1   **Performance Measures**
2
3   **2017 AHA/ACC Clinical Performance and Quality Measures for Adults with ST-Elevation and**
4   **Non-ST-Elevation Myocardial Infarction**
5
6   **A Report of the American Heart Association/American College of Cardiology Task Force on**
7   **Performance Measures**
8   *Developed in Collaboration with the Society for Cardiovascular Angiography and Interventions*
9
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10

Preamble

The American Heart Association (AHA) /American College of Cardiology (ACC) performance measure sets serve as vehicles to accelerate translation of scientific evidence into clinical practice. Measure sets developed by the AHA/ACC are intended to provide practitioners and institutions that deliver cardiovascular services with tools to measure the quality of care provided and identify opportunities for improvement.

Writing committees are instructed to consider the methodology of performance measure development (1) and to ensure that the measures developed are aligned with AHA/ACC clinical guidelines. The writing committees also are charged with constructing measures that maximally capture important aspects of care quality, including timeliness, safety, effectiveness, efficiency, equity, and patient-centeredness, while minimizing, when possible, the reporting burden imposed on hospitals, practices, and/or practitioners.

Potential challenges from measure implementation may lead to unintended consequences. The manner in which challenges are addressed is dependent on several factors, including the measure design, data collection method, performance attribution, baseline performance rates, reporting methods, and incentives linked to these reports.

The ACC/AHA Task Force on Performance Measures distinguishes quality measures from performance measures. Quality measures are those metrics that *may* be useful for local quality improvement but are not yet appropriate for public reporting or pay for performance programs (uses of performance measures). New measures are initially evaluated for potential inclusion as performance measures. In some cases, a measure is insufficiently supported by the guidelines. In other instances, when the guidelines support a measure, the writing committee may

1 feel it is necessary to have the measure tested to identify the consequences of measure

2 implementation. Quality measures may then be promoted to the status of performance measures

3 as supporting evidence becomes available.

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5 Paul A. Heidenreich, MD, MS, FACC, FAHA
6 *Chair,* ACC/AHA Task Force on Performance Measures
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8

9 1. Introduction

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11   In the summer of 2015, the AHA/ACC convened the writing committee to begin the

12 process of revising the existing set of performance measures for adult patients hospitalized with

13 ST-Elevation and Non-ST-Elevation Myocardial Infarction (STEMI and NSTEMI respectively)**,**

14 that was last updated in 2008 (2). The writing committee was charged with the task of

15 developing new measures to benchmark and improve the quality of care for patients with STEMI

16 and NSTEMI.

17   All the measures included in the measure set are briefly summarized in Table 1, which

18 provides information on the measure number, title, care setting, attribution, and domain. The

19 detailed measure specifications (available in Appendix A) provide not only the information

20 included in Table 1 but also more detailed information including the measure description,

21 numerator, denominator (including denominator exclusions and exceptions), rationale for the

22 measure, guideline recommendations that support the measure, measurement period, and sources

23 of data.

1   The writing committee has developed a comprehensive STEMI/NSTEMI measure set

2   that includes 24 total measures, of which 17 are performance measures, and seven quality

3   measures (as reflected in Table 1 and Appendix A). The writing committee believes that

4   implementation of this measure set by healthcare providers, physician practices, and hospital

5   systems will enhance the quality of care and likely improve outcomes of patients with STEMI

6   and NSTEMI.

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1 **Table 1. 2016 AHA/ACC ST-Elevation and Non-ST-Elevation Myocardial Infarction Clinical Performance and Quality Measures**

2

No.	Measure Title	Care Setting	Attribution	Measure Domain
Performance Measures				
PM-1	Aspirin at Arrival	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-2	Aspirin Prescribed at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-3	Beta Blocker Prescribed at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-4	Statin Prescribed at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-5	Evaluation of Left Ventricular Ejection Fraction (LVEF)	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-6	Angiotensin Converting Enzyme Inhibitor or Angiotensin Receptor Blocker Prescribed for Left Ventricular Systolic Dysfunction at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-7	Time to Fibrinolytic Therapy*	Inpatient	Facility or Provider Level	Communication and Care Coordination
PM-8	Time to Primary Percutaneous Coronary Intervention*	Inpatient	Facility or Provider Level	Communication and Care Coordination
PM-9	Reperfusion Therapy*	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-10	Time from Emergency Department Arrival at STEMI Referral Facility to Emergency Department Discharge from STEMI Referral Facility in Patients Transferred for Primary Percutaneous Coronary Intervention*	Inpatient	Facility Level	Communication and Care Coordination

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No.	Measure Title	Care Setting	Attribution	Measure Domain
PM-11	Time From First Medical Contact (At or Before Emergency Department Arrival at STEMI Referral Facility) to Primary Percutaneous Coronary Intervention at STEMI Receiving Facility Among Transferred Patients*	Inpatient	Facility Level	Communication and Care Coordination
PM-12	Cardiac Rehabilitation Patient Referral From an Inpatient Setting	Inpatient	Facility or Provider Level	Communication and Care Coordination
PM-13	P_2Y_{12} Receptor Inhibitor Prescribed at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-14	Immediate Angiography for Resuscitated Out-of-Hospital Cardiac Arrest in STEMI Patients*	Inpatient	Facility or Provider Level	Effective Clinical Care
PM-15	Non-Invasive Stress Testing Before Discharge in Conservatively-Treated Patients	Inpatient	Facility or Provider Level	Efficiency and Cost Reduction
PM-16	Early Cardiac Troponin Measurement† (within six Hours of Admission)	Inpatient	Facility or Provider Level	Efficiency and Cost Reduction
PM-17	Participation in a Regional or National Acute Myocardial Infarction Registry	Inpatient	Facility Level	Community, Population and Public Health
Quality Measures				
QM-1	Risk Stratification of NSTEMI Patients With a Risk Score†	Inpatient	Facility or Provider Level	Effective Clinical Care
QM-2	Early Invasive Strategy (within 24 hours) in High-Risk NSTEMI Patients†	Inpatient	Facility or Provider Level	Effective Clinical Care
QM-3	Therapeutic Hypothermia For Comatose STEMI Patients With Out-of-Hospital Cardiac Arrest*	Inpatient	Facility or Provider Level	Effective Clinical Care
QM-4	Aldosterone Antagonist Prescribed at Discharge	Inpatient	Facility or Provider Level	Effective Clinical Care
QM-5	Inappropriate In-Hospital Use of Nonsteroidal Anti-Inflammatory	Inpatient	Facility or Provider Level	Patient Safety

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No.	Measure Title	Care Setting	Attribution	Measure Domain
	Drugs			
QM-6	Inappropriate Prescription of Prasugrel at Discharge in Patients with a History of Prior Stroke or Transient Ischemic Attack (TIA)	Inpatient	Facility or Provider Level	Patient Safety
QM-7	Inappropriate Prescription of High-Dose Aspirin With Ticagrelor at Discharge	Inpatient	Facility or Provider Level	Patient Safety

1   *These measures apply only to patients with STEMI
2   †These measures apply only to patients with NSTEMI

3   ACC indicates American College of Cardiology; AHA, American Heart Association; NSTEMI, non-ST-elevation myocardial infarction; PM, performance measures; QM, quality
4   measures; STEMI, ST-elevation myocardial infarction

1 # 1.1. Scope and Definitions of the Problem

2 Acute myocardial infarction (AMI) is a frequent cause of hospital admission in the United States

3 and is associated with significant short- and long-term mortality and morbidity. Every 42

4 seconds, approximately one American will suffer an AMI, and the estimated annual incidences

5 of new and recurrent myocardial infarction (MI) events are 550,000 and 200,000 events,

6 respectively (3).

7 Fortunately, the rates of hospitalization and 30-day mortality for AMI have been on the decline

8 (4,5). This reduction in mortality is likely related to the shift in the pattern of clinical

9 presentation of AMI as well as to improved acute treatments and long-term care. Yeh and

10 colleagues examined age- and sex-adjusted incidence rates for STEMI and NSTEMI from a

11 community-based population (Northern California) between 1999 and 2008, and demonstrated

12 an overall significant decrease in AMI incidence rate after 2000 (6). Although the adjusted 30-

13 day mortality after AMI decreased significantly (driven by a significant reduction in NSTEMI

14 mortality), the overall mortality in 2008 after an AMI was still 7.8% at 30 days (6).

15 Importantly, AMI patients who survive the initial event have substantial risk for future

16 cardiovascular events, including recurrent MI, death, heart failure, and stroke. In the PLATO

17 (Platelet Inhibition and Patient Outcomes) trial, the rate of the combined cardiovascular endpoint

18 (vascular death, MI, or stroke) was 11.7% at 12 months among AMI patients treated with aspirin

19 and clopidogrel (7). This included a 6.9% rate of recurrent MI at 12 months (7). AMI is also

20 associated with a substantial direct and indirect cost burden. In 2010 alone, around 595,000

1 inpatient hospital discharges were attributed to AMI, thus classifying it among the top 10 most

2 expensive hospital principal discharge diagnoses (3).

3 The 2012 Third Universal Definition of Myocardial Infarction consensus document classifies MI

4 into five types, based on pathological, clinical and prognostic differences, along with different

5 treatment strategies (8). The performance and quality measures described in the current

6 document are predominantly pertinent to patients with spontaneous MI, or MI type 1. MI type 1

7 is an event related to atherosclerotic plaque disruption (e.g., rupture, ulceration, erosion) with

8 superimposed thrombus formation in a coronary artery, resulting in acute reduction in

9 myocardial blood supply and/or distal embolization with subsequent myonecrosis. The measure

10 set developed by our writing group does not uniformly apply to the other four types of MI. In

11 fact, some of those measures are even contraindicated with certain MI type, such as aspirin or

12 P_2Y_{12} receptor inhibitor therapies which are contraindicated in patients with a type 2 MI resulting

13 from severe hemorrhage and anemia. Given the widespread use of very sensitive assays for

14 markers of myocardial necrosis (such as the highly sensitive and specific cardiac Troponin

15 biomarkers, cTn) and advanced imaging modalities, very small amounts of myonecrosis

16 unrelated to ischemia can be detected (e.g., heart failure, renal failure, myocarditis, pulmonary

17 embolism). Our measures also do not apply to these myocardial injury events, which should be

18 differentiated from true AMI events.

19 For the sake of immediate treatment strategies (e.g., reperfusion therapy), AMI is differentiated

20 into STEMI and NSTEMI, depending on the existence of ST-segment elevation in two or more

21 contiguous leads on the presenting electrocardiogram (ECG). Acute STEMI equivalent can,

22 however, manifest with ECG findings of new (or presumably new) left bundle branch block

1   (LBBB), true posterior myocardial infarction, or even hyperacute T waves. The proportion of

2   STEMI versus NSTEMI events varies in different registries and depends on the age of patients,

3   their geographic location and the type of surveillance used. In general, STEMI patients account

4   for 29% to 47% of all AMI patients (9,10).

5   Updating the existing STEMI/NSTEMI measure set was a priority for the ACC and AHA.

6   Particular attention was given to evidence-based diagnostic and therapeutic strategies that have

7   high impact on outcome (e.g., Class I or III guideline recommendations) of patients with

8   STEMI/NSTEMI and that satisfy the attributes of performance measures (e.g., feasible, reliable,

9   actionable) as summarized in Table 3. This writing committee developed the measures in this

10   document after comprehensive examination of the most current relevant guidelines, internal

11   discussion and internal voting, peer review, and public comment.

12   ## 1.2. Disclosure of Relationships With Industry and Other Entities

13   The ACC/AHA Task Force on Performance Measures makes every effort to avoid actual,

14   potential, or perceived conflicts of interest that could arise as a result of relationships with

15   industry or other entities (RWI). Detailed information on the ACC/AHA policy on RWI can be

16   found at http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-

17   with-industry-policy. All members of the writing committee, as well as those selected to serve as

18   peer reviewers of this document, were required to disclose all current relationships and those

19   existing within the 12 months before the initiation of this writing effort. ACC/AHA policy also

20   requires that the writing committee chairs and at least 50% of the writing committee have no

21   relevant RWI.

Any writing committee member who develops new RWI during his or her tenure on the writing committee is required to notify staff in writing. These statements are reviewed periodically by the Task Force and by members of the writing committee. Author and peer reviewer RWI which are relevant to the document are included in the appendices: Please see Appendix B for relevant writing committee RWI and Appendix C for relevant peer reviewer RWI. Additionally, to ensure complete transparency, the writing committee members' comprehensive disclosure information, including RWI not relevant to the present document, is available online at [insert link to Comprehensive RWI here once paper finalized] Disclosure information for the Task Force is also available online at http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/guidelines-and-documents-task-forces.

The work of the writing committee was supported exclusively by the ACC and the AHA without commercial support. Members of the writing committee volunteered their time for this effort. Meetings of the writing committee were confidential and attended only by writing committee members and staff from the ACC, AHA, and the Society for Cardiovascular Angiography and Interventions who served as a collaborator on this project.

2. Methodology

2.1. Literature Review

In developing the updated STEMI/NSTEMI measure set, the writing committee reviewed evidence based guidelines and statements that would potentially impact the construct of the measures. The practice guidelines and statements that most directly contributed to the development of these measures are summarized in Table 2.

Table 2: Associated Guidelines and Other Clinical Guidance Documents

GUIDELINES	
1.	2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)
2.	2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction(12)
3.	AHA/ACCF Secondary Prevention and Risk Reduction Therapy for Patients With Coronary and Other Atherosclerotic Vascular Disease: 2011 update (13)
4.	2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (14)
5.	2015 ACC/AHA/SCAI Focused Update on Primary Percutaneous Coronary Intervention for Patients With ST-Elevation Myocardial Infarction: An Update of the 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention and the 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction (15)
6.	2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease (16)
7.	ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure: An Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure (17)
STATEMENTS	
1.	ACC/AHA Performance Measurement for Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults with Established Disease (18)
2.	Joint ESC/ACCF/AHA/WHF Expert Consensus Document. Third universal definition of myocardial infarction (8)
3.	ACC/AHA 2008 Performance Measures for Adults With ST-elevation and Non-ST-Elevation Myocardial Infarction (2)
4.	ACC/AHA 2008 Statement on Performance Measurement and Reperfusion Therapy (19)

1 ACC(F), American College of Cardiology Foundation; AHA, American Heart Association; ESC indicates European Society of
2 Cardiology; HFSA, Heart Failure Society of America; SCAI, Society for Cardiovascular Angiography and Interventions; WHF,
3 World Health Federation.

4 ## 2.2. Definition and Selection of Measures

5 The writing committee reviewed both recent guidelines and other clinical guidance documents

6 referenced in Table 2. The writing committee also examined available information on disparities

7 in care to address which new measures might be appropriate as performance measures versus

8 quality measures for this measure set update.

9   All measures were designed to assess quality of care experienced by individuals who

10 have STEMI or NSTEMI in the inpatient setting. Each measure was designed to limit

11 performance measurement to patients without a valid reason for exclusion from the measure.

12 Measure exclusions are those reasons that remove a patient from the denominator, regardless if

13 they would be included in the numerator. For example, all measures exclude patients who are

14 under 18 years of age or who are receiving comfort care measures only or hospice. In contrast to

1   exclusions, denominator exceptions are those conditions that remove a patient from the

2   denominator only if the numerator criteria are not met. Denominator exceptions are used in

3   select cases to allow for a fairer measurement of quality for those providers with higher risk

4   populations. Exceptions are also used to defer to the clinical judgement of the provider. Several

5   of the measures include exceptions. For example, in the case of the 'P$_2$Y$_{12}$ Inhibitor at

6   Discharge' measure, a care provider may write a prescription for an oral P$_2$Y$_{12}$ receptor inhibitor

7   (clopidogrel, ticagrelor, or prasugrel) even if the patient reveals that he/she will not take the

8   medication due to a number of reasons (e.g., concerns about its bleeding risk). In this case, the

9   provider would receive credit for the measure. However, if the patient has explicitly expressed to

10   the provide that he/she does not wish to have the medication prescribed, no prescription will be

11   written and the provider can then document in the medical record patient's refusal of the

12   medication. In this scenario, the provider will not be penalized for this performance measure

13   because a valid patient reason is documented. The writing committee closely deliberated the

14   exceptions to be included with each measure, and in some cases determined not to include any

15   exceptions (as in the case of the patient safety measures).

16   During the course of developing the measure set, the writing committee evaluated the

17   potential measures against the AHA/ACC attributes of performance measures (Table 3) to reach

18   consensus on which measures should be advanced for inclusion in the final measure set. After

19   the peer review and public comment period, the writing committee reviewed and discussed the

20   comments received, and further refined the measure set. The writing committee acknowledges

21   that the new measures created in this set will need to be tested and validated over time. By

22   publishing this performance and quality measure set, the writing committee hopes to encourage

1   their widespread and expeditious adoption, as well as facilitate the collection and analysis of data

2   that are needed to continuously assess their relevance over time. In the future, the writing

3   committee members anticipate having data that will allow them to re-assess whether any of the

4   measures included in this set should be revised (e.g., modified, deleted, or potentially upgraded

5   from a quality measure to a performance measure).

1   **Table 3. ACC/AHA Task Force on Performance Measures: Attributes for Performance Measures (20)**
2

1. Evidence Based

High-impact area that is useful in improving patient outcomes	a) For structural measures, the structure should be closely linked to a meaningful process of care that in turn is linked to a meaningful patient outcome.
	b) For process measures, the scientific basis for the measure should be well established, and the process should be closely linked to a meaningful patient outcome.
	c) For outcome measures, the outcome should be clinically meaningful. If appropriate, performance measures based on outcomes should adjust for relevant clinical characteristics through the use of appropriate methodology and high-quality data sources.

2. Measure Selection

Measure definition	a) The patient group to whom the measure applies (denominator) and the patient group for whom conformance is achieved (numerator) are clearly defined and clinically meaningful.
Measure exceptions and exclusions	b) Exceptions and exclusions are supported by evidence.
Reliability	c) The measure is reproducible across organizations and delivery settings.
Face validity	d) The measure appears to assess what it is intended to.
Content validity	e) The measure captures most meaningful aspects of care.
Construct validity	f) The measure correlates well with other measures of the same aspect of care.

3. Measure Feasibility

Reasonable effort and cost	a) The data required for the measure can be obtained with reasonable effort and cost.
Reasonable time period	b) The data required for the measure can be obtained within the period allowed for data collection.

4. Accountability

Actionable	a) Those held accountable can affect the care process or outcome.
Unintended consequences avoided	b) The likelihood of negative unintended consequences with the measure is low.

3   ACC indicates American College of Cardiology; AHA, American Heart Association.
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3. AHA/ACC ST-Elevation and Non–ST-Elevation Myocardial Infarction Measure Set Performance Measures

3.1 Discussion of Changes to 2016 ST-Elevation and Non–ST-Elevation Myocardial Infarction Measure Set

After reviewing the existing guidelines, and the 2008 performance and quality measure set (2),

the writing committee discussed which measures needed to be revised in order to reflect the

updated science, and worked to identify which guideline recommendations could serve as the

basis for new performance or quality measures. The writing committee also reviewed existing

measure sets that were publicly available.

The following subsections serve as a synopsis of the revisions that were made to previous

measures, and a description of why the new inpatient measures were created.

3.1.1. Retired Measures

The writing committee decided to retire one performance measure for smoking cessation

counseling due to the consistently high levels of performance achieved (Table 4). Other quality

measures, previously included as test measures in the 2008 measure set, were retired for the

reasons specified in Table 4.

Table 4: Retired ST-Elevation and Non–ST-Elevation Myocardial Infarction Measures From the 2008 Set

#	Care Setting	Measure Title	Rationale for Retiring the Measures
PM-12	Inpatient	Adult Smoking Cessation Advice/Counseling	This measure is being retired because perfect scores are consistently achieved and the measure appears to have reached a ceiling effect. Therefore, given absence of room for further improvement (e.g., inability to achieve any incremental benefit), the writing committee opted to omit this measure from the inpatient performance measure set for AMI. The writing committee also recognizes the importance of the American Medical Association/Physician Consortium for

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			Performance Improvement Tobacco Use: Screening and Cessation Intervention measure that already exists (21).
QM-1	Inpatient	LDL Cholesterol Assessment	This measure is being retired in order to be concordant with the new lipid guidelines that no longer recommend LDL measurements to target statin prescription and/or dosing.
QM-2	Inpatient	Excessive Initial Heparin Dose	This measure is being retired as it covers only one aspect of medication use, (e.g., overdosing), and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-3	Inpatient	Excessive Initial Enoxaparin Dose	This measure is being retired as it covers only one aspect of medication use, (e.g., overdosing), and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-4	Inpatient	Excessive Initial Abciximab Dose	This measure is being retired as it covers only one aspect of medication use, (e.g., overdosing), and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-5	Inpatient	Excessive Initial Eptifibatide Dose	This measure is being retired as it covers only one aspect of medication use, (e.g., overdosing), and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-6	Inpatient	Excessive Initial Tirofiban Dose	This measure is being retired as it covers only one aspect of medication use, (e.g., overdosing), and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-7	Inpatient	Anticoagulant Dosing Protocol	This measure is being retired as it covers only one aspect of medication use, and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.
QM-8	Inpatient	Anticoagulant Error Tracking System	This measure is being retired as it covers only one aspect of medication use, and misses other aspects such as under-dosing and inappropriate use. In addition, this is not a direct stand -alone Class I or III recommendation in the guidelines, and has shortcomings pertinent to measure feasibility and accountability.

1 AMI indicates acute myocardial infarction; LDL, low-density lipoprotein; PM, performance measure; QM, quality measure.
2
3 **3.1.2. Revised Measures**
4 The writing committee reviewed and made changes to four measures, which are summarized in

5 Table 5. The majority of the changes was made to reflect the new evidence and updated

6 guideline recommendations, to strengthen the measure construct, or to expand the measures to

1   include new proven pharmacotherapies. Table 5 summarizes the revised measures, including

2   their care setting, title, and a brief rationale for the revision.

1   **Table 5: Revised ST-Elevation and Non–ST-Elevation Measures**

#	Care Setting	Measure Title	Rationale for Revisions
PM-4	Inpatient	Statin for AMI	This measure is being revised to reflect the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (14), which recommended statin use for all patients with established atherosclerotic cardiovascular disease, including patients with AMI.
PM- 5	Inpatient	Evaluation of LVEF	The title of this measure is being revised from "Evaluation of Left Ventricular Systolic Function" to "Evaluation of Left Ventricular Ejection Fraction." The treatment recommendations regarding the use of guideline-directed medication therapies are based on left ventricular ejection fraction, not qualitative estimates of left ventricular systolic function. The 2013 ACCF/AHA STEMI guideline (12) explicitly recommended measuring left ventricular ejection fraction. The 2014 AHA/ACC NSTE-ACS guidelines (11) likewise have medication recommendations based on knowledge of the ejection fraction.
PM-12	Inpatient	Cardiac Rehabilitation Referral	This measure has been adapted from the AACVPR/ACCF/AHA 2010 Update: Performance Measures on Cardiac Rehabilitation for Referral to Cardiac Rehabilitation/Secondary Prevention Services (22). One modification since the publication of that 2010 measurement set was the removal of patient reasons from the list of measure exceptions. Specifically, patient refusal does not constitute a justifiable reason for a clinician not offering a referral to a patient. If documentation in the medical record exists noting that the provider has informed and discussed referral to cardiac rehab/secondary prevention program with the patient, but that the patient refuses a referral, then the healthcare provider would not be expected to send communication about the patient to the cardiac rehab/secondary prevention

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			program. This is consistent with HIPAA confidentiality regulations and shared decision making, and performance would then be considered met by the provider (preventing unjust penalization of the provider). At the time of publication, the National Quality Forum and Centers for Medicare & Medicaid Services Physician Quality Reporting System measure specifications have not been updated to reflect this change. However, the ACC and AHA staff are working to ensure this update is reflected in the National Quality Forum and Centers for Medicare & Medicaid Services databases.
PM-13	Inpatient	P_2Y_{12} Receptor Inhibitor Prescribed at Discharge	In the 2008 ACC/AHA STEMI/NSTEMI measure set (2), a test measure entitled 'clopidogrel at discharge' was included. Since then, two newer FDA-approved medications, ticagrelor and prasugrel, have emerged and demonstrated safety, efficacy and clinical effectiveness after AMI. All three medications are inhibitors of the P_2Y_{12} receptor, and are recommended on top of aspirin (as part of a dual antiplatelet regimen) to reduce recurrent ischemic events after AMI.

1 AACVPR indicates American Association of Cardiovascular and Pulmonary Rehabilitation; ACC, American College of Cardiology; AHA, American Heart Association; AMI, acute
2 myocardial infarction; FDA, the Food and Drug Administration; LVEF, Left Ventricular Ejection Fraction NSTEMI, non—ST-elevation myocardial infarction; NSTE-ACS, non–ST-
3 segment elevation acute coronary syndromes; HIPPA, the Health Insurance Portability and Accountability Act; STEMI, ST-elevation myocardial infarction.
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1   **3.1.3. New Measures**
2   The new measure set includes four performance measures, and seven quality measures. Table 6

3   includes a list of the new measures and their rationale.

4   Four of the quality measures are structured in a typical format in which the goal is to seek

5   a score of 100%. However, three of the new measures (QM-5, QM-6, and QM-7) are safety

6   measures, and in those, the goal is to seek a score of 0% (e.g., 0% use or prescription of an

7   inappropriate treatment reflects an optimal quality of care).

8   For more detailed information on the measure construct, please refer to the detailed

9   measure specifications summarized in Appendix A.

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1 **Table 6: New STEMI/NSTEMI Measures**
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#	Care Setting	Measure Title	Rationale for Creating New Measure	Rationale for Designating as a Quality Measure as Opposed to a Performance Measure (If Applicable)
PM-14	Inpatient	Immediate Angiography for Resuscitated Out-of-Hospital Cardiac Arrest in STEMI Patients	This measure seeks to implement a Class I (Level of Evidence B) recommendation in the 2013 ACCF/AHA STEMI guideline (12) that immediate angiography with PCI when indicated should be performed in resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI. The writing committee opted to include angiography only, which is easily measurable, and not PCI because of the difficulty associated with ascertaining PCI appropriateness or its lack thereof.	Not Applicable.
PM-15	Inpatient	Non-Invasive Stress Testing Before Discharge in Conservatively-Treated Patients	This measure seeks to implement Class I (Level of Evidence B) recommendations in both the 2013 STEMI (12) and 2014 AHA/ACC NSTE-ACS (11) guidelines to perform non-invasive stress testing to detect inducible ischemia in medically-treated STEMI and NSTEMI patients.	Not Applicable.
PM-16	Inpatient	Early Cardiac Troponin Measurement (within 6 hours of admission)	This measure seeks to implement Class I (Level of Evidence A) recommendations in the 2014 AHA/ACC NSTE-ACS guideline (11) to measure serial cardiac troponin levels (at presentation and three-six hours after symptom onset in all patients.	Not Applicable.

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PM-17	Inpatient	Participation in Regional or National Acute Myocardial Infarction Registry	This measure seeks to implement class I (Level of Evidence B) and Class IIa (Level of Evidence B) recommendations in the 2013 STEMI (12) and 2014 AHA/ACC NSTE-ACS guidelines (11), respectively. The writing group felt that participation in a regional or national AMI registry will help track and assess the outcomes, complications and quality of care for patients with AMI, and is supported by evidence.	Not Applicable.
QM-1	Inpatient	Risk Score Stratification for NSTEMI Patients	This measure seeks to implement a Class I (Level of Evidence A) recommendation in the 2014 AHA/ACC NSTE-ACS (11) guideline that risk scores should be used to assess prognosis in patients with NSTE-ACS. The writing committee realizes the importance of this measure to dictate the appropriate strategy (invasive versus ischemic-guided) and the timing of the strategy (early versus late invasive) in patients with NSTEMI.	The writing committee felt it is best to keep this as a quality measure because of issues related to the measure feasibility. Most registries do not include risk scores, and most risk scores (e.g., GRACE, TIMI, PURSUIT) are difficult to compute retrospectively from their respective components, and are likely to cause a significant abstraction burden.

QM-2	Inpatient	Early Invasive Strategy (within 24 hours) in High-Risk NSTEMI Patients	This measure seeks to implement a Class I (Level of Evidence A) recommendation in the 2014 AHA/ACC NSTE-ACS guideline (11) that an early invasive strategy should be performed in initially stabilized high-risk patients with NSTE-ACS.	The writing committee felt it is best to keep this as a quality measure for many reasons. The writing group acknowledges that early invasive strategy (compared with a delayed invasive strategy) in high-risk NSTE-ACS patients predominantly reduce recurrent ischemia (rather than the hard outcomes of recurrent MI or death). Although this strategy additionally reduces length of stay and costs, it creates a logistical burden on cardiac catheterization labs, especially during weekends. Finally, objective risk stratification by risk scores is usually not available in current registries; thus, ascertaining which patients benefit from early invasive strategy may not be readily feasible.
QM-3	Inpatient	Therapeutic Hypothermia For Comatose STEMI Patients With Out-of-Hospital Cardiac Arrest	This measure seeks to implement a Class I (Level of Evidence B) recommendation in the 2013 ACCF/AHA STEMI guideline (12) that therapeutic hypothermia should be started as soon as possible in comatose patients with STEMI and out-of-hospital cardiac arrest caused by VF or VT.	The writing committee felt it is best to keep this as a quality measure because of newer conflicting data on the effectiveness of therapeutic hypothermia.
QM-4	Inpatient	Aldosterone Antagonist at Discharge	This measure seeks to implement Class I recommendations in the 2013 ACCF/AHA STEMI (12) and 2014 AHA/ACC NSTE-ACS (11) guidelines supporting the use of aldosterone antagonists in eligible patients with STEMI and NSTEMI, respectively.	The writing committee felt it is best to keep this as a quality measure because of issues related to the measure construct. This measure is likely to present a significant abstraction burden and may be relevant only to a small fraction of AMI patients (given the elaborate inclusion/exclusion criteria in the EPEHSUS (23) clinical trial).

QM-5	Inpatient	Inappropriate In-Hospital Use of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)	This measure seeks to implement Class III recommendations (Class III HARM, Level of Evidence: B) in both the 2013 ACCF/AHA STEMI (12) and 2014 AHA/ACC NSTE-ACS (11) guidelines, cautioning against the use of these drugs after AMI.	The writing committee felt it is best to keep this as a quality measure given the low impact associated with the use of NSAIDs during the brief hospitalization period (this is likely more relevant in the outpatient setting). The existence of extensive and evolving list of NSAIDs may also create significant abstraction burden.
QM-6	Inpatient	Inappropriate Prescription of Prasugrel at Discharge in Patients With a History of Prior Stroke or Transient Ischemic Attack (TIA)	This measure seeks to implement Class III recommendations (Class III HARM, Level of Evidence: B) in both the 2013 ACCF/AHA STEMI (12) and 2014 AHA/ACC NSTE-ACS (11) guidelines, cautioning against the use of prasugrel in patients with prior TIA/stroke, because of net clinical harm in these patients. The FDA issued a black box warning on this regard.	The writing committee felt it is best to keep this as a quality measure only.
QM-7	Inpatient	Inappropriate Prescription of High-Dose Aspirin with Ticagrelor at Discharge	This measure seeks to implement Class III recommendations (Class III HARM, Level of Evidence: B) in both the 2013 ACCF/AHA STEMI (12) and 2014 AHA/ACC NSTE-ACS (11) guidelines, cautioning against the use of high-dose aspirin > 100 mg among patient receiving ticagrelor. The FDA issued a black box warning on this regard.	The writing committee felt it is best to keep this as a quality measure only.

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2 ACCF indicates American College of Cardiology Foundation; ACS, acute coronary syndrome; AHA, American Heart Association; ECG, electrocardiogram; EPEHSUS, Eplerenone
3 Post–Acute Myocardial Infarction Heart Failure Efficacy and Survival Study; FDA, the Food and Drug Administration; GRACE, Global Registry of Acute Coronary Events; NSAIDs,
4 nonsteroidal anti-inflammatory drugs; NSTE, non-ST-segment elevation; PM indicates performance measure; PCI, percutaneous coronary intervention; PURSUIT, Platelet Glycoprotein
5 IIb/IIIa in Unstable Angina: Receptor Suppression Using Integrilin; QM, quality measure; TIA, transient ischemic attack; TIMI, Thrombolysis in Myocardial Infarction; VF, ventricular
6 fibrillation; VT, ventricular tachycardia

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4. Areas for Further Research

The writing committee recognizes that the ultimate measure of performance lies in the assessment of outcomes, such as mortality (in-hospital or 30-day) and health status. However, the complexity associated with adjustment for the large number of patient characteristics that both influence treatment decisions and impact mortality make these measures less attractive to use. 30-day risk-adjusted AMI mortality has been used by CMS for payment incentives and in public reporting. The impact of these and other measures on hospital quality should be the focus of research. The committee also realizes that many measures are already 'topped-out' and can be retired to minimize abstraction burden. Additional research should examine the impact of dropping such a measure. Furthermore, continuous research to examine temporal trends and disparities in the achievement of performance and quality measures will help guide future revisions as well as the implementation of the current set. While the majority of current measures are binary (for example, yes or no for medication prescription), the next frontier in performance evaluation may be also to measure doses of prescribed pharmacotherapies and compare them to doses used in randomized trials showing benefit.

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11   **Key Words**
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13   ACC/AHA Performance Measures ■ ■ ST-elevation myocardial infarction■ ■ non-ST- elevation
14   myocardial infarction ■ ■ acute myocardial infarction ■ ■ performance measures■ ■ quality
15   measures■ ■ quality indicators ■

1   # Appendix A. STEMI and NSTEMI Performance Measures

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3   ## Performance Measures for Use in Patients With Inpatient STEMI and
4   ## NSTEMI

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7   ## Inpatient Measures

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Short Title: PM-1: Aspirin at Arrival	
PM-1: AMI: Aspirin Received at Arrival	
Measure Description: Percentage of patients, age 18 years and older, hospitalized with AMI who received aspirin within 24 hours before or after hospital arrival.	
Numerator	• Patients with AMI who have received aspirin within 24 hours before or after hospital arrival
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice on day of or day after arrival • Patients who die during hospitalization on day of or day after arrival • Patients who are on comfort measures/hospice only documented on day of or day after arrival • Patients who are transferred to another hospital for inpatient care on day of or day after arrival • Patients received in transfer from the inpatient, outpatient, or emergency department (ED) of another facility • Patients discharged on day of or day after arrival
Denominator Exceptions	• Documentation of a medical reason for not prescribing aspirin at arrival (e.g., aspirin allergy or intolerance, oral anticoagulant therapy as pre-arrival medication, active bleeding).
Measurement Period	Encounter

Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level.
Care Setting	Inpatient

Rationale

Coronary heart disease with atherosclerotic plaque disruption (e.g., rupture, erosion, ulceration) and superimposed platelet-rich thrombus formation are the main pathophysiological mechanisms causing MI (type 1 or spontaneous MI).

Acute occlusion of the coronary artery by the 'plaque + superimposed thrombus complex' results in acute imbalance in myocardial oxygen demand and supply which, when prolonged and unabated, leads to myocardial cell necrosis and infarction.

Acute and complete occlusion of the coronary artery usually results in STEMI, which usually presents with persistent ST elevation on the ECG or as an STEMI equivalent (e.g., new or presumably new LBBB, or true posterior MI, or even hyperacute T-wave appearance). On the other hand, severely obstructive but incompletely-occlusive coronary lesions usually result in NSTEMI, characterized by the absence of persistent ST-elevation on ECG, but rather the presence of ST depression, T-wave inversion or other non-specific changes.

Aspirin inhibits the formation of thromboxane A2, a potent stimulator of platelet aggregation, and is the first-line therapy for acute myocardial infarction (24). A loading dose of 162-325 mg of non-enteric coated aspirin formulation should be administered as soon as possible (to be crushed or chewed to achieve rapid absorption), followed preferably by an 81 mg daily dose to minimize bleeding risk. (24-28)

In the Second International Study of Infarct Survival (ISIS-2) trial (24), aspirin therapy administered within the first 24 hours after acute STEMI resulted in a 23% relative risk reduction in five-week vascular mortality (or 2.4% absolute risk reduction) in patients with STEMI. Significant reductions in the incidence of non-fatal re-infarction and stroke were also observed with aspirin (24).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Aspirin 162 to 325 mg should be given before primary PCI (27,29,30). *(Class I, Level of Evidence: B)*

2. Aspirin (162- to 325-mg loading dose) and clopidogrel (300-mg loading dose for patients <75 years of age, 75-mg dose for patients >75 years of age) should be administered to patients with STEMI who receive fibrinolytic therapy (24,31,32). *(Class I, Level of Evidence: A)*

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary

Syndromes (11)

1. Non–enteric-coated, chewable aspirin (162 mg to 325 mg) should be given to *all* patients with NSTE-ACS without contraindications as soon as possible after presentation, and a maintenance dose of aspirin (81 mg/d to 162 mg/d) should be continued indefinitely (7,33-36). *(Class I, Level of Evidence: A)*

2. Patients not on aspirin therapy should be given non−enteric-coated aspirin 325 mg as soon as possible before PCI (29,30,37,38). *(Class I, Level of Evidence: B)*

3. In patients with NSTE-ACS who are unable to take aspirin because of hypersensitivity or major gastrointestinal intolerance, a loading dose of clopidogrel followed by a daily maintenance dose should be administered (39) *(Class I, Level of Evidence: B)*

1   ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association, AMI, acute myocardial
2   infarction; ECG, electrocardiogram; ED, emergency department; LBBB, left bundle branch block; MI, myocardial infarction;
3   NSTE-ACS, non-ST-segment elevation acute coronary syndrome; NSTEMI, non-ST-segment elevation myocardial infarction;
4   STEMI, PCI, percutaneous coronary intervention; ST-segment elevation myocardial infarction.

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Short Title: PM-2: Aspirin at Discharge	
PM-2: AMI: Aspirin Prescribed at Discharge	
Measure Description: Percentage of patients, age 18 and older, hospitalized with AMI who are prescribed aspirin at hospital discharge.	
Numerator	• Patients with AMI who are prescribed aspirin at hospital discharge
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• Documentation of a medical reason for not prescribing aspirin at discharge (e.g., aspirin allergy or intolerance, oral anticoagulant therapy at discharge, active bleeding)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	

Coronary heart disease with atherosclerotic plaque disruption (e.g., rupture, erosion, ulceration) and superimposed platelet-rich thrombus formation are the main pathophysiological mechanisms causing MI (type 1 or spontaneous MI).

Acute occlusion of the coronary artery by the 'plaque + superimposed thrombus complex' results in acute imbalance in myocardial oxygen demand and supply which, when prolonged and unabated, leads to myocardial cell necrosis and infarction.

Aspirin inhibits the formation of thromboxane A2, a potent stimulator of platelet aggregation, and is the first-line therapy for AMI (24). Following an initial loading dose of 162-325 mg of non-enteric coated aspirin, an 81 mg daily dose is preferred to higher doses to minimize bleeding risk (25-28).

Aspirin should be continued indefinitely after a MI (40). The Antithrombotic Trialists' Collaboration's meta-analyses firmly confirmed the benefits of long-term aspirin therapy in patients at high-risk of occlusive vascular events, including patients with prior or acute MI (26). A subsequent meta-analysis inclusive of 16 secondary prevention trials (N =17,000 patients) compared long-term aspirin versus control, and demonstrated that aspirin

allocation was associated with a 1.5% significantly lower risk of serious vascular events per year, as well as significant reductions in coronary events and total stroke events (33).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. After PCI, aspirin should be continued indefinitely (13,26,41). *(Class I, Level of Evidence: A)*

2. Aspirin should be continued indefinitely (24,31,32) *(Class I, Level of Evidence: A)* and clopidogrel (75 mg daily) should be continued for at least 14 days (31,32) *(Class I, Level of Evidence: A)* and up to 1 year *(Class I, Level of Evidence: C)* in patients with STEMI who receive fibrinolytic therapy.

2014 AHA/ACC Guideline for the Management of Patients with Non—ST-Elevation Acute Coronary Syndromes (11)

1. After PCI, aspirin should be continued indefinitely at a dose of 81 mg to 325 mg daily (13,33,41). *(Class I, Level of Evidence: B)*

2. Aspirin should be continued indefinitely. The maintenance dose should be 81 mg daily in patients treated with ticagrelor and 81 mg to 325 mg daily in all other patients (33,34,36). *(Class I, Level of Evidence: A)*

1 ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI, acute myocardial
2 infarction; MI, myocardial infarction; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial
3 infarction.

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Short Tile: PM-3: Beta-Blocker at Discharge	
PM-3: AMI: Beta-Blocker Prescribed at Discharge	
Measure Description: Percentage of patients, age 18 or older, hospitalized with AMI, who are prescribed a beta-blocker at hospital discharge.	
Numerator	• Patients with AMI who are prescribed a beta blocker at hospital discharge
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• Documentation of a medical reason for not prescribing a beta blocker at hospital discharge (e.g., beta blocker allergy or intolerance, advanced heart block and no pacemaker, significant bradycardia or hypotension prior to discharge, active asthma or reactive airways disease, increased risk of heart failure/cardiogenic shock, recent history of cocaine or methamphetamine use with signs of acute intoxication).
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	
Beta blockers are excellent anti-ischemic and anti-anginal medications that decrease myocardial oxygen demand by reducing the heart rate, blood pressure, and contractility. They also reduce cardiac automaticity and the risk of VF after MI. In addition, they improve coronary perfusion by prolonging diastole and have a myriad of additional salubrious effects. Oral beta blockers should therefore be administered to all patients with MI without contraindications for their use. Common contraindications for beta blocker use include heart failure or risk for cardiogenic shock, bradycardia, hypotension, heart block, or active bronchospasm, or acute cocaine ingestion. Patients with initial contraindications	

to beta blockers in the first 24 hours after an AMI should be reevaluated to determine their subsequent eligibility.

A systematic review of randomized controlled trials inclusive of 54,234 patients with acute or prior MI demonstrated that beta blockers are effective in secondary prevention after MI and impart a 23% reduction in the odds of death in long-term trials (42). Notably, the evidence is established predominantly in the pre-reperfusion era among patients with STEMI. The effects of beta blockers appear also to be greatest among patients with MI complicated by heart failure, systolic cardiomyopathy or ventricular arrhythmias (42).

Although not prospectively studied, the AHA/ACCF secondary prevention guidelines recommend a 3-year treatment course with beta blockers for patients with uncomplicated MI (13). Many of these patients, however, have either hypertension or heart failure/systolic cardiomyopathy, and are usually continued on an oral beta blocker indefinitely.

It is advisable to use beta blockers without intrinsic sympathomimetic activity, and in patients with MI complicated with systolic cardiomyopathy with or without heart failure, one of the three proven beta blockers should be used: carvedilol, sustained-release metoprolol succinate, or bisoprolol.

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Beta blockers should be continued during and after hospitalization for all patients with STEMI and with no contraindications to their use (42,43). *(Class I, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non—ST-Elevation Acute Coronary Syndromes (11)

1. In patients with concomitant NSTE-ACS, *stabilized* HF, and reduced systolic function, it is recommended to continue beta-blocker therapy with 1 of the 3 drugs proven to reduce mortality in patients with HF: sustained-release metoprolol succinate, carvedilol, or bisoprolol. *(Class I, Level of Evidence: C)*

2. Beta blockers should not be administered to patients with ACS with a recent history of cocaine or methamphetamine use who demonstrate signs of acute intoxication due to the risk of potentiating coronary spasm. *(Class III, Level of Evidence: C)*

1   ACC(F): American College of Cardiology Foundation., ACS indicates acute coronary syndrome; AHA, American Heart
2   Association, AMI, acute myocardial infarction; HF, heart failure; MI, myocardial infarction; NSTE-ACS, non—ST-segment
3   acute coronary syndrome; STEMI, ST-segment elevation myocardial infarction; VF, ventricular fibrillation.

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Short Title: PM-4: Statin at Discharge	
PM-4: AMI: Statin Prescribed at Discharge	
Measure Description: Percentage of patients 18 years of age and older, hospitalized with AMI, who were prescribed high-intensity statin at hospital discharge.	
Numerator	• Patients with AMI who are prescribed a high-intensity statin at hospital discharge High-intensity statin dose is defined in Table 5 of the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (14).
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are discharged to hospice or who are on comfort care measures only • Patients who are transferred to another acute care hospital
Denominator Exceptions	• Documentation of a medical reason for not prescribing a high-intensity statin (e.g., allergy, intolerance or contraindications to high-intensity statin[s], other medical reasons) • Documentation of prescription of a moderate-intensity statin for patients older than 75 years of age • Documentation of a patient reason for not prescribing a statin • Patient currently enrolled in a clinical trial related to lipid lowering therapy
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	
Patients with a MI are at high risk for recurrent CV events. Statins inhibit the HMG-CoA reductase enzyme, the rate-limiting step in cholesterol biosynthesis, and are powerful drugs for lowering LDL-cholesterol (LDL-C), with	

reductions ≥ 50% observed with the high-intensity statin regimens.

Statins have been shown in multiple secondary prevention trials to reduce CV events, including coronary heart disease death, recurrent MI, cerebrovascular events, coronary revascularization and all-cause mortality (44-46). They have also been shown to delay coronary atherosclerosis progression and possibly induce plaque regression, on serial angiographic and intravascular ultrasound studies.

Given that the clinical evidence does not support the notion of titrating statin therapy to achieve a proposed LDL-C target and that statins are beneficial in all patients at high cardiovascular risk irrespective of their LDL-C levels, the paradigm of treating patients to LDL-C targets is largely abandoned (14,47). On the other hand, high-intensity statin therapy appears to confer incremental clinical benefit compared with less intensive therapy (48). The *Cholesterol Treatment Trialists* conducted meta-analyses of individual participant data from randomized trials of more versus less intensive statin regimens (five trials; 39,612 patients) (48). They demonstrated that more intensive regimens produced a highly significant 15% further reduction in major vascular events, driven by reductions in coronary death or non-fatal MI, coronary revascularization and ischemic stroke (48).

The 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults recommends treatment of patients ≤ 75 years of age who have clinical atherosclerotic cardiovascular disease [ASCVD] (including those with MI) with high-intensity statin (14). Moderate-intensity statins are recommended in their counterparts > 75 years of age and in those who have contraindications/intolerance to high-intensity regimens. The guideline emphasizes that statin use therapy should be individualized in persons >75 years of age according to the potential for ASCVD risk-reduction benefits, adverse effects, drug-drug interactions and patient preferences (14). Improved compliance with therapy is an impetus for timing the initiation of statin therapy before discharge in patients hospitalized with acute MI.

Clinical Recommendation(s)

The 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (14):

1. High-intensity statin therapy should be initiated or continued as first-line therapy in women and men ≤75 years of age who have *clinical ASCVD*, unless contraindicated. *(Class I, Level of Evidence: A)*

2. In individuals with *clinical ASCVD** in whom high-intensity statin therapy would otherwise be used, when high-intensity statin therapy is contraindicated† or when characteristics predisposing to statin-associated adverse effects are present, moderate-intensity statin should be used as the second option if tolerated. *(Class I, Level of Evidence: A)*

3. In individuals with *clinical* ASCVD* >75 years of age, it is reasonable to evaluate the potential for ASCVD risk-reduction benefits and for adverse effects, drug-drug interactions and to consider patient preferences, when initiating a moderate- or high-intensity statin. It is reasonable to continue statin therapy in those who are tolerating it. *(Class IIA; Level of Evidence: B)*

*Clinical ASCVD includes acute coronary syndromes, history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, TIA, or peripheral arterial disease presumed to be of atherosclerotic origin.

†Contraindications, warnings, and precautions are defined for each statin according to the manufacturer's prescribing information(14)

1 ACC indicates American College of Cardiology; ACSVD, atherosclerotic cardiovascular disease; AHA, American Heart
2 Association, AMI, acute myocardial infarction; CV, cardiovascular; HMG-CoA, 3-hydroxy-3-methylglutaryl-coenzyme A, LDL-
3 C, low density lipoprotein-cholesterol, MI, myocardial infarction; TIA, transient ischemic attack.

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Short Title: PM-5: Evaluation of Left Ventricular Ejection Fraction (LVEF)	
PM-5: AMI: Evaluation of LVEF	
Measure Description: Percentage of patients, age 18 or older, hospitalized with AMI, with documentation in the hospital record that LVEF is evaluated during hospitalization or is planned for after discharge.	
Numerator	• Patients with AMI with documentation in the hospital record that LVEF assessment, which can be either qualitative or quantitative, is done during the hospitalization or is planned for after discharge
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level.
Care Setting	Inpatient
Rationale	

LVEF is important from a therapeutic and prognostic standpoint for patients with acute AMI for many reasons:

- Patients with reduced left ventricular ejection fraction (LVEF) may benefit from specific medical therapies, such as inhibitors of the renin-angiotensin-aldosterone system.
- The presence of left ventricular systolic dysfunction (LVSD) may help inform and guide the invasive strategy and revascularization modality (e.g., further risk stratification in patients with non-ST-elevation MI, use of percutaneous circulatory assist devices during percutaneous coronary interventions, choice of surgical revascularization).
- LVEF is one of the strongest predictors of long-term survival following AMI.
- LVEF measurement during hospitalization provides a baseline and dictates outpatient re-assessment few

weeks later in patients with initially depressed post-MI LVEF. This will help guide the need for device therapy.

LV function can be assessed by a variety of modalities (e.g., contrast ventriculography, echocardiography, CT angiography). However, a transthoracic echocardiography is most useful. It is non-invasive, relatively inexpensive, and helps provide a comprehensive assessment of the LV function (regional and global) and size, and rule out post-MI mechanical and other complications.

Clinical Recommendation(s)
2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12) 1. LVEF should be measured in all patients with STEMI. *(Class I, Level of Evidence: C)* **2014 AHA/ACC Guideline for the Management of Patients with Non—ST-Elevation Acute Coronary Syndromes (11)** 1. A noninvasive imaging test is recommended to evaluate LV function in patients with definite ACS (49-53) . *(Class I, Level of Evidence: C)*

1 ACC (F) indicates American College of Cardiology Foundation; ACS, acute coronary syndrome; AHA, American Heart
2 Association; AMI, acute myocardial infarction; CT, computed tomography; LV; left ventricular; LVEF, left ventricular ejection
3 fraction; LVSF, left ventricular systolic function, MI, myocardial infarction; NSTEMI, non-ST-segment elevation myocardial
4 infarction; STEMI, ST-segment elevation myocardial infarction.

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Short Title: PM-6: ACE Inhibitor (ACEI) or Angiotensin Receptor Blocker (ARB) for LVSD

PM-6: AMI: ACEI or ARB Prescribed for LVSD at Discharge

Measure Description: Percentage of patients, age 18 or older, hospitalized with AMI and LVSD who are prescribed an ACEI or ARB at hospital discharge.

Numerator	• Patients with AMI with LVSD (defined as chart documentation of a LVEF <40% or a narrative description of LVSF consistent with moderate or severe systolic dysfunction) who are prescribed an ACEI or ARB at hospital discharge
Denominator	• All AMI patients with LVSD
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient care
Denominator Exceptions	• Documentation of medical reasons for not prescribing an ACEI and not prescribing an ARB at discharge (e.g., allergy or intolerance to ACEI and ARB including: angioedema, hyperkalemia, hypotension, renal artery stenosis, worsening renal function) • Patients already receiving an angiotensin receptor-neprilysin inhibitor (ARNI) (e.g., valsartan/sacubitril)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	

ACEIs improve survival in patients with AMI, particularly in those with reduced LVEF. They attenuate LV remodeling and infarct expansion and have a variety of additional beneficial effects (effects on ischemic preconditioning, fibrinolysis, recurrent MI, sudden death).

The Survival and Ventricular Enlargement (SAVE) study demonstrated the benefits of captopril in reducing mortality, recurrent MI and HF hospitalization in AMI patients with an LVEF <40%, but without overt HF on entry

(54). Other studies showed comparable findings (55,56).

ARBs are reasonable alternatives to ACEIs in patients with AMI and LV systolic dysfunction, and can be used for patients who are intolerant to ACEIs. In the *Valsartan in Acute Myocardial Infarction* (VALIANT) trial, losartan was non-inferior to captopril in patients with MI complicated by LVSD, heart failure, or both (57).

Common contraindications to the use of these agents include hypotension, shock, bilateral renal artery stenosis, worsening of renal function with ACEI/ARB exposure, and drug allergy.

The ARNI, valsartan/sacubitril, is the first approved ARNI for the treatment of patients with heart failure and reduced ejection fraction. Compared to the ACEI, enalapril, it reduced the composite endpoint of cardiovascular death or heart failure hospitalization in the pivotal PARADIGM-HF trial(Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in Heart Failure) (17). The ARNI is even recommended as a replacement therapy for symptomatic heart failure educed ejection fraction with New York Heart Association class II or III who tolerate an ACEI or ARB (17). An ACEI should not be added to AMI patients already treated with an ARNI given the increased risk of angioedema and other complications (e.g., hypotension, renal insufficiency). Additionally, an ARB is already a component of the ARNI regimen and as such adding ARB is not clinically advocated.

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. An angiotensin-converting enzyme inhibitor (ACE) should be administered within the first 24 hours to all patients with STEMI with anterior location, HF, or ejection fraction (EF) less than or equal to 0.40, unless contraindicated (54,58-60). *(Class I, Level of Evidence: A)*

2. An angiotensin receptor blocker (ARB) should be given to patients with STEMI who have indications for but are intolerant of ACE inhibitors (57,61) . *(Class I, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non—ST-Elevation Acute Coronary Syndromes (11)

1. ACE inhibitors should be started and continued indefinitely in all patients with LVEF less than 0.40 and in those with hypertension, diabetes mellitus, or stable chronic kidney disease (CKD), unless contraindicated (62,63) . *(Class I, Level of Evidence: A)*

2. ARB are recommended in patients with HF or MI with LVEF less than 0.40 who are ACE inhibitor intolerant (57,64). *(Class I, Level of Evidence: A)*

1 ACC(F) American College of cardiology Foundation; ACEI, angiotensin-converting enzyme inhibitor; AHA, American Heart
2 Association; AMI, acute myocardial infarction; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor-neprilysin
3 inhibitor; CKD, chronic kidney disease; HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction; LVSD,
4 left ventricular systolic dysfunction; LVSF, left ventricular systolic function, MI; myocardial infarction; PARADIGM-HF,
5 Prospective comparison of ARNI with ACEI to Determine Impact on Global Mortality and morbidity in Heart Failure; STEMI,
6 ST-segment elevation myocardial infarction.

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Short Title: PM-7: Door-to-Needle Time (DTN Time)	
PM-7: Acute STEMI: Time to Fibrinolytic Therapy	
Measure Description: Percentage of patients, age 18 or older, with acute STEMI, or its equivalent, who receive fibrinolytic therapy with a time from hospital arrival to fibrinolysis ≤ 30 minutes.	
Numerator	• All patients with acute STEMI or its equivalent defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, whose time from hospital arrival to fibrinolytic therapy (STN time) is ≤ 30 minutes
Denominator	• All patients with acute STEMI and its equivalent
Denominator Exclusions	• Patients less than 18 years of age • Patients received in transfer from the inpatient, outpatient, or ED of another facility
Denominator Exceptions	• Documentation of a medical reason for delayed fibrinolytic therapy (e.g., cardiopulmonary arrest, cardiogenic shock, initial suspicion of bleeding/stroke or other contraindications to use fibrinolytic therapy, respiratory failure requiring intubation, intra-aortic balloon pump insertion) • Documentation of a patient reason (e.g., initial patient concern with bleeding hazards)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	

In the Second International Study of Infarct Survival trial (24), the fibrinolytic streptokinase significantly reduced 5-week vascular mortality by 2.8% compared to placebo, which remained significant at a median follow-up of 15 months. In that trial, the combination of streptokinase and aspirin was also associated with significantly fewer re-infarction, stroke and death events compared to placebo (24). The benefits of acute reperfusion with fibrinolytic therapy in patients with STEMI was further corroborated by the report from the Fibrinolytic Therapy Trialists, which included nine trials randomizing a total of 58,600 patients to fibrinolytic therapy versus control (65). The aforementioned collaborative report also demonstrated an inverse relation between the benefit from fibrinolytic and delay from symptom onset, with highly significant absolute mortality reductions of 3% for patients presenting within 0-6 hours and 2% for those presenting 7-12 hours from symptom onset (65).

The ACCF/AHA guideline for the management of STEMI (12) recommends that patients who present with STEMI to a non-PCI capable hospital should receive timely fibrinolytic therapy, if inter-hospital timely transfer time for primary PCI is not feasible (to achieve mechanical reperfusion within ≤ 120 minutes of first medical contact [FMC]). Despite the lack of strong supporting evidence, the clinical consensus is to also to consider fibrinolytic administration in symptomatic STEMI patients presenting > 12 hours after symptom onset with STEMI when PCI is not feasible and when there is a large myocardium at jeopardy or hemodynamic instability (12).

The survival benefit observed with fibrinolytic agents is greatest when they are administered within the first 2 hours after the onset of STEMI symptoms (66-68). As the length of time between patient's presentation and the delivery of fibrinolytic therapy (door-to-needle time) increases, the benefit from therapy decreases and progressive increase in infarct size and reduction in LVEF ensue. Thus, the benefit of fibrinolytic therapy is most effective when provided promptly, and the ACCF/AHA guideline set a benchmark time goal from hospital arrival to drug administration, or door-to-needle time, to be ≤ 30 minutes (12).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. In the absence of contraindications, fibrinolytic therapy should be administered to patients with STEMI at non–PCI-capable hospitals when the anticipated FMC-to-device time at a PCI- capable hospital exceeds 120 minutes because of unavoidable delays (65,69,70). *(Class I, Level of Evidence: B)*

2. When fibrinolytic therapy is indicated or chosen as the primary reperfusion strategy, it should be administered within 30 minutes of hospital arrival* (66,68,71-73). *(Class I, Level of Evidence: B)*

3. In the absence of contraindications, fibrinolytic therapy should be given to patients with STEMI and onset of ischemic symptoms within the previous 12 hours when it is anticipated that primary PCI cannot be performed within 120 minutes of FMC (24,65,74-78). *(Class I, Level of Evidence: A)*

4. Fibrinolytic therapy should not be administered to patients with ST depression except when a true posterior (inferobasal) MI is suspected or when associated with ST elevation in lead aVR (65,79-82). *(Class III, Level of Evidence: B)*

5. In the absence of contraindications, fibrinolytic therapy should be administered to patients with STEMI and cardiogenic shock who are unsuitable candidates for either PCI or CABG (65,83,84). *(Class I, Level of Evidence: B)*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible

1   ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; CABG, coronary artery

2   bypass graft; DTN, door-to-needle; ECG, electrocardiogram; ED, emergency department; FMC, first medical contact; LBBB, left

3   bundle branch block; LVEF, left ventricular ejection fraction MI, myocardial infarction; PCI, percutaneous coronary

4   intervention; STEMI, ST-segment elevation myocardial infarction.

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Short Title: PM-8: First Medical Contact-Device Time (FMC- Device Time)	
PM-8: Acute STEMI: Time to Primary Percutaneous Coronary Intervention (PCI)	
Measure Description: Percentage of patients, age 18 or older, with acute STEMI, or its equivalent, who receive primary PCI during the hospital stay with a time from FMC-device ≤ 90 minutes.	
Numerator	• Patients with acute STEMI, or its equivalent, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, whose FMC-device time during primary PCI is ≤ 90 minutes.
Denominator	• All patients with acute STEMI or its equivalent who receive primary PCI
Denominator Exclusions	• Patients less than 18 years of age • Patients received in transfer from the inpatient, outpatient, or ED of another facility
Denominator Exceptions	• Documentation of a medical reason for delayed primary PCI (e.g. cardiopulmonary arrest, cardiogenic shock, vascular access issues, percutaneous circulatory assist device insertion, and respiratory failure requiring intubation) • Patients have received fibrinolytic therapy as the initial reperfusion therapy (e.g., non-primary PCI, rescue PCI) • Patient currently enrolled in a clinical trial related to reperfusion therapy
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	
Primary PCI has been shown to be superior to fibrinolytic therapy in recanalizing the infarct-related artery and imparts better clinical outcomes (85,86). In a meta-analysis of 23 trials randomizing a total of 7,739 patients with acute STEMI to primary angioplasty or fibrinolytic therapy, primary angioplasty was superior in reducing short-term mortality, non-fatal re-infarction, stroke, and the combined cardiovascular endpoint (87). Primary angioplasty also	

resulted in higher rates of infarct artery patency, Thrombolysis in Myocardial Infarction3 flow, and lower rates of recurrent ischemia, emergency repeat revascularization procedures, and intracranial hemorrhage (87). The benefits of primary angioplasty persisted during long-term follow-up and were independent of the type of fibrinolytic therapy used (87).

Clinical Recommendation(s)

2013 ACCF/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators (87-89). *(Class I, Level of Evidence: A)*

2. EMS transport directly to a PCI- capable hospital for primary PCI is the recommended triage strategy for patients with STEMI, with an ideal FMC-to-device time system goal of 90 minutes or less* (90-92). *(Class 1, Level of Evidence: B)*

3. Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours' duration (85-87). *(Class I, Level of Evidence: A)*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

1 ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; ECG indicates
2 electrocardiogram; ED, emergency department; EMS, emergency medical services; LBBB, left bundle branch block; FMC, first
3 medical contact; MI, myocardial infarction; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial
4 infarction.

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Short Title: PM-9: Reperfusion Therapy	
PM-9: Acute STEMI: Reperfusion Therapy	
Measure Description: Percentage of patients, age 18 or older, with acute STEMI, or its equivalent, who receive fibrinolytic therapy or primary PCI.	
Numerator	• Patients with acute STEMI and its equivalent, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, who receive fibrinolytic therapy or primary PCI.
Denominator	• All patients with acute STEMI and its equivalent.
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice shortly/immediately after arrival • Patients who are on comfort care measures only or hospice documented on arrival
Denominator Exceptions	• Documentation of a medical reason for not receiving reperfusion therapy (e.g., active major bleeding, acute stroke, terminal illness/futile).
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level.
Care Setting	Inpatient
Rationale	
Overall, patients presenting with acute STEMI can undergo either pharmacologic (fibrinolytic therapy) or mechanical (primary angioplasty/PCI) reperfusion. Given its superiority to fibrinolytic therapy, the ACCF/AHA guideline for the management of STEMI (12) outlines that primary PCI is the preferred treatment and should be performed timely in patients with acute STEMI. However, if primary PCI cannot be performed in a timely manner (within FMC-device time] ≤ 90 minutes, including the inability to transfer the patient timely from a non-PCI-	

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capable to a PCI-capable hospital to achieve FMC-device ≤ 120 minutes), timely fibrinolytic therapy (within door-to-needle ≤ 30 minutes) is an acceptable alternative therapeutic strategy. On the other hand, if fibrinolytic therapy is contraindicated or if the complications of cardiogenic shock or acute severe heart failure ensue, primary PCI should be undertaken irrespective of the time delay from FMC or STEMI symptom onset.

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Reperfusion therapy should be administered to all eligible patients with STEMI with symptom onset within the prior 12 hours (65,87). *(Class I, Level of Evidence: A)*

2. Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators (87-89) . *(Class I, Level of Evidence: A)*

3. EMS transport directly to a PCI- capable hospital for primary PCI is the recommended triage strategy for patients with STEMI, with an ideal FMC-to-device time system goal of 90 minutes or less* (90-92). *(Class I, Level of Evidence: B)*

4. Immediate transfer to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI who initially arrive at or are transported to a non–PCI-capable hospital, with an FMC-to-device time system goal of 120 minutes or less* (88,89,93,94). *(Class I, Level of Evidence: B)*

5. In the absence of contraindications, fibrinolytic therapy should be administered to patients with STEMI at non–PCI-capable hospitals when the anticipated FMC-to-device time at a PCI- capable hospital exceeds 120 minutes because of unavoidable delays (65,69,70). *(Class I, Level of Evidence: B)*

6. Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours' duration (85-87). *(Class I, Level of Evidence: A)*

7. Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours' duration who have contraindications to fibrinolytic therapy, irrespective of the time delay from FMC (95,96). *(Class I, Level of Evidence: B)*

8. Primary PCI should be performed in patients with STEMI and cardiogenic shock or acute severe HF, irrespective of time delay from MI onset (97-100). *(Class I, Level of Evidence: B)*

9. In the absence of contraindications, fibrinolytic therapy should be given to patients with STEMI and onset of ischemic symptoms within the previous 12 hours when it is anticipated that primary PCI cannot be performed within 120 minutes of FMC (24,65,74-78). *(Class I, Level of Evidence: A)*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

1   ACCF indicates American College of Cardiology Foundation; AHA American Heart Association; CPR cardiopulmonary
2   resuscitation; DBP, diastolic blood pressure; DTN, door-to-needle; ECG, electrocardiogram; EMS, emergency medical services,
3   FMC, first medical contact; FTT, Fibrinolytic Therapy Trialists'; HF, heart failure; ISIS-2, Second International Study of Infarct
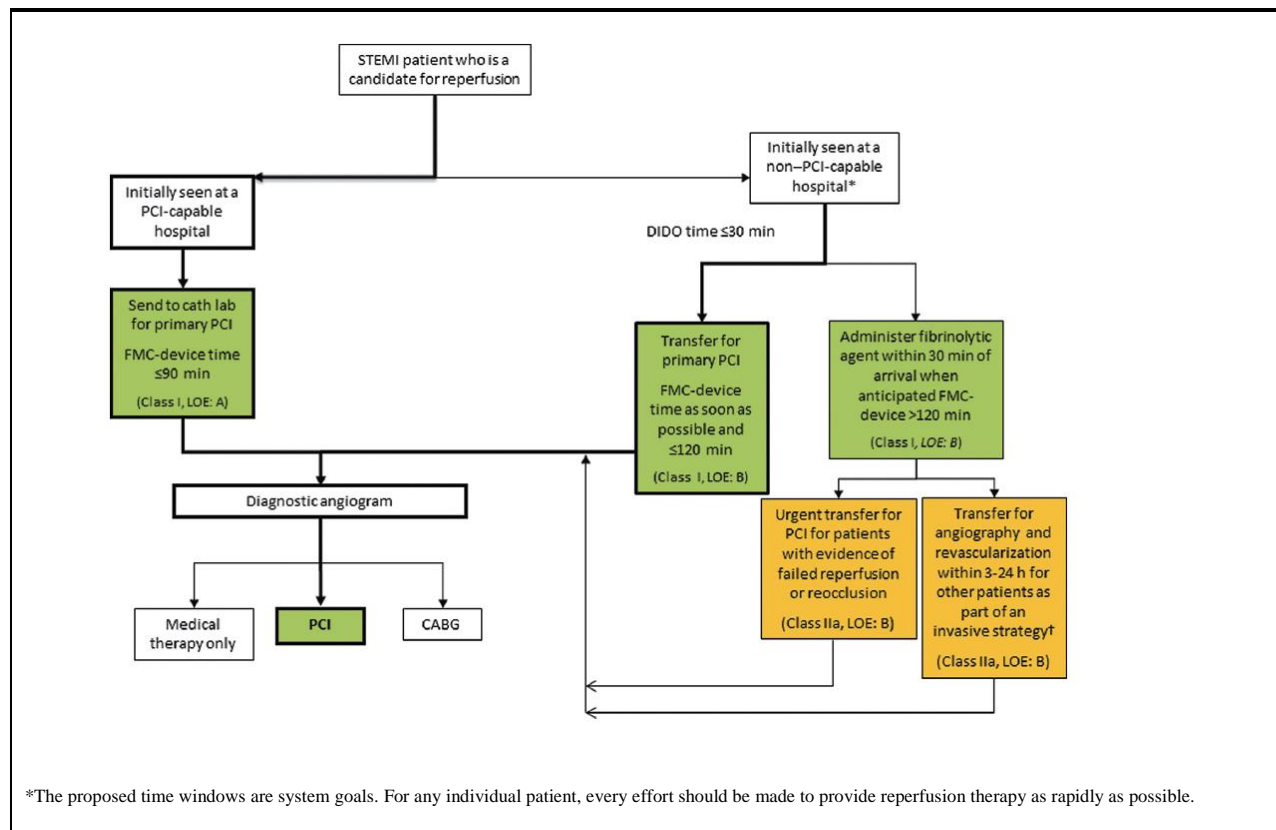
1 Survival; LBBB, left bundle branch block; MI, myocardial infarction; PCI, percutaneous coronary intervention; SBP, systolic
2 blood pressure; STEMI, ST-segment elevation myocardial infarction; TIMI, thrombolysis in myocardial infarction

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Short Title: PM-10: Door-in-Door-Out Time (DIDO Time)

PM-10: Acute STEMI: Time from Emergency Department Arrival at STEMI Referral Facility to ED Discharge from STEMI Referral Facility in Patients Transferred for Primary PCI

Measure Description: Percentage of patients, age 18 or older, with acute STEMI, or its equivalent, whose median time from the ED arrival at STEMI referral facility to ED discharge from STEMI referral facility is ≤30 minutes.

Numerator	• Patients with acute STEMI, or its equivalent, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new left LBBB, or evidence of true posterior MI on the ECG, who are seen initially at non-PCI-capable hospital and who are transferred to a PCI-capable hospital within DIDO time ≤30 minutes
Denominator	• All patients with acute STEMI, or its equivalent, who are seen initially at non-PCI-capable hospital and who are transferred to a PCI-capable hospital
Denominator Exclusions	• Patients less than 18 years of age • Patients who are transferred for a PCI that is described as non-primary treatment for AMI by a healthcare provider (e.g., patients who receive fibrinolytic therapy as the primary reperfusion therapy)
Denominator Exceptions	• Documentation of a medical reason for the delay (e.g., cardiopulmonary arrest, balloon pump insertion, respiratory failure requiring intubation). • Documentation of a patient reason for the delay (e.g., initial concern, patient choice) • Patient currently enrolled in a clinical trial related to AMI and reperfusion therapy
Measurement Period	Encounter

Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility level Only STEMI referral facility (non-PCI-capable facility) is accountable for this measure.
Care Setting	Inpatient

Rationale
Clinical trials have demonstrated improved outcome for patients with STEMI who are transferred to primary PCI hospital in a timely manner. Current guidelines recommend that transfer occur immediately with an overall goal of FMC- to- device of 120 minutes or less; this can be best achieved by shortening the time in the first ED and transferring the STEMI patient within door-in-door-out of 30 minutes or less (88,89,93,94,101)

Clinical Recommendation(s)
2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12) 1. Immediate transfer to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI who initially arrive at or are transported to a non–PCI-capable hospital, with an FMC-to-device time system goal of 120 minutes or less* (88,89,93,94). *(Class I, Level of Evidence: B)* 2. Immediate transfer to a PCI-capable hospital for coronary angiography is recommended for suitable patients with STEMI who develop cardiogenic shock or acute severe HF, irrespective of the time delay from MI onset (101) . *(Class I, Level of Evidence: B)*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible.

1 ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI, acute myocardial
2 infarction; DIDO, door-in-door-out; ECG; electrocardiogram; ED, emergency department; FMC, first medical contact; LBBB;
3 left bundle branch block; LOE; level of evidence; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation
4 myocardial infarction.

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Short Title: PM-11: Time to Primary PCI Among Transferred Patients	
PM-11: Acute STEMI: Time from First Medical Contact (at or before ED Arrival at STEMI Referral Facility) to Primary PCI at STEMI Receiving Facility Among Transferred Patients	
Measure Description: Percentage of patients, age 18 or older, with acute STEMI, or its equivalent, whose median time from FMC that is (at or before the ED arrival to STEMI referral facility [non-PCI-capable facility]) to primary PCI at a STEMI receiving facility (PCI-capable facility) is ≤120 minutes.	
Numerator	• Patients with acute STEMI, or its equivalent, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, who are seen initially at non-PCI-capable hospital and who are transferred to a PCI-capable hospital and have received primary PCI ≤120 minutes from FMC
Denominator	• All patients with acute STEMI, or its equivalent, who are seen initially at non-PCI-capable hospital and who are transferred to a PCI-capable hospital and have received primary PCI
Denominator Exclusions	• Patients less than 18 years of age • Patients who are transferred for a PCI that is described as non-primary by a healthcare provider (e.g., patients who receive fibrinolytic therapy at the referral facility as the primary reperfusion therapy)
Denominator Exceptions	• Documentation of a medical reason for the delay (e.g., cardiopulmonary arrest, balloon pump insertion, respiratory failure requiring intubation) • Documentation of a patient reason for the delay (e.g., initial patient concern) • Patient currently enrolled in a clinical trial related to STEMI and reperfusion therapy
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility* level *Both STEMI referral facility (non-PCI-capable) and STEMI receiving facility (PCI-capable) are accountable for this measure.

Care Setting	Inpatient

Rationale
Patient outcome is improved if patients, initially presenting to a non-PCI-capable hospital, can be quickly transferred to a PCI-capable hospital for primary PCI. (88,89,93,94)

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)
1. Immediate transfer to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI who initially arrive at or are transported to a non–PCI-capable hospital, with an FMC-to-device time system goal of 120 minutes or less* (88,89,93,94). *(Class I, Level of Evidence: B)*

*The proposed time windows are system goals. For any individual patient, every effort should be made to provide reperfusion therapy as rapidly as possible

1 ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; ECG, electrocardiogram; ED,
2 emergency department; FMC, first medical contact; LBBB; left bundle branch block; MI, myocardial infarction; PCI,
3 percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction.

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Short title: PM-12: Cardiac Rehabilitation (CR) Referral	
PM-12: AMI: CR Patient Referral from an Inpatient Setting	
Measure Description: Percentage of patients, age 18 or older, hospitalized with AMI who are referred to an outpatient CR/secondary prevention program during their AMI hospital stay.	
Numerator	• AMI patients who are referred to outpatient CR/secondary prevention program prior to hospital discharge
Denominator	• Number of hospitalized patients in the reporting period hospitalized with qualifying event/diagnosis
Denominator Exclusions	None
Denominator Exceptions	• Provider-oriented criteria (patient deemed to have a high-risk condition or a contraindication to exercise, for example) • Health care system barriers (financial barriers or lack of CR programs near a patient's home, for example)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	

A key component to outpatient CR program utilization is the appropriate and timely referral of patients. Generally, the most important time for this referral to take place is while the patient is hospitalized for a qualifying event/diagnosis (MI, chronic stable angina, coronary artery bypass graft, PCI, cardiac valve surgery, or cardiac transplantation).

This performance measure has been developed to help healthcare systems implement effective steps in their systems of care that will optimize the appropriate referral of a patient to an outpatient CR program.

This measure is designed to serve as a stand-alone measure or, preferably, to be included within other performance measurement sets that involve disease states or other conditions for which CR services have been found to be appropriate and beneficial (e.g., following MI, coronary artery bypass graft surgery). This performance measure is provided in a format that is meant to allow easy and flexible inclusion into such performance measurement sets.

Effective referral of appropriate inpatients to an outpatient CR program is the responsibility of the healthcare team within a healthcare system that is primarily responsible for providing cardiovascular care to the patient during the

hospitalization.

Clinical Recommendation(s)

ACC/AHA 2004 Guideline Update for Coronary Artery Bypass Graft Surgery (102)
1. Cardiac rehabilitation should be offered to all eligible patients after CABG. *(Class I, Level of Evidence: B).*

ACC/AHA 2007 Update of the Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction (103)

1. Advising medically supervised programs (cardiac rehabilitation) for high-risk patients (e.g., recent acute coronary syndrome or revascularization, HF) is recommended *(Class I, Level of Evidence: B).*

ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina and Non–ST-Segment Elevation Myocardial Infarction (104)

1. Cardiac rehabilitation/secondary prevention programs are recommended for patients with UA/NSTEMI, particularly those with multiple modifiable risk factors and/or those moderate- to high-risk patients in whom supervised exercise training is particularly warranted. *(Class I, Level of Evidence: B)*
2. Cardiac rehabilitation/secondary prevention programs, when available, are recommended for patients with UA/NSTEMI, particularly those with multiple modifiable risk factors and those moderate- to high-risk patients in whom supervised or monitored exercise training is warranted. *(Class I, Level of Evidence: B)*

ACC/AHA 2007 Chronic Angina Focused Update of the Guidelines for the Management of Patients With Chronic Stable Angina (105)

1. Medically supervised programs (cardiac rehabilitation) are recommended for at-risk patients (e.g., recent acute coronary syndrome or revascularization, heart failure). *(Class I, Level of Evidence: B)*

ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult (106)

1. Exercise training is beneficial as an adjunctive approach to improve clinical status in ambulatory patients with current or prior symptoms of HF and reduced LVEF. *(Class I, Level of Evidence: B)*

AHA Evidence-Based Guidelines for Cardiovascular Disease Prevention in Women: 2007 Update (107)

1. A comprehensive risk-reduction regimen, such as cardiovascular or stroke rehabilitation or a physician-guided home- or community-based exercise training program, should be recommended to women with a recent acute coronary syndrome or coronary intervention, new-onset or chronic angina, recent cerebrovascular event, peripheral arterial disease *(Class I, Level of Evidence: A),* or current/prior symptoms of heart failure and an LVEF ≤ 40%. *(Class I, Level of Evidence: B)*

ACC/AHA/SCAI 2007 Focused Update of the Guidelines for Percutaneous Coronary Intervention (108)

1. Advising medically supervised programs (cardiac rehabilitation) for high-risk patients (e.g., recent acute coronary syndrome or revascularization, heart failure) is recommended. *(Class I, Level of Evidence: B)*

1 ACC indicates American College of Cardiology; AHA, American Heart Association; CR, cardiac rehabilitation; LVEF, left
2 ventricular; MI, myocardial infarction; PCI, percutaneous coronary intervention; SCAI, the Society for Cardiac Angiography and
3 Interventions; STEMI, ST-segment elevation myocardial infarction; UA/NSTEMI, unstable angina/non-ST segment myocardial
4 infarction.

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Short Title: PM-13: P_2Y_{12} Inhibitor at Discharge	
PM-13: AMI: P_2Y_{12} Receptor Inhibitor Prescribed at Discharge	
Measure description: Percentage of patients, age 18 and older, hospitalized with AMI who are prescribed an appropriate P_2Y_{12} receptor inhibitor at hospital discharge.	
Numerator	• Patients with AMI who are prescribed an appropriate P_2Y_{12} receptor inhibitor at hospital discharge Appropriate P_2Y_{12} receptor inhibitors include: • Clopidogrel, prasugrel or ticagrelor in PCI-treated patients • Clopidogrel or ticagrelor in medically-treated patients • Clopidogrel or prasugrel in STEMI patients receiving fibrinolytic therapy
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• Documentation of a medical reason for not prescribing a P_2Y_{12} receptor inhibitor at hospital discharge (e.g., allergy or intolerance to each of the three P_2Y_{12} receptor inhibitors, oral anticoagulant therapy at discharge, active bleeding, patients with CABG procedure done during hospital stay or scheduled after discharge) • Documentation of a patient reason for not prescribing a P_2Y_{12} receptor inhibitor at hospital discharge • Patient currently enrolled in a clinical trial related to AMI and involving new antiplatelet therapies
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient

Rationale
Coronary heart disease with atherosclerotic plaque disruption (e.g., rupture, erosion, ulceration) and superimposed platelet-rich thrombus formation are the main pathophysiological mechanisms causing MI (type 1 or spontaneous MI). Dual antiplatelet therapy has become the mainstay treatment strategy after AMI. Aspirin inhibits the formation of thromboxane A2, a potent stimulator of platelet aggregation, and is the first-line therapy for AMI. P_2Y_{12} Receptor Inhibitors have incremental benefits to aspirin, and patients with acute MI who are treated with P_2Y_{12} Receptor Inhibitor at discharge have improved cardiovascular outcomes (predominantly, lower recurrent MI events) (11,12).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. P_2Y_{12} inhibitor therapy should be given for 1 year to patients with STEMI who receive a stent (bare-metal or drug-eluting) during primary PCI using the following maintenance doses:
   a. Clopidogrel 75 mg daily (109,110) *(Class I, Level of Evidence: B)*; or
   b. Prasugrel 10 mg daily (109) *(Class I, Level of Evidence: B);* or
   c. Ticagrelor 90 mg twice a day ‡(111) *(Class I, Level of Evidence: B)*

   ‡The recommended maintenance dose of aspirin to be used with ticagrelor is 81 mg daily.

2. Prasugrel should not be administered to patients with a history of prior stroke or transient ischemic attack (110). *(Class III, Level of Evidence: B)*

3. Aspirin should be continued indefinitely (24,31,32) *(Class I, Level of Evidence: A)* and clopidogrel (75 mg daily) should be continued for at least 14 days (24,31,32) *(Class I, Level of Evidence: A)* and up to 1 year *(Class I, Level of Evidence: C)* in patients with STEMI who receive fibrinolytic therapy.

4. Clopidogrel should be provided as follows:
   a. A 300-mg loading dose should be given before or at the time of PCI to patients who did not receive a previous loading dose and who are undergoing PCI within 24 hours of receiving fibrinolytic therapy *(Class I, Level of Evidence: C);*
   b. A 600-mg loading dose should be given before or at the time of PCI to patients who did not receive a previous loading dose and who are undergoing PCI more than 24 hours after receiving fibrinolytic therapy *(Class I, Level of Evidence: C);* and
   c. A dose of 75 mg daily should be given after PCI (31,32,110,111). *(Class I, Level of Evidence: C)*

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. A P_2Y_{12} inhibitor (either clopidogrel or ticagrelor) in addition to aspirin should be administered for up to 12 months to all patients with NSTE-ACS without contraindications who are treated with either an early invasive or ischemia-guided strategy. Options include:
   - Clopidogrel: 300-mg or 600-mg loading dose, then 75 mg daily (27,36). *(Class I, Level of Evidence: B)*
   - Ticagrelor: 180-mg loading dose, then 90 mg twice daily (7,112). *(Class I, Level of Evidence: B)*

2. In patients receiving a stent (bare-metal stent or drug-eluting stent [DES]) during PCI for NSTE- ACS, P_2Y_{12}

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inhibitor therapy should be given for at least 12 months (113). Options include:
- Clopidogrel: 75 mg daily (114,115) *(Class I, Level of Evidence: B)* or
- Prasugrel: 10 mg daily (110) *(Class I, Level of Evidence: B)* or
- Ticagrelor: 90 mg twice daily (7) *(Class I, Level of Evidence: B)*

3. In addition to aspirin, a P_2Y_{12} inhibitor (either clopidogrel or ticagrelor) should be continued for up to 12 months in all patients with NSTE-ACS without contraindications who are treated with an ischemia-guided strategy. Options include:
- Clopidogrel: 75 mg daily (36,114) *(Class I, Level of Evidence: B)* or
- Ticagrelor: 90 mg twice daily (7,112) *(Class I, Level of Evidence: B)*

ACC (F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI, acute myocardial infarction; CABG, coronary artery bypass graft; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction; NSTE-ACS, non—ST-segment elevation- acute coronary syndrome

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Short Title: PM-14: Immediate Angiography After Cardiac Arrest	
PM-14: STEMI: Immediate Angiography for Resuscitated Out-of-Hospital Cardiac Arrest in STEMI Patients	
Measure Description: Percentage of patients, age 18 and older, who are resuscitated from out-of-hospital cardiac arrest and whose initial ECG shows STEMI, who receive immediate angiography.	
Numerator	• Patients with STEMI, or its equivalent, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, who are resuscitated from out-of-hospital cardiac arrest and receive immediate angiography Note: Immediate angiography is defined as invasive angiography within 120 minutes after resuscitation from out-of-hospital cardiac arrest.
Denominator	• All patients with STEMI who are resuscitated from out-of-hospital cardiac arrest
Denominator Exclusions	• Patients less than 18 years of age • Patients who die during hospitalization shortly following their out-of-hospital cardiac arrest (<120 minutes) • Patients who are transferred to hospice or are placed on comfort care measures shortly following their out-of-hospital cardiac arrest (<120 minutes) • Patients received in transfer from another facility
Denominator Exceptions	• Documentation of a medical reason for not receiving immediate angiography following resuscitated out-of-hospital cardiac arrest (e.g., severe anoxic brain injury, contraindications to invasive angiography, terminal illness/futile) • Documentation of a patient reason for not receiving immediate angiography following resuscitated out-of-hospital cardiac arrest (e.g., patient's will or family wishes) • Documentation of a system reason for not receiving immediate angiography following resuscitated out-of-hospital cardiac arrest (e.g., presentation to a non-PCI capable hospital and too unstable to transfer)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level

Care Setting	Inpatient

Rationale
Many patients with cardiac arrest and ST-segment elevation on the ECG often have high- risk coronary anatomy, which may benefit from timely coronary angiography to identify severe coronary artery disease and possibly guide/dictate revascularization (usually with PCI) (12,116-131).

Clinical Recommendation(s)
2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)   1. Immediate angiography and PCI when indicated should be performed in resuscitated out-of-hospital cardiac arrest patients whose initial ECG shows STEMI (116-131). *(Class I, Level of Evidence: B)*

1 ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; ECG indicates
2 electrocardiogram; ED, emergency department; LBBB; left bundle branch block; MI, myocardial infarction; PCI, percutaneous
3 coronary intervention; STEMI, ST-segment elevation myocardial infarction.

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Short Title: PM-15: Stress Test in Conservatively-Treated Patients	
PM-15: AMI: Non-Invasive Stress Testing Before Discharge in Conservatively-Treated Patients	
Measure Description: Percentage of patients, age 18 or older, hospitalized with AMI, who are initially conservatively-managed (have not received invasive coronary angiography) and with documentation in the hospital record that a non-invasive stress testing was performed before discharge.	
Numerator	• Patients with AMI who are initially conservatively-managed and who received a non-invasive stress test prior to discharge.
Denominator	• All patients with AMI who are initially treated with a conservative management strategy (medical therapies alone without invasive coronary angiography as a planned initial therapy).
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• Documentation of a medical reason for not receiving a non-invasive stress test before discharge (e.g., contraindications to non-invasive stress testing [for instance, patients with intolerance to dobutamine or vasodilator, or patients with ongoing ischemia], terminal illness/futile) • Documentation of a patient reason for not receiving a non-invasive stress test before discharge (e.g., patient choice not to undergo ischemic work-up or to postpone to the outpatient setting) • Documentation of cross-over from an initial conservative management to undergo invasive coronary angiography without the need for a non-invasive stress test (as in the case of recurrent spontaneous ischemia)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)

Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient

Rationale

Some patients with acute MI who are managed conservatively (e.g., managed with medical therapies, with coronary angiography not planned as an initial treatment strategy) have high-risk coronary artery disease. These patients may not experience spontaneous ischemia during their hospitalization, and need to be further risk stratified before discharge with a stress test (preferably, a submaximal stress test). This will help identify the high-risk patient who needs invasive angiography and possible revascularization, predominantly to mitigate recurrent ischemia/MI (11,12,132-135). A non-invasive stress test can be exercise-based or pharmacological, and the means for detecting ischemia may be via ECG alone or with an added imaging modality.

Notably, many patients with acute MI who are managed conservatively initially may cross over to undergo invasive coronary angiography, without undergoing a non-invasive stress test. Common clinical indications for resorting to coronary angiography during the same AMI hospitalization after an initial conservative management trial include, but are not limited to: spontaneous non-inducible ischemia among patients already treated with aggressive medical therapies; LVSD), where a high level of suspicion for left main or multi-vessel coronary artery disease exists, etc. These aforementioned scenarios are to be differentiated (and excluded from the denominator) from those during which coronary angiography is performed in initially conservatively-managed AMI patients because of a high-risk non-invasive stress test.

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Noninvasive testing for ischemia should be performed before discharge to assess the presence and extent of inducible ischemia in patients with STEMI who have not had coronary angiography and do not have high-risk clinical features for which coronary angiography would be warranted (132,134,135). *(Class I, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. Noninvasive stress testing is recommended in low and intermediate-risk patients who have been free of ischemia at rest or with low-level activity for a minimum of 12 to 24 hours (49-52,133). *(Class I, Level of Evidence: B)*

1   ACC(F) indicates American College of Cardiology Foundation; AHA, American heart Association; AMI, acute myocardial
2   infarction; ECG, electrocardiogram, LVSD, left ventricular systolic dysfunction, MI, myocardial infarction; STEMI, ST-segment
3   elevation myocardial infarction.

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Short Title: PM-16: Early Troponin Measurement After NSTEMI	
PM-16: Acute NSTEMI: Early Cardiac Troponin Measurement (within six hours of admission)	
Measure Description: Percentage of patients, age 18 or older, hospitalized with acute NSTEMI, who have cardiac troponin biomarkers measured within six hours of hospital arrival.	
Numerator	• Patients with acute NSTEMI who have at least one set of cardiac troponin biomarkers, measured by central laboratory troponin assays and excluding point-of-care assays in the ED or elsewhere, within six hours of hospital arrival
Denominator	• All patients with acute NSTEMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice shortly after arrival (< six hours) • Patients who die during hospitalization shortly after arrival (< six hours) • Patients who are on comfort measures/hospice only documented shortly after arrival (< six hours) • Patients who are transferred to another hospital for inpatient care shortly after arrival (< six hours) • Patients received in transfer from the inpatient, outpatient, or ED of another facility • Patients discharged shortly after arrival (< six hours)
Denominator Exceptions	None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	
Troponins are components of the myocardial cell contractile apparatus. When measured in the circulation, they are	

highly sensitive and specific to diagnose myocardial necrosis. In the correct clinical setting (e.g. angina/ischemic symptoms, ischemic ECG changes, imaging evidence of ischemia), a pattern of rise and fall in troponin I or T levels is essential to the diagnosis of AMI. While STEMI is usually readily diagnosed by the presence of acute current of injury on the presenting ECG, patients with NSTE-ACS can present with non-specific ECG changes (e.g. subtle or non-specific ST or T wave changes). Thus, measuring troponin levels expeditiously help in the early diagnosis and risk stratification of these patients, which can lead to earlier triage and institution of appropriate medical and interventional treatments (11).

Clinical Recommendation(s)

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. Serial cardiac troponin I or T levels (when a contemporary assay is used) should be obtained at presentation and 3 to 6 hours after symptom onset in all patients who present with symptoms consistent with ACS to identify a rising and/or falling pattern of values (8,136-141). *(Class I, Level of Evidence: A)*

2. Additional troponin levels should be obtained beyond 6 hours after symptom onset in patients with normal troponin levels on serial examination when changes on ECG and/or clinical presentation confer an intermediate or high index of suspicion for ACS (8,142-144). *(Class I, Level of Evidence: A)*

3. If the time of symptom onset is ambiguous, the time of presentation should be considered the time of onset for assessing troponin values (139,144,145). *(Class I, Level of Evidence: A)*

1   ACC indicates American College of Cardiology; ACS; acute coronary syndrome; AHA, American Heart Association; ECG,
2   electrocardiogram; NSTEMI, non—ST-segment myocardial infarction.

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Short Title: PM-17: AMI Registry Participation	
PM-17: AMI: Participation in a Regional or National Acute Myocardial Infarction Registry	
Measure Description: Participation in a national or regional AMI registry that provides regular performance reports based on benchmarked data.	
Numerator	Does the facility participate in a national or regional AMI registry that provides regular performance reports based on benchmarked data? (yes/no)
Denominator	Non applicable
Denominator Exclusions	None
Denominator Exceptions	None
Measurement Period	Not applicable
Sources of Data	Facility attestation
Attribution	Measure reportable at the facility level only
Care Setting	Inpatient

Rationale
Participation in registries allows tracking of quality of care and benchmarking against best practices (12).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. All communities should create and maintain a regional system of STEMI care that includes assessment and continuous quality improvement of emergency medical services and hospital-based activities. Performance can be facilitated by participating in programs such as Mission: Lifeline and the D2B Alliance (90,146-148) . *(Class I, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non-St-Elevation Acute Coronary Syndromes (11)

1. Participation in a standardized quality-of-care data registry designed to track and measure outcomes, complications, and performance measures can be beneficial in improving the quality of NSTE-ACS care (2,149-156). *(Class IIa, Level of Evidence: B)*

3 ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI acute myocardial
4 infarction; D2B, Door-to-Balloon; NSTE-ACS, non—ST-segment elevation acute coronary syndrome; STEMI, ST-segment
5 myocardial infarction

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Quality Improvement Measures for Inpatient STEMI and NSTEMI Patients

Inpatient Measures

Short Title: QM-1: Risk Score Stratification for NSTEMI	
QM-1: NSTEMI: Risk stratification of NSTEMI patients with a risk score	
Measure Description: Percentage of patients, age 18 or older, hospitalized with NSTEMI, who have a risk stratification score documented during hospitalization.	
Numerator	• Patients with NSTEMI who have a risk score documented during hospitalization Examples of commonly utilized risk stratification scores include: • TIMI (Thrombolysis in Myocardial Infarction) risk score • GRACE (Global Registry of Acute Coronary Events) risk score
Denominator	• All patients with NSTEMI
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)

Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient

Rationale
Objective risk stratification with validated risk scores help triage and dictate the initial treatment strategy in patients with NSTEMI. For example, those at high-risk will likely benefit from an early invasive strategy (within 12-24 hours), while intermediate-risk patients may receive delayed invasive strategy (within 24-72 h time frame). In addition, risk scores, such as the TIMI risk index and GRACE risk model are useful in predicting recurrent cardiovascular outcomes (short- and intermediate-term) following NSTEMI (11,157,158).

Clinical Recommendation(s)
2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11) 1. Risk scores should be used to assess prognosis in patients with NSTE-ACS (157,159-166). *(Class I, Level of Evidence: A)*

ACC indicates American College of Cardiology; AHA, American Heart Association; GRACE indicates Global Registry of Acute Coronary Events; NSTE-ACS, non—ST-segment elevation acute coronary syndrome; NSTEMI, non—ST-segment myocardial infarction; TIMI, Thrombolysis in Myocardial Infarction.

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Short Title: QM-2: Early Invasive Strategy for High-Risk NSTEMI	
QM-2: Acute NSTEMI: Early Invasive Strategy (Within <24 hours) for High-Risk NSTEMI patients	
Measure Description: Percentage of patients, age 18 or older, hospitalized with acute NSTEMI, who are at high risk and who receive an early invasive strategy within 24 hours of admission	
Numerator	• Patients with acute NSTEMI who are high-risk and receive early invasive strategy (diagnostic angiography with intent to perform revascularization if appropriate based on coronary anatomy) within 24 hours of admission. Definitive criteria defining of high risk NSTEMI patients include: • GRACE risk score >140 (or TIMI risk score >4) • Temporal change in Troponin Biomarker • New or presumably new ST depression
Denominator	• All patients with acute NSTEMI who are at high risk
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice on day of or day after arrival • Patients who die early during hospitalization on day of or day after arrival • Patients who are on comfort care measures only or hospice on day of or day after arrival • Patients who are transferred to another hospital for inpatient care on day of or day after arrival • Patients discharged on day of or day after arrival on day of or day after arrival • Patients received in transfer from the inpatient, outpatient, or ED of another facility • Patients who are unstable (refractory angina/ischemia, heart failure or new or worsening, mitral regurgitation, hemodynamic instability, sustained ventricular fibrillation or pulseless ventricular tachycardia) need urgent/immediate invasive strategy within 2 hours, and are excluded from denominator and numerator
Denominator Exceptions	• Documentation of a medical reason for not receiving an early invasive strategy after high-risk NSTEMI (e.g., extensive clinical comorbidities,

	contraindications to invasive angiography, terminal illness/futile)
	• Documentation of a patient reason for not receiving an early invasive strategy after high-risk NSTEMI
	• Documentation of a system reason for not receiving an early invasive strategy after high-risk NSTEMI (e.g., financial barriers, hospitalization at a facility without a cardiac catheterization laboratory)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient

Rationale
Several studies (167-172) and meta-analyses (173,174) have concluded that a strategy of routine invasive therapy is generally superior to an ischemia-guided strategy or a selectively invasive approach. Compared to a delayed invasive strategy (within 24-72 hours), an early invasive strategy (within the initial 24 hours) in patients with NSTEMI reduces recurrent/refractory ischemia, length of stay and costs. However, there is no definitive evidence that it has an incremental benefit in reducing MI or death. Patients who are unstable (refractory angina/ischemia, heart failure or new or worsening, mitral regurgitation, hemodynamic instability, sustained ventricular fibrillation or ventricular tachycardia) need an urgent/immediate invasive strategy within two hours, and are excluded from the denominator and numerator.
Clinical Recommendation(s)

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)
 	
1. An early invasive strategy (diagnostic angiography with intent to perform revascularization if appropriate based on coronary anatomy) is indicated in initially stabilized patients with NSTE- ACS (without serious comorbidities or contraindications to such procedures) who have an elevated risk for clinical events (Table 8) (157,159,175-179). *(Class I, Level of Evidence: B)*
 	
2. An early invasive strategy (i.e., diagnostic angiography with intent to perform revascularization) is not recommended in patients with:
   a. (e.g., hepatic, renal, pulmonary failure, cancer), in whom the risks of revascularization and comorbid conditions are likely to outweigh the benefits of revascularization. *(Class III, Level of Evidence: C)*
   b. Acute chest pain and a low likelihood of ACS *(Class III, Level of Evidence: B)* who are troponin-negative, especially women (174). *(Class: III, Level of Evidence: C)*
 	
3. Older patients with NSTE-ACS should be treated with GDMT, an early invasive strategy, and revascularization as appropriate (180-184). *(Class I, Level of Evidence: A)*
 	
4. Patients with prior CABG and NSTE-ACS should receive antiplatelet and anticoagulant therapy according to GDMT and should be strongly considered for early invasive strategy because of their increased risk

(139,145,173,174,185,186). *(Class I, Level of Evidence: B)*

5. Women with NSTE-ACS and high-risk features (e.g., troponin positive) should undergo an early invasive strategy (168,169,174,187). *(Class I, Level of Evidence: A)*

1 ACC indicates American College of Cardiology; AHA, American Heart Association; CABG indicates coronary artery bypass
2 graft; ED, emergency department; GDMT, guideline-directed medical therapy; GRACE, Global Registry of Acute Coronary
3 Events; MI; myocardial infarction; NSTE-ACS, non—ST-segment elevation acute coronary syndrome; NSTEMI, non—ST-
4 segment elevation myocardial infarction; TIMI, Thrombolysis in Myocardial Infarction.

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Short Title: QM-3: Therapeutic Hypothermia for STEMI Patients	
QM-3: STEMI: Therapeutic Hypothermia for Comatose STEMI Patients with Out-of-Hospital Cardiac Arrest	
Measure Description: Percentage of patients, age 18 or older, with STEMI who become comatose after resuscitated out-of-hospital cardiac arrest (secondary to ventricular fibrillation or pulseless ventricular tachycardia) and who receive therapeutic hypothermia.	
Numerator	• Patients with STEMI, defined by characteristic symptoms of myocardial ischemia with diagnostic ST-segment elevation, new or presumably new LBBB, or evidence of true posterior MI on the ECG, who are comatose following resuscitated out-of-hospital cardiac arrest (ventricular fibrillation or pulseless ventricular tachycardia), who receive therapeutic hypothermia
Denominator	• All patients with STEMI who are comatose following resuscitated out-of-hospital cardiac arrest (ventricular fibrillation or pulseless ventricular tachycardia).
Denominator Exclusions	• Patients less than 18 years of age • Patients who die shortly after arrival (<12 hours) • Patients who become comfort care measures only or hospice shortly after arrival (<12 hours) • Patients who are transferred to another hospital for inpatient care shortly after arrival (<12 hours) • Patients received in transfer from the inpatient setting from another facility
Denominator Exceptions	• Documentation of a medical reason for not receiving therapeutic hypothermia for comatose STEMI patients with out-of-hospital cardiac arrest (e.g., intracranial hemorrhage, severe/active bleeding, significant hypotension refractory to multiple vasopressors, severe sepsis, pregnancy).
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g. administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	

Therapeutic hypothermia in comatose patients with acute MI following certain types of cardiac arrest (predominantly related to VF or pulseless VT) has been shown to improve outcomes (e.g., increased survival to hospital discharge with good neurologic function, higher rate of a favorable neurologic outcome, and possibly reduced intermediate-term mortality) (12,188-190).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Therapeutic hypothermia should be started as soon as possible in comatose patients with STEMI and out-of-hospital cardiac arrest caused by ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT), including patients who undergo primary PCI (188-190). *(Class I, Level of Evidence: B)*

1   ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; ECG, electrocardiogram;
2   LBBB; left bundle branch block; MI, myocardial infarction; STEMI, ST-segment elevation myocardial infarction; VF,
3   ventricular fibrillation; VT, ventricular tachycardia.

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Short Title: QM-4: Aldosterone Antagonist at Discharge	
QM-4: AMI: Aldosterone Antagonist Prescribed at Discharge	
Measure description: Percentage of eligible patients, age 18 and older, hospitalized with AMI, who are prescribed an aldosterone antagonist at hospital discharge.	
Numerator	• Eligible* patients with AMI who are prescribed an aldosterone antagonist at hospital discharge *Eligible AMI patients for an aldosterone antagonist are patients with no contraindications who are already receiving an ACE inhibitor and beta blocker, and who have an EF ≤ 40%, and either HF or diabetes mellitus).
Denominator	• All post- AMI patients who: [a] are receiving an ACE inhibitor and a beta blocker; AND [b] have a LVEF ≤ 40%; AND [c] have either diabetes mellitus or heart failure
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• Documentation of a medical reason for not prescribing an aldosterone antagonist at hospital discharge (e.g., allergy or intolerance to aldosterone antagonist, significant renal dysfunction [Cr >2.5 mg/dL in men; >2.0 mg/dL in women], hyperkalemia [K >5.0 mEq/L]) • Patient currently enrolled in a clinical trial related to AMI (e.g., trials involving renin-angiotensin-aldosterone system inhibitors)
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provide level
Care Setting	Inpatient
Rationale	

The Eplerenone Post-Acute Myocardial Infarction Heart Failure Efficacy and Survival (EPHESUS) study demonstrated benefits from adding eplerenone, a selective aldosterone antagonist, to ACE inhibitors or ARBs (in 87% of patients) and beta blockers (75%), including a 15% and 17% reduction in overall and cardiovascular mortality, respectively. Therefore, in the absence of contraindications, post-MI patients with heart failure may benefit from adding an aldosterone antagonist to an ACE inhibitor or ARB, and a beta blocker. Monitoring of patients' renal function, electrolytes (screening for hyperkalemia, in particular), and blood pressure should be undertaken (11,12,23).

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. An aldosterone antagonist should be given to patients with STEMI and no contraindications who are already receiving an angiotensin-converting enzyme inhibitor and beta blocker and who have an EF less than or equal to 0.40 and either symptomatic HF or diabetes mellitus (23). *(Class I, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. Aldosterone blockade is recommended in post–MI patients without significant renal dysfunction (creatinine >2.5 mg/dL in men or >2.0 mg/dL in women) or hyperkalemia (K +>5.0 mEq/L) who are receiving therapeutic doses of ACE inhibitor and beta blocker and have a LVEF 0.40 or less, diabetes mellitus, or HF (23). *(Class I, Level of Evidence: A)*

1 ACE indicates angiotensin-converting enzyme; ACC, American College of Cardiology; AHA, American Heart Association;
2 AMI, acute myocardial infarction; ARB, angiotensin receptor blockers; Cr, creatinine; EF, ejection fraction; EPHESUS,
3 Eplerenone Post-Acute Myocardial Infarction Heart Failure Efficacy and Survival K, potassium; HF, heart failure; LVEF, left
4 ventricular ejection fraction; MI, myocardial infarction; STEMI, ST-segment elevation myocardial infarction.

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Short Title: QM-5: Inappropriate In-Hospital Use of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)	
QM-5: AMI: Inappropriate In-Hospital Use of NSAIDs	
Measure Description: Percentage of patients, age 18 years and older, hospitalized with AMI who are inappropriately prescribed nonsteroidal anti-inflammatory drugs NSAIDs during hospitalization.	
Numerator	• Patients with AMI who were prescribed NSAIDs (with the exception of aspirin) in the hospital For purposes of this measure, a non-inclusive list of nonsteroidal anti-inflammatory drugs include the following medications: 1. Ibuprofen 2. Ketoprofen 3. Sulindac 4. Naproxen 5. Etodolac 6. Fenoprofen 7. Diclofenac 8. Flurbiprofen 9. Ketorolac 10. Piroxicam 11. Indomethacin 12. Mefenamic Acid 13. Meloxicam 14. Celecoxib 15. Nabumetone 16. Oxaprozin 17. Ketoprofen 18. Meclofenamate 19. Tolmetin 20. Salsalate
Denominator	• All patients with AMI
Denominator Exclusions	• Patients less than 18 years of age
Denominator Exceptions	• None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level

Care Setting	Inpatient

Rationale
NSAIDs likely increase the risk of major adverse cardiac events in patients with myocardial infarction (e.g., impaired infarct healing, possibly increased risk of rupture following transmural infarction, higher risk of accompanying acute kidney injury, increased risk of gastrointestinal bleeding in at-risk AMI patients who are already receiving antithrombotic therapies) (191,192).

Clinical Recommendation(s)
2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12) 1. Glucocorticoids and nonsteroidal anti-inflammatory drugs are potentially harmful for treatment of pericarditis after STEMI (193,194). *(Class III, Level of Evidence: B)* **2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)** 1. Nonsteroidal anti-inflammatory drugs (NSAIDs) (except aspirin) should not be initiated and should be discontinued during hospitalization for NSTE-ACS because of the increased risk of MACE associated with their use (191,192). *(Class III, Level of Evidence: B)*

1 ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI, acute myocardial

2 infarction; FDA, the Food and Drug Administration; MACE, major adverse cardiac events; NSAIDs, nonsteroidal anti-

3 inflammatory drugs; NSTE-ACS, non—ST-segment elevation acute coronary syndrome; STEMI, ST-segment elevation

4 myocardial infarction; TIA, transient ischemic attack; TRITON-TIM 38, Trial to Assess Improvement in Therapeutic Outcomes

5 by Optimizing Platelet Inhibition with Prasugrel–Thrombolysis in Myocardial Infarction.

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Short Title: QM-6: Inappropriate Prasugrel at Discharge in Transient Ischemic Attack (TIA)/Stroke Patients
QM-6: AMI: Inappropriate Prescription of Prasugrel at Discharge in Patients with a History of Prior Stroke or TIA
Measure Description: Percentage of patients, age 18 years and older, hospitalized with AMI, who had a history of prior stroke or TIA and who are inappropriately prescribed prasugrel at discharge.

Numerator	• Patients with AMI and a history of prior stroke (ischemic or hemorrhagic) or TIA who are prescribed prasugrel at discharge
Denominator	• All patients with AMI and a history of prior stroke (ischemic or hemorrhagic) or TIA
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry)
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient

Rationale
The TRITON-TIMI (Trial to Assess Improvement in Therapeutic Outcomes by Optimizing Platelet Inhibition with Prasugrel–Thrombolysis in Myocardial Infarction) 38 randomized clinical trial demonstrated the superiority of prasugrel over clopidogrel in reducing the composite of cardiovascular death, non-fatal MI or on-fatal stroke among AMI patients (albeit with an increased risk of major bleeding). While the elderly and underweight subjects did not experience net clinical benefit from the use of prasugrel, the subgroup of patients with TIA or stroke had an increased net clinical harm with prasugrel conpared to clopidogrel (12,110). Notably, a history of ischemic or hemorrhagic stroke or TIA symptoms were considered exclusion criteria in the TRITON-TIMI 38 trial, although a small group ended up being randomized in error and exhibited increased harm with prasugrel. Subsequently, the FDA issued a boxed warning cautioning against the use of prasugrel in patients with TIA or stroke. Overall, patients with prior history of ischemic or hemorrhagic stroke or TIA symptoms should not receive prasugrel.

While ischemic stroke is defined as a permanent infarction (symptomatic or asymptomatic) of the central nervous system, TIA is defined as a transient neurologic dysfunction caused by focal ischemia without ensuing infarction. A hemorrhagic stroke results from either subarachnoid or intracerebral bleeding, and usually represent 20% of all stroke events.

Clinical Recommendation(s)

2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)

1. Prasugrel should not be administered to patients with a history of prior stroke or transient ischemic attack (110). *(Class III, Level of Evidence: B)*

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. Prasugrel should not be administered to patients with a prior history of stroke or transient ischemic attack. (110). *(Class III, Level of Evidence: B)*

1   ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI acute myocardial
2   infarction; TIA, transient ischemic attack; TRITON-TIMI, Trial to Assess Improvement in Therapeutic Outcomes by Optimizing
3   Platelet Inhibition with Prasugrel–Thrombolysis in Myocardial Infarction.

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Short Title: QM-7: Inappropriate High-Dose Aspirin with Ticagrelor at Discharge	
QM-7: AMI: Inappropriate Prescription of High-Dose Aspirin with Ticagrelor at Discharge	
Measure Description: Percentage of patients, age 18 years and older, hospitalized with AMI who are prescribed ticagrelor and high-dose aspirin at discharge.	
Numerator	• Patients with AMI who are prescribed ticagrelor and high-dose aspirin at discharge Note: The recommended maintenance dose of aspirin is 81 mg daily in patients treated with ticagrelor. A high-dose aspirin is defined as a daily maintenance dose > 100 mg. In the United States, a high-dose aspirin for thromboprophylaxis is usually a 162 mg or a 325 mg regimen.
Denominator	• All patients with AMI who are prescribed ticagrelor at discharge.
Denominator Exclusions	• Patients less than 18 years of age • Patients who leave against medical advice • Patients who die during hospitalization • Patients who are on comfort care measures only or hospice • Patients who are transferred to another hospital for inpatient acute care
Denominator Exceptions	• None
Measurement Period	Encounter
Sources of Data	Medical record or other database (e.g., administrative, clinical, registry).
Attribution	Measure reportable at the facility or provider level
Care Setting	Inpatient
Rationale	
In the Platelet Inhibition and Patient Outcomes (PLATO) trial, a pre-specified subgroup analysis showed a significant regional variation in the comparative efficacy of ticagrelor with diminished benefits in North America compared to the rest of the world. Subsequent analyses demonstrated that the lowest risk of the composite ischemic outcome with ticagrelor compared with clopidogrel is associated with a low maintenance dose of concomitant aspirin.(7,12,34). Overall, a high-dose aspirin (more than 100 mg) is associated with increased bleeding hazard without an improved antiplatelet efficacy. The FDA also issued a boxed warning indicating that aspirin daily maintenance doses of >100 mg decrease the effectiveness of ticagrelor.	
Clinical Recommendation(s)	
2013 ACCF/AHA Guideline for the Management of Patients with ST-Elevation Myocardial Infarction (12)	

1. P2Y12 inhibitor therapy should be given for 1 year to patients with STEMI who receive a stent (bare-metal or drug-eluting) during primary PCI using the following maintenance doses:
   a. Clopidogrel 75 mg daily (109,110)*(Class I, Level of Evidence: B);* or
   b. Prasugrel 10 mg daily (109) *(Class I, Level of Evidence: B); or*
   c. Ticagrelor 90 mg twice a day‡(111) *(Class I, Level of Evidence: B)*
 ‡The recommended maintenance dose of aspirin to be used with ticagrelor is 81 mg daily.

2014 AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes (11)

1. Aspirin should be continued indefinitely. The maintenance dose should be 81 mg daily in patients treated with ticagrelor and 81 mg to 325 mg daily in all other patients (33,34,36). *(Class I, Level of Evidence: A)*

1 ACC(F) indicates American College of Cardiology Foundation; AHA, American Heart Association; AMI, acute myocardial
2 infarction; FDA, the Food and Drug Administration; PCI, percutaneous coronary intervention; PLATO, Platelet Inhibition and
3 Patient Outcomes; STEMI, ST-segment elevation myocardial infarction.

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2 Appendix B. Author Listing of Relationships With Industry and
3 Other Entities (Relevant) — AHA/ACC 2017 Update of St-Elevation
4 Myocardial Infarction and Non-St-Elevation Myocardial Infarction
5 Measures

Committee Member	Employment	Consultant	Speaker	Ownership/ Partnership/ Principal	Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
Jneid Hani, *Chair*	Baylor College of Medicine — Associate Professor of Medicine; Director of Interventional Cardiology Research The Michael DeBakery VA Medical Center— Director of Interventional Cardiology	None	None	None	None	None	None
Daniel Addison	Fellow at Massachusetts General Hospital	None	None	None	None	None	None
Deepak L. Bhatt	Executive Director of Interventional Cardiovascular Programs, Brigham and Women's Hospital Heart & Vascular Center; Harvard Medical School —Professor of Medicine	• Duke Clinical Research Institute: Ferring Pharmaceuticals • Duke Clinical Research Institute: Novartis • Duke Clinical Research Institute: Bristol-Myers Squibb/Pfizer • Duke Clinical Research Institute: Eli Lilly	None	None	• Amarin† • Amgen Inc. † • Astra Zeneca† • Bristol Myers Squibb† • Eisai† • Ethicon† • Flowco* • Forest Laboratories † • Ischemix† • Medtronic† • Merck and Co, Inc* • Pfizer† • PLxPharma* • Roche† • Sanofi Aventis†	• Cardax* • Duke Clinical Research Institute Data Safety Monitoring Board • Harvard Clinical Research Institute: Boehringer Ingelheim • Harvard Clinical Research Institute: St. Jude Data Safety Monitoring Board • Harvard Clinical Research Institute (St. Jude) Data Safety Monitoring Board • Merck & Co., Inc. Planning Committee for Clinical Study* • Novartis	None

Committee Member	Employment	Consultant	Speaker	Ownership/ Partnership/ Principal	Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
					• Takeda* • The Medicines Company† • BIOFLOW-V (Biotronik)-clinical trial • EVOLVD Short DAPT Study (Boston Scientific)		
Gregg Fonarow	Ahmanson-UCLA Cardiomyopathy Center Division of Cardiology — Director of UCLA's Cardiology Fellowship Program	• Amgen • Boston Scientific • Janssen • Johnson&Johnson • Medicines Company • Medtronic • Novartis† • St. Jude Medical • Takeda • ZS Pharma	None	None	• Medtronic • Novartis†	None	None
Kathleen L. Grady	Northwestern University Feinberg School of Medicine — Associate Professor	None	None	None	None	None	None
Lee A. Green	University of Michigan — Professor Emeritus	None	None	None	None	None	None
Paul Heidenreich	Stanford VA Palo Alto Health Care System — Professor of Medicine	None	None	None	None	None	None
P. Michael Ho	University of Colorado School of Medicine — Associate Professor of	• Anthem, Inc.† • Premier, Inc.†	None	None	• Telligen*	• Janssen Pharmaceuticals, Inc†	None

Committee Member	Employment	Consultant	Speaker	Ownership/ Partnership/ Principal	Research	Institutional, Organizational, or Other Financial Benefit	Expert Witness
	Medicine						
Corrine Jurgens	Stony Brook University — Associate Professor	None	None	None	None	None	None
Marjorie King	Helen Hayes Hospital	None	None	None	None	None	None
Dharam Kumbhani	UT Southwestern Medical Center — Assistant Professor of Medicine	None	None	None	None	None	None
Samir Pancholy	The Wright Center for Graduate Medical Education	None	• Metronic • Pfizer† • Terumo Medical		• Duke Clinical Research Institute Odyssey Outcomes Trial	None	None

1　This table represents the relationships of committee members with industry and other entities that were reported by authors to be relevant to this document.
2　These relationships were reviewed and updated in conjunction with all meetings and/or conference calls of the writing committee during the document
3　development process. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant
4　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 $5,000 or more of the
5　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.
6　A relationship is considered to be modest if it is less than significant under the preceding definition. Relationships in this table are modest unless otherwise noted.
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9　According to the ACC/AHA, a person has a relevant relationship IF: a) the relationship or interest relates to the same or similar subject matter, intellectual
10　property or asset, topic, or issue addressed in the document; or b) the company/entity (with whom the relationship exists) makes a drug, drug class, or device
11　addressed in the document, or makes a competing drug or device addressed in the document; or c) the person or a member of the person's household has a
12　reasonable potential for financial, professional, or other personal gain or loss as a result of the issues/content addressed in the document.
13
14　*No financial relationship
15　†Significant (greater than $5,000) relationship.
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17　ACC indicates American College of Cardiology; AHA, American Heart Association; BIOFLOW-V, A Prospective Randomized
18　Multicenter Study to Assess the SaFety and Effectiveness of the Orsiro SiroLimus Eluting Coronary Stent System in the
19　Treatment Of Subjects With up to Three De Novo or Restenotic Coronary Artery Lesions - V; EVOLVE DAPT, A Prospective,
20　Multicenter, Single-arm Study Designed to Assess the Safety of 3-month Dual Antiplatelet Therapy in Subjects at High Risk for
21　Bleeding Undergoing Percutaneous Coronary Intervention With the SYNERGY Everolimus-Eluting Platinum Chromium
22　Coronary Stent System

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16   Committee to Develop Performance Measures for ST-Elevation and Non-ST-Elevation
17   Myocardial Infarction) Developed in Collaboration With the American Academy of Family
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