

Performance Measures for AMI

Setting the bar for accountability and improved quality of care.

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A 66-year-old man with a history of smoking presented to a community hospital emergency department with 3 hours of severe chest pain. Physical examination showed a heart rate of 90 beats per minute, blood pressure of 90/60 mm Hg, and bibasilar rales. Electrocardiography performed within 5 minutes of arrival demonstrated 2-mm ST elevation in leads V1 through V4 (Figure 1). The community hospital does not have percutaneous coronary intervention (PCI) capability but participates in a regional ST-elevation myocardial infarction (STEMI) network. The patient was treated with aspirin (325 mg), clopidogrel (600 mg), and heparin (4,000 units) and was transported by helicopter to the network STEMI receiving hospital. The duration between the patient's arrival and departure at the community hospital emergency

department was 60 minutes (door-in/door-out [DIDO] time). The helicopter transport time between the STEMI referral and receiving hospitals was 60 minutes.

The patient underwent primary PCI via right radial artery access. After aspiration thrombectomy, a drug-eluting stent was placed in the left anterior descending artery within 20 minutes of arrival. The first medical contact-to-balloon time was 140 minutes. The patient was started on metoprolol (50 mg twice daily), atorvastatin (40 mg daily), aspirin (81 mg daily), and clopidogrel (75 mg daily) and was discharged on hospital day 3 with instructions to follow up with his primary care physician in 2 weeks. Was this high-quality patient care? Were all performance measures for acute myocardial infarction (AMI) achieved for this episode of care?

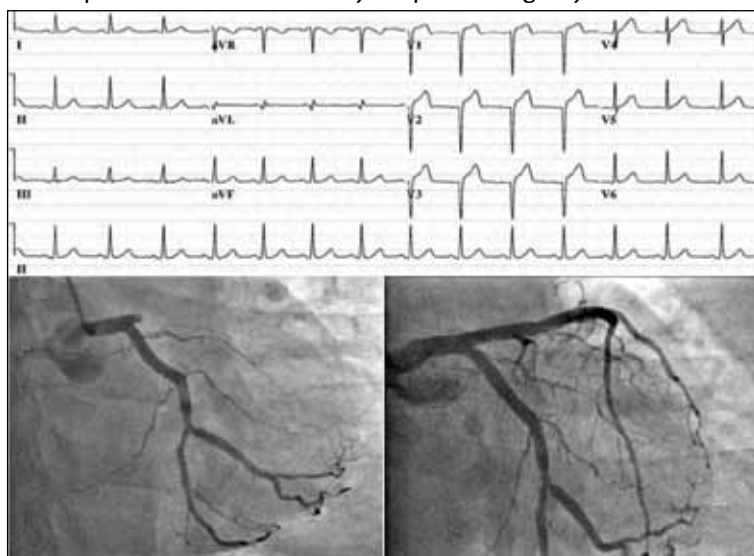


Figure 1. Case patient's echocardiogram, preprocedural angiogram, and final angiogram.

DIFFERENTIATING GUIDELINES, APPROPRIATE USE CRITERIA, AND PERFORMANCE MEASURES

Health care systems are rapidly transforming to achieve the triple aim of better patient care and experience, better population health, and lower cost. Cardiovascular disease is at the forefront of this transformation, with access to an abundance of national registries, clinical practice guidelines, appropriate use criteria, and performance measures.

Clinical practice guidelines are consensus documents written by a group of experts that define the standard of care based on the best scientific evidence. Guidelines are intended to assist clinicians in decision making about medications, devices, and diagnostic and treatment strategies for most patients and conditions. Guideline recom-

TABLE 1. IDEAL ATTRIBUTES FOR PERFORMANCE MEASURES

Attribute	Comments
Evidence basis	Well-established scientific basis for the measure with explicit reference to published guidelines
Interpretable	Assessment of the degree to which a provider can clearly understand the meaning of measure results and take action if necessary
Actionable	The measure is in an area where the practitioner is empowered to influence the health care system toward improvement
Denominator defined	The patient group to whom the measure applies with explicit and clinically meaningful inclusion and exclusion criteria and sampling frames
Numerator defined	The patient group meeting a clinically meaningful definition of conformance, which may be explicitly or implicitly specified
Face validity	This appears to measure what it is intended to measure
Content validity	The measure captures the most meaningful aspects of care
Construct validity	The measure correlates well with other measures of the same aspect of care
Reliability	The measure is reproducible across organizations and delivery settings
Feasibility	Required data can be collected with reasonable effort, at reasonable cost, and with reasonable time for collection

mendations are derived from the available evidence (randomized and observational) and include the class of recommendation (ie, class I, IIa, IIb, III-no benefit, or III-harm) and level of evidence (A, B, or C). For instance, the most recent American Heart Association (AHA)/American College of Cardiology (ACC) STEMI and non-STEMI (NSTEMI) guidelines include 116 class I recommendations for patients with AMI.¹⁻³

Appropriate use criteria are intended to assist clinicians in assessing patterns of utilization for a specific test or procedure and to inform clinicians and hospitals of potential overuse.⁴ Appropriate use criteria are derived from common patient scenarios that are independently scored for appropriateness by a technical panel of experts using a modified Delphi exercise. There is no attempt to achieve consensus, and individual scores from each member of the technical panel are averaged to reach the final score: 1 to 3 (rarely appropriate), 4 to 6 (may be appropriate), and 7 to 9 (appropriate). As such, appropriate use criteria reflect the aggregate sense of best practice for common patient scenarios.

Performance measures are intended to assist clinicians to improve patient outcomes. They are derived from clinical practice guideline recommendations with the strongest evidence and address areas that are most in need of improvement. Performance measures are classified into measures to be used for quality improvement and accountability (such as public reporting or pay for performance) versus for quality improvement only. Performance measures are collected and reported at the hospital level and reflect the quality of care delivered by that institution.⁵

METHODOLOGY FOR DEVELOPING PERFORMANCE MEASURES

A rigorous methodology is utilized to develop and test performance measures.⁶ The characteristics of an ideal performance measure are summarized in Table 1 and include evidence-based, interpretable, actionable, face validity, content validity, construct validity, reliability, and feasibility. Fundamental to inclusion as a performance measure are having strict inclusion and exclusion criteria for the numerator and denominator, as well as being able to clearly define the numerator and denominator populations. The recommendation is to include all patients who receive treatment for a condition in both the numerator and denominator. Patients in whom a performance measure is contraindicated with appropriate documentation should not be included in the denominator.

AMI performance measures should be applied only to patients in whom AMI is the primary admitting diagnosis. Patients experiencing AMI in the setting of other admitting diagnoses are excluded because they have more complex situations and contraindications to these standards. AMI performance measures are intended to include patients with both STEMI and NSTEMI but not unstable angina. The diagnosis of unstable angina is more ambiguous, which leads to difficulty in delineating the relevant denominator.

Performance measures are also categorized into specific care domains, including structure, process, and outcome measures.⁷ Structure measures are defined as a feature of a health care organization or clinician related to its capacity to provide high-quality care. Examples of structure measures include volume of AMI patients, accreditation status,

and availability of electronic medical records and computerized physician order entry. Process measures are defined as health care activities performed for, on behalf of, or by a patient. Examples of process measures include prescribing evidence-based medications at discharge and door-to-balloon time. Outcome measures include intermediate clinical outcome (change in physiologic state that leads to a longer-term health outcome) and health outcome (health status of a patient [desirable or adverse] resulting from care). Examples of intermediate clinical outcomes include low-density lipoprotein and medication adherence, whereas examples of health outcomes include mortality, readmissions, and quality of life.

INTENDED USE OF PERFORMANCE MEASURES

Performance measures are intended to be used for two purposes: (1) quality improvement and accountability (such as public reporting or pay for performance) and (2) quality improvement only. Measures for quality improvement and accountability must be developed through a rigorous process that includes public comment and peer-review periods. These measures are based on guideline recommendations that were prioritized by considering the clinical importance of the intervention, link to patient outcomes, strength of evidence, and major gaps or variability in current care.^{8,9} These performance measures are designed and intended for public reporting and accountability. In contrast, test measures are intended for internal quality assessment purposes. This distinction is based on the ability to rigorously delineate the populations being measured, as well as the precision and consistency of the measure.

PERFORMANCE MEASURES FOR AMI

The most recent ACC/AHA performance measures for patients with AMI were published in 2008, updating the previous 2006 document.^{5,10} There are 13 performance measures and nine test measures for patients hospitalized with a primary diagnosis of AMI (Table 2). AMI performance measures are clustered into three conceptual groups: (1) the use of medications and diagnostic testing; (2) the use of reperfusion therapy and timeliness; and (3) the use of secondary prevention.

Among the first group of performance measures (the use of medications and diagnostic testing), evaluation of left ventricular systolic function is a new measure, and the use of beta-blockers at arrival has been deleted. The rationale to delete early use of beta-blockers stems from the COMMIT trial in which 45,852 patients with AMI were randomized to intravenous metoprolol or placebo, and early treatment with metoprolol was associated with an increased risk of cardiogenic shock and mortality.¹¹

The second group of performance measures involves the use and timeliness of reperfusion therapy for patients with STEMI. These performance measures highlight important delays in reperfusion therapy for patients with STEMI who are transferred for primary PCI.^{12,13} The three new measures are the percentage of patients with STEMI who receive any reperfusion therapy (fibrinolysis or primary PCI), DIDO time at the STEMI referral hospital for patients transferred for primary PCI, and first-door-to-balloon time for patients transferred for primary PCI. *DIDO time* refers to the time from emergency department arrival to discharge at the STEMI referral hospital for patients who are transferred for primary PCI. The writing committee endorsed that the DIDO time should be < 30 minutes, and this measure is attributable to the STEMI referral hospital.

Recent data demonstrated that only 11% of patients with STEMI who are transferred for primary PCI achieved a DIDO time of < 30 minutes¹⁴; moreover, DIDO time performance showed large variability across hospitals in the United States.¹⁵ *First-door-to-balloon time* refers to the duration of time from emergency department arrival at the STEMI referral hospital to primary PCI at the STEMI receiving hospital. This measure is attributable to the STEMI receiving hospital, reflects the overall system of care, and includes DIDO time, transport time, and the time from arrival at the STEMI receiving hospital to device deployment. The recently updated PCI guidelines have altered this performance measure to first medical contact-to-balloon time for patients transferred for primary PCI, with a goal of < 120 minutes.¹⁶

The third group of performance measures focuses on secondary prevention and transition to outpatient care. Smoking cessation advice/counseling applies to all patients with a history of smoking who were hospitalized with AMI and is frequently overlooked. This measure highlights the index hospitalization as a critical window of opportunity to engage the patient in smoking cessation, as well as the importance of smoking cessation to subsequent patient outcomes. Cardiac rehabilitation patient referral is defined as a formal communication from the health care provider to the patient about participating in early cardiac rehabilitation and reflects a 30% improvement in mortality shown in patients who participated in cardiac rehabilitation.¹⁷

The nine test measures are intended for internal quality improvement purposes because they do not meet the same rigorous requirements and standards. For example, LDL cholesterol assessment within 24 hours of admission with AMI is a class I guideline recommendation; however, due to concern for overly burdensome data collection, it is categorized as a test measure. An excessive initial dose of anticoagulants is included because clinical registry data have suggested excessive dosing is common and has been

TABLE 2. SUMMARY OF ACC/AHA Performance and Test Measures for STEMI and NSTEMI

Measure	Description
Performance Measures	
Aspirin at arrival	AMI patient who received aspirin within 24 hours of arrival
Aspirin prescribed at discharge	AMI patients prescribed aspirin on discharge
Beta-blocker prescribed at discharge	AMI patients prescribed beta-blocker on discharge
Statin prescribed at discharge	AMI patients prescribed statin on discharge
Evaluation of LV function	AMI patients with documentation of LVSF during hospitalization or documented plans for assessment as an outpatient
ACEI/ARB for LV systolic dysfunction	AMI patients with documented LVEF < 40% or narrative description of moderate or severe LV systolic dysfunction prescribed ACEI or ARB at discharge
Time to fibrinolytic therapy	Median time from hospital arrival to fibrinolytic therapy in patients with STEMI; patients with STEMI who receive fibrinolysis within 30 minutes of arrival
Time to primary PCI	Median time from hospital arrival to primary PCI for STEMI patients; patients with STEMI who receive primary PCI within 90 minutes
Reperfusion therapy	Patients with STEMI who receive fibrinolysis, primary PCI, or transfer for primary PCI
Time from ED arrival at STEMI referral to ED discharge	Also known as DIDO; median time from ED arrival at STEMI referral facility to ED discharge in patients with STEMI transferred for primary PCI
Time from ED arrival at STEMI referral to primary PCI	Median time from ED arrival at STEMI referral facility to primary PCI at STEMI receiving facility
Smoking cessation counseling	AMI patients with a history of smoking who are given smoking cessation advice or counseling during hospital stay
Referral for cardiac rehabilitation	AMI patients referred to outpatient cardiac rehabilitation
Test Measures	
1. LDL cholesterol assessment	AMI patients with documented LDL cholesterol or plans for testing as an outpatient
2. Excessive initial heparin dose	AMI patients who receive excessive initial dosing
3. Excessive initial enoxaparin dose	
4. Excessive initial abciximab dose	
5. Excessive initial eptifibatide dose	
6. Excessive initial tirofiban dose	
7. Anticoagulant dosing protocol	Presence of a protocol or clinical aid in the hospital record of AMI patients to assist with dosing of anticoagulants and intravenous antiplatelet drugs
8. Anticoagulant error tracking system	Presence of a tracking system for errors in anticoagulant therapy
9. Clopidogrel prescribed at discharge for medically managed AMI patients	Medically treated AMI patients who are prescribed clopidogrel or ticlopidine at discharge
Abbreviations: ACEI, ACE inhibitors; ARB, angiotensin receptor blocker; ED, emergency department; LV, left ventricle; LVEF, left ventricular ejection fraction; LVSF, left ventricular systolic function.	

associated with adverse patient outcomes, particularly with vulnerable populations such as the elderly and those with renal impairment.¹⁸

The performance measures for PCI have completed the public comment and peer-review phase and are expected to be published in the summer of 2013. The PCI performance measures will include measures for accountability and quality improvement only. A summary of these PCI performance measures will be published in a future issue of *Cardiac Interventions Today*.

INCORPORATING PERFORMANCE MEASURES INTO YOUR PRACTICE

Performance measures are quantifiable indices of quality pertaining to the most important aspects of patient care and are directly related to patient outcomes. They provide a clear, parsimonious, and validated set of measures for the systematic assessment of health care quality for a specific disease process or procedure at the hospital level. For example, performance measures are not intended to report the shortest door-to-balloon time achieved in ideal situations; rather, the measure reports the average door-to-balloon time achieved in usual, routine situations. By collecting and reporting these measures and joining national registries, hospitals can benchmark their performance against hospitals in their region or the nation. Measurement and benchmarking are necessary and critical first steps to improving quality and patient outcomes. As a tool for objectively assessing quality, performance measures facilitate identification of gaps in quality and opportunities for improvement. Moreover, performance measures will be increasingly used in assessing quality for public reporting, reimbursement, and value-based purchasing.

CONCLUSION

How well did the health care system function in the clinical case? Four AMI performance measures were missed and represent opportunities for improvement. Taken in sequence, the DIDO time at the STEMI referral hospital was > 30 minutes. Perhaps one of the most difficult areas to address, DIDO time requires improved communication, coordination, and collaboration within the system of care. Second, the first medical contact-to-balloon time was > 120 minutes. This result was largely attributable to the prolonged DIDO and transport times but reflects the effectiveness and efficiency of the entire system of care. The third and fourth missed performance measures were smoking cessation counseling and referral to cardiac rehabilitation. Despite an excellent PCI result and use of evidence-based medications, these two measures improve patient outcomes but are often overlooked.

How well would your system perform in this situation?

Performance measures are a powerful tool to identify gaps and opportunities for quality improvement and provide a clear path forward for providing high-quality, accountable care. ■

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