring the quality of specific types of interventions and their influence on tobacco abstinence rates. The writing committee, therefore, elected to keep the requirement to 1 screening and intervention per 1-year measuring period.

Eventually, the writing committee believes this process measure could be replaced by documentation of tobacco-free rates. The writing committee decided that developing a measure of tobacco-free rates was premature at this juncture because of socioeconomic and geographic disparities and the difficulty of actually determining ongoing rates of tobacco use (given the high recidivism rate after smoking cessation).

#### 4.3.3. Coronary Artery Disease: Lipid Control

The lipid control measure also underwent significant revision. The original measure, which emphasized achieving a low-density lipoprotein target and was indifferent to the drugs used to achieve it, was retired. It was replaced with a measure that emphasizes statin use. This decision was predicated on emerging insights that statin therapy specifically results in a relatively constant relative risk reduction that is clinically important in a high-risk population, such as those with established CAD. In contrast, the data supporting specific lipid targets (a distinct concept from higher-dose statins that are associated with additional clinical benefits) are much weaker. Given the absence of data on the clinical benefit of some nonstatin medications that reduce cholesterol (46,47), the writing committee believed that the weight of evidence supported a specific, statin-based performance measure.

#### 4.3.4. Hypertension and Coronary Artery Disease: Blood Pressure Control

The link between hypertension and the development of cardiovascular events is well substantiated. Individuals with high underlying cardiovascular risk (e.g., those with established atherosclerotic disease, diabetes mellitus, chronic kidney disease, or multiple cardiovascular risk factors) have the greatest absolute risk of new cardiovascular events attributable to uncontrolled hypertension.

We chose 140/90 mm Hg as the threshold for hypertension control in these performance measures because it is the recommended blood pressure goal in JNC 7 both for individuals with and without established cardiovascular disease (19). As noted previously, the status of specific blood pressure targets for patients with diabetes and hypertension is currently in flux despite the JNC 7 recommendation of  $< 130/80$  mm Hg as a goal (19). Arguments also have been made to support a general goal of  $< 130/80$  mm Hg for patients with high cardiovascular risk, including patients with established CAD (79,80). Nevertheless, no clinical trial directly com-

compares the clinical outcomes of large populations of coronary disease patients treated to different blood pressure targets. Some clinical trials in which specific antihypertensive drug therapies were given to individuals with CAD or high cardiovascular disease risk who had blood pressures <140/90 mm Hg have shown beneficial results (81–83), but other trials have had negative or equivocal findings (84–87). Although this heterogeneity in the published literature justifies the use of the less strict <140/90 mm Hg threshold in these performance measures, lower blood pressure targets may be appropriate for some patients with CAD or other conditions. At this point, however, it is unclear how such patients could be reliably identified for purposes of performance measurement.

The writing committee recognized that hypertension treatment decisions generally should be based on the average of multiple readings and that for many patients there is a role for blood pressure measurement outside the clinician's office (e.g., home blood pressure monitoring or ambulatory blood pressure monitoring). Whether different goals should be used in interpreting blood pressures obtained at home is an issue that has not been clearly resolved, so the writing committee did not specify a different blood pressure threshold for measurements obtained outside the office (79).

The writing committee engaged in a protracted and detailed discussion of the blood pressure value to be used in calculating this measure because the clinician may be looking at multiple home readings, the results of ambulatory blood pressure monitoring, values obtained in the office, or some combination of all of these. It is difficult to provide one operational definition for use in a performance measure that indicates whether blood pressure measurements that may be available within a patient's medical record should be averaged to indicate how well the blood pressure is controlled. Ultimately, the writing committee settled on requiring the provider to specify at each visit the blood pressure reading that was used in clinical decision making. When a clinician uses the mean of multiple readings to determine whether a patient has controlled blood pressure, this value can be used as the specified value in the performance measure.

Achievement of the hypertension performance measures requires that the blood pressure decrease to <140/90-mm Hg threshold or that  $\geq 2$  antihypertensive medications are prescribed in the absence of a medical-, patient-, or healthcare system-related reason that justifies not doing so. (For purposes of this measure, the individual components of combination medications are counted separately.) The drug-prescription measure was selected with the recognition that measures used for accountability and reporting that are solely based on outcomes—here, blood pressure control—may not yield informative comparisons when risk adjustment is not performed and that it is not feasible to develop and broadly apply robust risk-adjustment models at this time. (The writing committee nevertheless believed that the proportion of patients with controlled blood pressure remains of interest and should be tracked by providers separately for quality-improvement purposes.) In addition, the trials that demonstrated the cardiovascular benefits of blood pressure lowering have typically used  $\geq 2$  medications in the more intensively

treated groups, especially in participants who did not meet the trial-specific blood pressure control goals.

A limitation to the hypertension performance measures presented here is that their scope includes only blood pressure control or the prescription of  $\geq 2$  drugs. The writing committee recognizes that many other necessary aspects of hypertension care are not part of these measures. These include but are not limited to counseling and other interventions to promote dietary modification, weight loss, physical activity, self-monitoring, care plan adherence, and appropriate follow-up. The writing committee did not leave these topics out of the measures because we viewed them as less important than drug therapy. Rather, they are less readily measured with existing data sources, and the satisfaction of counseling requirements for a performance measure does not provide any indication about the quality of the counseling interactions provided by clinicians. We also recognize that appropriate recognition and treatment of concomitant risk factors (e.g., smoking, dyslipidemia, related comorbidities such as kidney disease) are important components of the care of patients with hypertension, but they are not within the scope of these measures.

#### 4.3.5. Coronary Artery Disease: Antiplatelet Therapy

The writing committee chose to revise the 2005 antiplatelet therapy measure to include only the prescription of clopidogrel or aspirin in the numerator. The prior measure allowed for prescription of any antiplatelet agent to be counted in the numerator. The rationale for the change is that the guidelines on which this measurement set is based (88) state that aspirin should be started at 75 to 162 mg per day and continued indefinitely in all patients unless contraindicated (Class I, Level of Evidence: A) and that clopidogrel can be used when aspirin is absolutely contraindicated (Class IIa, Level of Evidence: B). No other antiplatelet agents are recommended.

The writing committee recognizes that a new antiplatelet agent, prasugrel, has been approved by the U.S. Food and Drug Administration for use in acute coronary syndromes and that some patients with chronic stable coronary disease will be on this agent. The writing committee concluded, however, that prasugrel could not be added to the antiplatelet measure until such time as the drug is recommended in the pertinent practice guideline. In the interim, patients on this agent can be excluded from the denominator as a medical exception. The same reasoning will hold for other antiplatelet agents currently under development that may receive Food and Drug Administration approval in the future.

### 4.4. Potential Measures Considered But Not Included in This Update

The writing committee considered several other potential measures. For various reasons they were determined to be inappropriate for inclusion in the measure set.

#### 4.4.1. Coronary Artery Disease: Overuse of Stress Testing

In an attempt to address efficiency in the management of CAD, the writing committee considered a measure of >1 stress test per year in patients with stable CAD. This measure

was selected because of a belief among some of the writing committee members that excessive stress testing in patients whose symptom status had not changed was a significant issue. To investigate this hypothesis, AMA–PCPI staff reviewed Medicare claims data and found that, in the absence of an acute coronary syndrome, few patients with CAD had >1 stress test in a given year. This information is available at <http://www.ama-assn.org/apps/listserv/x-check/qmeasure.cgi?submit=PCPI> (4a).

Additionally, the writing committee took note of the ACCF's separate efforts to develop appropriate use criteria for diagnostic imaging (89). Furthermore, in a study performed with United Healthcare, gaps were identified in the appropriate application of diagnostic imaging as measured by these criteria (29). As the current measures set was being developed, the ACCF submitted imaging efficiency measures to NQF that were based on its appropriate use criteria and that had been successfully piloted in the United Healthcare study (90). Finally, the writing committee is aware that the ACCF is preparing a document that will delineate the methodology it is using in developing measures of quality and appropriateness in the use of technology and that will incorporate the results of its efficiency measures work. The writing committee agrees with the observation made in the ACCF/AHA statement on efficiency measures that appropriate use criteria are well suited as the basis of such measures because they incorporate quality and appropriateness (91). Because of the difficulty encountered in constructing an efficiency measure and because of the work being done by ACCF in this important area, the writing committee decided to defer for now the further development of diagnostic efficiency measures, pending the results of the ACCF's efforts.

#### **4.4.2. Measures Related to Appropriate Use of Percutaneous Coronary Intervention, Physiological Testing Before Percutaneous Coronary Intervention, and Treatment Selection for Revascularization**

The writing committee determined that addressing appropriate use of percutaneous coronary intervention (PCI) is beyond the scope of this document. The ACCF/AHA/AMA–PCPI/NCQA PCI Writing Committee will specifically address appropriate use of PCI and physiological testing before PCI and will evaluate both overuse and underuse of PCI. Although overuse will most readily be assessed through procedural registries, such as the ACC's NCDR CathPCI Registry, underuse will require the assessment of symptoms among patients with stable ischemic heart disease. With more experience from the currently proposed symptom management measure and the input from the ACCF/AHA/AMA–PCPI/Society for Cardiovascular Angiography and Interventions/NCQA PCI Writing Committee, we anticipate being able to provide measures for the appropriate use of PCI in subsequent measurement sets.

#### **4.4.3. Measures Related to Shared Decision Making**

Shared decision-making approaches have been advocated as a way to potentially increase patient commitment to long-term adherence to cardiovascular medications such as statins and

antihypertensive agents (92,93). Shared decision making, facilitated by the use of structured decision aids, does appear to improve patients' confidence in and satisfaction with whatever decision they make about taking chronic medication (94). Nevertheless, the limited published data on the effects of the use of decision aids on decisional outcomes, including medication acceptance and adherence, have shown mixed results (95–99), partly because of inconsistent implementation of the decision aid (100).

Patients' perceptions of untreated risk severity and potential benefits and harms of treatment depend heavily on the ways in which risk information is conveyed (94). Expressing potential treatment benefit in terms of relative (versus absolute) risk reduction has been associated with higher acceptance of and adherence to statin therapy (101). Detailed information about potential adverse side effects of medications may tend to decrease initial medication acceptance, no matter how it is expressed. Accuracy of patients' risk perceptions may be best improved by using naturalistic frequencies and graphic illustrations (93,102).

Thus far, no care guidelines policy groups have set forth evidence-based recommendations or proposed any metrics for evaluating shared decision making, although international standards are under development (103,104). For these reasons, the writing committee is not including any provision related to shared decision making for the management of CAD and hypertension.

### **4.5. Testing and Research**

Testing is a requirement for all performance measures before their use in public reporting or pay-for-performance programs (105,106), and NQF will not fully endorse measures that have not been comprehensively tested (78). The AMA–PCPI has published a document delineating the thorough testing protocol to which all of its measures will be subjected (107). All of the new measures in this set will be tested according to that protocol. The writing committee recommends that these measures not be broadly used for accountability purposes until this testing is complete.

Additionally, the writing committee recommends that the process measures in this set be systematically studied with respect to their effects on clinical, financial, and patient satisfaction outcomes. Of particular note in this regard is the blood pressure control measure in the hypertension set, which was the subject of much discussion during the writing committee deliberations and during the public comment period. The writing committee encourages research into the effect of this measure on the prescription of optimal or maximally tolerated doses of antihypertensive medications and on ultimately achieving blood pressure control targets; such research should use appropriate risk adjustment and evaluate both desired outcomes and unintended consequences. All arguments about these issues remain highly theoretical until these sorts of objective data are obtained.

Another measure of particular interest with respect to its potential impact on outcomes is the symptom and activity assessment measure in the CAD set. Implementation of this measure is likely to identify patients whose angina symptoms

are not adequately controlled, leading to additional diagnostic and therapeutic interventions. These interventions, in turn, may have a positive impact on angina-related quality of life, as well as morbidity rate, mortality rate, and costs. Understanding the balance of these various outcomes in different populations will have obvious utility for policy makers, physicians, and especially patients.

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**Appendix A. Author Relationships With Industry and Other Entities—ACCF/AHA/AMA-PCPI 2011 Performance Measures for Adults With Coronary Artery Disease and Hypertension**

Committee Member	Employment	Consultant	Speaker	Ownership/ Partnership/ Principal	Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
Joseph Drozda, Jr., Co-chair	Sisters of Mercy Health System—Director of Outcomes Research	None	None	None	Novartis	• Boston Scientific Rhythm (son)* • UnitedHealth	None
Joseph V. Messer, Co-chair	Rush University Medical Center—Professor of Medicine; Cardiovascular Associates of Glenbrook and Evanston	None	None	None	None	None	None
John Spertus†, Co-chair	Saint Luke’s Hospital of Kansas City—Clinical Director, Outcomes Research	• Amgen • Novartis • PRISM Technology • St. Jude Medical • UnitedHealth	None	• Health Outcomes Sciences • Kansas City Cardiomyopathy Questionnaire* • Peripheral Artery Questionnaire* • Seattle Angina Questionnaire*	• Atherotect* • Bristol-Myers Squibb/Sanofi-aventis* • Eli Lilly* • Johnson & Johnson* • Roche Diagnostics*	• CV Outcomes‡	None
Bruce Abramowitz	University of Illinois at Chicago—Associate Professor of Medicine; Advocate Christ Medical Center—Director, Interventional Cardiology	None	None	None	None	None	None
Karen Alexander	Duke University Medical Center DCRI—Associate Professor	• Gilead	None	None	• POZEN • Sanofi-aventis	None	None
Craig T. Beam	Medical Development Specialists—Senior Vice President	None	None	None	None	None	None

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**Appendix A. Continued**

Committee Member	Employment	Consultant	Speaker	Ownership/ Partnership/ Principal	Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
Robert O. Bonow	Northwestern University Feinberg School of Medicine—Goldberg Distinguished Professor and Chief, Division of Cardiology	None	None	None	None	None	None
Jill S. Burkiewicz	Midwestern University Chicago College of Pharmacy—Associate Professor and Pharmacy Practice and PGY1 Residency Program Director	None	None	None	None	None	None
Michael Crouch	Memorial Family Medicine Residency Program—Residency Director	None	None	None	None	None	None
David C. Goff, Jr.	Wake Forest University of School of Medicine—Professor, Department of Medicine; Professor and Chair, Department of Epidemiology and Prevention	None	None	None	• Merck* • Takeda	None	None
Richard Hellman	University of Missouri—Kansas City School of Medicine—Clinical Professor of Medicine	None	None	None	None	None	None
Thomas James III	Humana, Inc—Medical Director, National Network Operations	None	None	None	None	None	None
Marjorie L. King	Columbia University (Helen Hayes Hospital)—Director, Cardiac Services	None	None	None	None	None	None
Edison A. Machado, Jr.	IPRO—Chief Quality Officer and Vice President, Strategy Division	None	None	None	None	None	None
Eduardo Ortiz	National Heart, Blood and Lung Institute—Senior Medical Officer	None	None	None	None	None	None
Michael O'Toole	Midwest Heart Specialists—Chief Information Officer	None	None	None	None	None	None
Stephen D. Persell	Northwestern University—Assistant Professor, Department of Medicine and Institute for Healthcare Studies	None	None	None	None	None	None
Jesse M. Pines	University of Pennsylvania—Assistant Professor of Emergency Medicine and Associate Director, Emergency Care Policy and Research Division	None	None	None	None	None	None
Frank J. Rybicki	Brigham and Women's Hospital—Director, Cardiac CT and Vascular CT/MRI	• Bracco Diagnostics • Siemens Medical • Toshiba Medical	• Bracco Diagnostics • Siemens Medical • Toshiba Medical	None	• Bracco Diagnostics • Siemens Medical • Toshiba Medical	None	None
Lawrence B. Sadwin	Torbot Group, Inc.	None	None	None	None	None	None
Joanna D. Sikkema	University of Miami—Director, Acute Care Nurse Practitioner Program	None	None	None	None	None	None
Peter K. Smith	Duke University Medical Center—Professor and Chief, Thoracic Surgery	• Baxter Corporation*	None	None	None	None	None
Patrick J. Torcson	St. Tammany Parish Hospital—Director of Hospital Medicine	None	None	None	None	None	None
John B. Wong	Tufts Medical Center—Chief, Division of Clinical Decision Making	None	None	None	None	None	None

This table represents the relationships of committee members with industry and other entities that were determined to be relevant to this document. These relationships were reviewed and updated in conjunction with all meetings and/or conference calls of the writing committee during the document development process. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of 5% or more of the voting stock or share of the business entity, or ownership of \$10 000 or more of the fair market value of the business entity; or if funds received by the person from the business entity exceed 5% of the person's gross income for the previous year. A relationship is considered to be modest if it is less than significant under the preceding definition. Relationships that exist with no financial benefit are also included for the purpose of transparency. Relationships in this table are modest unless otherwise noted.

\*Significant relationship.

†Recused from voting on Measures 3 and 4.

‡No financial relationship.

DCRI indicates Duke Clinical Research Institute.

**Appendix B. Reviewer Relationships With Industry and Other Entities—ACCF/AHA/AMA-PCPI 2011 Performance Measures for Adults With Coronary Artery Disease and Hypertension**

Peer Reviewer	Representation	Consultant	Speaker	Ownership/ Partnership/ Principal	Personal Research	Institutional, Organizational or Other Financial Benefit	Expert Witness
James T. Dove	Official Reviewer—ACCF Board of Trustees	None	None	None	<ul style="list-style-type: none"> <li>• Baxter</li> <li>• GlaxoSmithKline*</li> <li>• Medtronic</li> </ul>	None	<ul style="list-style-type: none"> <li>• Plaintiff, PCI, 2008</li> </ul>
Gordon L. Fung	Official Reviewer—ACCF Board of Governors	<ul style="list-style-type: none"> <li>• Novartis Pharmaceuticals</li> </ul>	<ul style="list-style-type: none"> <li>• Abbott Cardiovascular</li> <li>• GlaxoSmithKline</li> </ul>	None	<ul style="list-style-type: none"> <li>• Roche</li> </ul>	None	None
Kathleen L. Grady	Official Reviewer—ACCF/AHA Task Force on Performance Measures Lead Reviewer	None	None	None	None	None	None
Clyde W. Yancy	Official Reviewer—AHA	None	None	None	None	None	None
Elliott Antman	Content Reviewer—ACCF/AHA STEMI Guideline Writing Committee	<ul style="list-style-type: none"> <li>• Eli Lilly</li> <li>• Momenta Pharmaceuticals</li> <li>• Sanofi-aventis</li> </ul>	None	None	<ul style="list-style-type: none"> <li>• Accumetrics</li> <li>• AstraZeneca Pharmaceuticals</li> <li>• Bayer Healthcare AG</li> <li>• Biosite Incorporated</li> <li>• Bristol-Myers Squibb</li> <li>• Pharmaceutical Research Institute</li> <li>• CV Therapeutics</li> <li>• Daiichi Sankyo†</li> <li>• Eli Lilly†</li> <li>• GlaxoSmithKline</li> <li>• Merck</li> <li>• Novartis Pharmaceuticals</li> <li>• Nuvelo</li> <li>• Orth-Clinical Diagnostics</li> <li>• Pfizer</li> <li>• Roche Diagnostics GmbH</li> <li>• Roche Diagnostics Corporation</li> <li>• Sanofi-aventis†</li> <li>• Sanofi-Synthelabo Recherche</li> <li>• Schering-Plough Research Institute</li> </ul>	None	None
Joseph Cacchione	Content Reviewer—ACCF Formation of Optimal Cardiovascular Utilization Strategies (FOCUS) Group	<ul style="list-style-type: none"> <li>• UnitedHealth*</li> </ul>	None	None	None	None	None
Christopher P. Cannon	Content Reviewer—ACCF National Cardiovascular Data Registry	<ul style="list-style-type: none"> <li>• Automedics Medical Systems</li> <li>• Bristol-Myers Squibb†</li> </ul>	None	None	<ul style="list-style-type: none"> <li>• Accumetrics*</li> <li>• AstraZeneca Pharmaceuticals*</li> <li>• Bristol-Myers Squibb/Sanofi-aventis*</li> <li>• GlaxoSmithKline</li> <li>• Merck</li> <li>• Takeda</li> </ul>	None	None
Bernard Chaitman	Content Reviewer—ACCF/AHA Task Force on Data Standards	<ul style="list-style-type: none"> <li>• Eli Lilly</li> <li>• Forest Pharmaceuticals*</li> <li>• Gilead Sciences*</li> <li>• Merck*</li> <li>• Roche*</li> </ul>	None	None	<ul style="list-style-type: none"> <li>• Pfizer</li> </ul>	None	None
Julius M. Gardin	Content Reviewer—ACCF/AHA SIHD Guideline Writing Committee	None	None	None	None	None	None
Lee A. Green	Content Reviewer—ACCF/AHA Task Force on Performance Measures	None	None	None	None	None	None
Mary Hand	Content Reviewer—ACCF/AHA STEMI Guideline Writing Committee	None	None	None	None	None	None
Robert C. Hendel	Content Reviewer—ACCF/AHA Task Force on Appropriate Use Criteria	<ul style="list-style-type: none"> <li>• Astellas Pharma</li> <li>• United Health Care</li> </ul>	<ul style="list-style-type: none"> <li>• Astellas Pharma*</li> </ul>	None	<ul style="list-style-type: none"> <li>• GE Healthcare</li> </ul>	None	None
Judith S. Hochman	Content Reviewer—ACCF/AHA STEMI Guideline Writing Committee	<ul style="list-style-type: none"> <li>• Bristol-Myer Squibb/ Sanofi Pharmaceuticals Partnership</li> <li>• Eli Lilly</li> <li>• GlaxoSmithKline</li> <li>• Millennium Pharmaceuticals</li> <li>• Schering-Plough Research Institute</li> </ul>	None	None	<ul style="list-style-type: none"> <li>• Bayer HealthCare AG</li> <li>• Johnson &amp; Johnson Pharmaceutical Research &amp; Development</li> <li>• Schering-Plough (TIMI 50)</li> </ul>	None	None
Harlan M. Krumholz	Content Reviewer—Individual	None	None	None	None	None	None

(Continued)

**Appendix B. Continued**

Peer Reviewer	Representation	Consultant	Speaker	Ownership/ Partnership/ Principal	Personal Research	Institutional, Organizational or Other Financial Benefit	Expert Witness
Frederick G. Kushner	Content Reviewer—ACCF/AHA STEMI Guideline Writing Committee	None	None	<ul style="list-style-type: none"> <li>• Bristol-Myers Squibb</li> <li>• Merck</li> <li>• Pfizer</li> <li>• Roche</li> </ul>	<ul style="list-style-type: none"> <li>• Daiichi-Sankyo</li> <li>• Novartis Pharmaceuticals</li> </ul>	None	None
Frederick A. Masoudi	Content Reviewer—ACCF/AHA Task Force on Performance Measures	None	None	None	None	None	None
E. Magnus Ohman	Content Reviewer—ACCF/AHA Task Force on Practice Guidelines	<ul style="list-style-type: none"> <li>• CV Therapeutics</li> <li>• Gilead Sciences</li> <li>• Liposcience</li> <li>• Schering-Plough</li> <li>• The Medicines Company*</li> </ul>	None	None	<ul style="list-style-type: none"> <li>• Bristol-Myers Squibb</li> <li>• Eli Lilly</li> <li>• Sanofi-aventis</li> <li>• Schering-Plough*</li> <li>• The Medicines Company*</li> </ul>	None	None
Leslee J. Shaw	Content Reviewer—ACCF/AHA Task Force on Appropriate Use Criteria	None	None	None	<ul style="list-style-type: none"> <li>• Astellas Pharma</li> <li>• Bracco Diagnostics</li> </ul>	None	None
Craig R. Smith	Content Reviewer—ACCF/AHA SIHD Guideline Writing Committee	None	None	None	None	None	None
Sidney C. Smith, Jr.	Content Reviewer—ACCF/AHA STEMI Guideline Writing Committee	None	None	None	None	None	None
Sarah A. Spinler	Content Reviewer—AHA QCOR Steering Committee	None	None	None	None	None	None
Nanette K. Wenger	Content Reviewer—ACCF/AHA UA/ NSTEMI Guideline Writing Committee	None	None	None	None	None	None
Kim A. Williams	Content Reviewer—Formation of Optimal Cardiovascular Utilization Strategies (FOCUS) Group	• Astellas	• Astellas*	None	<ul style="list-style-type: none"> <li>• Bristol-Myers Squibb</li> <li>• PGx</li> </ul>	None	None
John R. Windle	Content Reviewer—ACCF Clinical Quality Committee	None	None	None	None	None	None
Michael J. Wolk	Content Reviewer—ACCF/AHA Task Force on Appropriate Use Criteria	None	None	None	None	None	None

This table represents the relevant relationships with industry and other entities that were disclosed at the time of peer review. It does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of 5% or more of the voting stock or share of the business entity, or ownership of \$10 000 or more of the fair market value of the business entity; or if funds received by the person from the business entity exceed 5% of the person's gross income for the previous year. A relationship is considered to be modest if it is less than significant under the preceding definition. Relationships that exist with no financial benefit are also included for the purposes of transparency Relationships in this table are modest unless otherwise noted.

\*Significant relationship.  
 †No financial relationship.

ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; PCI, percutaneous coronary intervention; QCOR, Quality of Care and Outcomes Research in Cardiovascular Disease and Stroke Scientific Sessions; SIHD, stable ischemic heart disease; STEMI, ST-segment elevation myocardial infarction; and UA, unstable angina.

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