Acute Myocardial Infarction

Over 300,000 Medicare patients are hospitalized for heart attack (acute myocardial infarction) each year. Many do not receive important therapies that are known to be beneficial. The National Acute Myocardial Infarction Project focuses on increasing the use of appropriate care processes to improve patient outcomes. The goal is to lower the one-year mortality rate for Medicare beneficiaries following hospital admission for heart attack.

Public Health Importance
Cardiovascular disease is America’s biggest killer. Every minute an American dies of coronary heart disease. Each year, approximately 1.1 million people experience an acute myocardial infarction (AMI) or heart attack. Almost two-thirds of heart attack patients do not make complete recovery, and people who survive the acute phase have a chance of related illness. Death is 2-9 times higher than that of the general population and one third dies during the acute phase. Older Americans bear the brunt of this medical burden. Over 80% of all heart attack-related deaths occur in individuals age 65 or older.

Heart disease is the leading cause of hospitalization among persons age 65 or older. In 1996, AMI accounted for 394,850 hospitalizations among Medicare beneficiaries, or about 12 hospitalizations for every 1,000 enrollees. The payments to hospitals for these episodes totaled over $3.6 billion, or about $9,780 per discharge.

According to the National Institutes of Health, the prevalence of coronary heart disease in African Americans has increased steadily since the early 1970’s with coronary heart disease 40% higher for African Americans than Caucasians. Additionally, the Commonwealth Fund found that Hispanics are less likely than African Americans or Caucasians to receive clinical services such as blood pressure checks or smoking cessation advice.

Main Objective
To decrease the morbidity and mortality associated with AMI in Medicare beneficiaries.

Process Objectives
To increase use of the following care processes for patients hospitalized with AMI:
- Administration of aspirin within 24 hours before or after hospital arrival
- Administration of beta blocker within 24 hours of hospital arrival
- Timely initiation of reperfusion therapy (either thrombolytic agent or percutaneous coronary intervention)
- Aspirin prescribed at discharge
- Beta blocker prescribed at discharge
- Angiotensin converting enzyme inhibitor prescribed at discharge if left ventricular ejection fraction is impaired
- Smoking cessation counseling during hospitalization

The project also considers other care processes that may decrease mortality after AMI (e.g. lipid testing and management); quality indicators are being developed for use in quality improvement efforts.
## AMI Performance Measures

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<th>Performance Measure</th>
<th>Criterion Met or Acceptable Alternative</th>
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| 1. Acute myocardial infarction (AMI) patients without aspirin contraindications who received aspirin within 24 hours before or after hospital arrival. | Documentation that aspirin was prescribed within 24 hours before or after hospital arrival in cases where there is no documentation of one or more of the following potential contraindications/reasons for not prescribing aspirin on arrival:  
  ▲ aspirin allergy  
  ▲ active bleeding on arrival or within 24 hours after arrival  
  ▲ Warfarin/Coumadin as pre-arrival medication  
  ▲ other reason documented by a physician, nurse practitioner, or physician assistant for not prescribing aspirin on arrival                                                                 |
| 2. Acute myocardial infarction (AMI) patients without aspirin contraindications who are prescribed aspirin at hospital discharge. | Documentation that aspirin was prescribed at discharge in cases where there is no documentation of one or more of the following potential contraindications/reasons for not prescribing aspirin at discharge:  
  ▲ aspirin allergy  
  ▲ active bleeding on arrival or during hospital stay  
  ▲ Warfarin/Coumadin prescribed at discharge  
  ▲ other reason documented by a physician, nurse practitioner, or physician assistant for not prescribing aspirin at discharge                                                                 |
<p>| 3. Acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) and without angiotensin converting enzyme inhibitor (ACEI) contraindications who are prescribed an ACEI at hospital discharge. | Documentation that an ACEI was prescribed at discharge in patients with LVSD who are not participating in an ACEI alternative clinical trial at the time of discharge and where there is no documentation of a potential contraindication/reason for not prescribing an ACEI at discharge (ACEI allergy, moderate or severe aortic stenosis, or other reason documented by a physician, nurse practitioner, or physician assistant for not prescribing an ACEI at discharge). LVSD is defined as documentation of a left ventricular ejection fraction (LVEF) less than 40% or a narrative description of left ventricular function (LVF) consistent with moderate or severe systolic dysfunction. When there are two or more documented LVFs, the LVF closest to discharge is used. |
| 4. Acute myocardial infarction (AMI) patients with a history of smoking cigarettes who are given smoking cessation advice or counseling during hospital stay. | Documentation of smoking cessation advice or counseling in patients with a history of smoking cigarettes anytime during the year prior to hospital arrival. Smoking cessation advice/counseling includes prescription of a smoking cessation aid. |</p>
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| 5. Acute myocardial infarction (AMI) patients without beta blocker contraindications who are prescribed a beta blocker at hospital discharge. | Documentation that a beta blocker was prescribed at discharge in cases where there is no documentation of one or more of the following potential contraindications/reasons for not prescribing a beta blocker at discharge:  
  ▲ beta blocker allergy  
  ▲ bradycardia (heart rate less than 60 bpm) on day of discharge or day prior to discharge while not on a beta blocker  
  ▲ second or third degree heart block on ECG on arrival or during hospital stay and does not have a pacemaker  
  ▲ systolic blood pressure less than 90 mm Hg on day of discharge or day prior to discharge while not on a beta blocker  
  ▲ other reason documented by a physician, nurse practitioner, or physician assistant for not prescribing a beta blocker at discharge |
| 6. Acute myocardial infarction (AMI) patients without beta blocker contraindications who received a beta blocker within 24 hours after hospital arrival. | Documentation that a beta blocker was prescribed within 24 hours after hospital arrival in cases where there is no documentation of one or more of the following potential contraindications/reasons for not prescribing a beta blocker on arrival:  
  ▲ beta blocker allergy  
  ▲ bradycardia (heart rate less than 60 bpm) on arrival or within 24 hours after arrival while not on a beta blocker  
  ▲ heart failure on arrival or within 24 hours after arrival  
  ▲ second or third degree heart block on ECG on arrival or within 24 hours after arrival and does not have a pacemaker  
  ▲ shock on arrival or within 24 hours after arrival  
  ▲ systolic blood pressure less than 90 mm Hg on arrival or within 24 hours after arrival  
  ▲ other reason documented by a physician, nurse practitioner, or physician assistant for not prescribing a beta blocker on arrival |
| 7. Median time from arrival to administration of a thrombolytic agent in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time. (NOT A QIO PERFORMANCE EVALUATION MEASURE) | Time from arrival to initial administration of a thrombolytic agent in patients with ST segment elevation or LBBB documented on the interpretation of the 12-lead ECG done closest to hospital arrival (includes ECGs done up to one hour prior to hospital arrival and ECGs done after hospital arrival). |
| 7a. Acute myocardial infarction (AMI) patients receiving primary thrombolytic therapy during the hospital stay with a time from hospital arrival to thrombolysis of 30 minutes or less. | Time from arrival to initial administration of a thrombolytic agent is ≤ 30 minutes in patients with ST segment elevation or LBBB documented on the interpretation of the 12-lead ECG done closest to hospital arrival (includes ECGs done up to one hour prior to hospital arrival and ECGs done after hospital arrival). |
### Performance Measure vs. Criterion Met or Acceptable Alternative

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<td>8. Median time from arrival to percutaneous transluminal coronary angioplasty (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time. (NOT A QIO PERFORMANCE EVALUATION MEASURE)</td>
<td>Time from arrival to PTCA in patients with ST segment elevation or LBBB documented on the interpretation of the 12-lead ECG done closest to hospital arrival (includes ECGs done up to one hour prior to hospital arrival and ECGs done after hospital arrival). Patients who received thrombolytic therapy during the hospital stay are excluded. If the date/time the lesion is first accessed is documented, this is used as the PTCA time.</td>
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<tr>
<td>8a. Acute myocardial infarction (AMI) patients receiving primary percutaneous transluminal coronary angioplasty (PTCA) during the hospital stay with a time from hospital arrival to PTCA of 90 minutes or less.</td>
<td>Time from arrival to PTCA is ≤ 90 minutes in patients with ST segment elevation or LBBB documented on the interpretation of the 12-lead ECG done closest to hospital arrival (includes ECGs done up to one hour prior to hospital arrival and ECGs done after hospital arrival). Patients who received thrombolytic therapy during the hospital stay are excluded. If the date/time the lesion is first accessed is documented, this is used as the PTCA time.</td>
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| T1a. Acute myocardial infarction (AMI) patients with documentation of low-density lipoprotein cholesterol (LDL-c) level in the hospital record or documentation that LDL-c testing was done during the hospital stay or is planned for after discharge. (Test Measure) | In cases where there is no reason documented by a physician, nurse practitioner, or physician assistant for not doing LDL-c testing, there must be:  
- documentation that an LDL-c test was performed during the hospital stay, OR  
- documentation of pre-arrival LDL-c, either as a numeric value or a narrative qualitative description, OR  
- documentation of a plan to do LDL-c testing after discharge. |
| T1b. Acute myocardial infarction (AMI) patients who received low-density lipoprotein cholesterol (LDL-c) testing within 24 hours after hospital arrival. (Test Measure)                                                                 | Documentation that LDL-c testing was done within 24 hours after hospital arrival.                                                                                                                                                                                                 |
| T2. Acute myocardial infarction (AMI) patients with low-density lipoprotein cholesterol (LDL-c) ≥ 130mg/dL who are prescribed a lipid-lowering medication at hospital discharge. (Test Measure)                                                                 | Documentation that a lipid-lowering medication was prescribed at discharge in patients with LDL-c ≥ 130mg/dL (or narrative equivalent) on test performed during the hospital stay, or on test performed prior to hospital arrival if in-hospital test was not done or results are not available. Cases where a reason for not prescribing a lipid-lowering medication at discharge is documented by a physician, nurse practitioner, or physician assistant are excluded. |

### Clinical Background

**Clinical Trials**

Multiple clinical trials have demonstrated the efficacy of aspirin, beta blockers, early reperfusion, and ACE inhibitors for appropriate patients with AMI. For example, in the Second International Study of Infarct Survival (ISIS-2), the early use of aspirin in patients with an evolving myocardial infarction was associated with a 23 percent reduction in short-term mortality. In pooled analyses, long-term use of aspirin after an AMI reduces vascular mortality by 13 percent, nonfatal myocardial infarction by 31 percent, and nonfatal stroke by 42 percent.
The early use of beta blockers reduced short-term mortality from 4.3 to 3.7 percent in the First International Study of Infarct Survival and from 4.9 to 4.3 percent in the Metoprolol in Acute Myocardial Infarction (MIAMI) trial. In pooled analyses, long-term use of beta blockers after an AMI reduces mortality by 23 percent.

The use of prompt acute reperfusion (either thrombolytic therapy or primary percutaneous coronary interventions) in appropriate patients has been shown to reduce mortality. A benefit of 23 lives saved per 1,000 treated with thrombolytic therapy per hour of earlier treatment has been described. Similarly, in patients treated with primary angioplasty during the first several hours after onset of symptoms, the survival benefit depends on time to reperfusion.

ACE inhibitors, given long-term after an AMI, have been shown to reduce mortality in patients with impaired left ventricular systolic function. A 20 percent reduction was found in the Survival and Ventricular Enlargement (SAVE) trial, 27 percent reduction in the Acute Infarction Ramipril Efficacy (AIRE) trial, and 22 percent reduction in the Trandolapril Cardiac Evaluation (TRACE) trial. Smoking cessation after AMI decreases mortality. Patients who continue to smoke heavily have a mortality rate that is 1.33 to 2.55 times that of patients who quit.

Clinical Guidelines
The American College of Cardiology and American Heart Association summarized the scientific evidence and published clinical guidelines for the management of AMI in 1996 and an update in 1999. Guidelines for the management of patients with non-ST-segment elevation myocardial infarction were published in 2000 and updated in 2002. The process objectives for CMS’ National AMI Project are consistent with recommendations in these guidelines. The quality indicators are not clinical guidelines, but adapt information from the guidelines in order to measure performance.

Opportunity for Improvement
In 1992, CMS initiated the Cooperative Cardiovascular Project (CCP), a quality improvement project focusing on AMI in the Medicare population. The project began as a pilot initiative in 4 states and was subsequently expanded nationally. The National Acute Myocardial Infarction Project, initiated in 1999, continued to measure national performance in the care of AMI. Data from this project demonstrate the ongoing need for improvement in AMI care.

Selected quality indicator rates measured between the years 2000 and 2001 are shown below. National average rates are listed; it should be recognized, however, that substantial geographic variation exists. Patients with contraindications for the therapy are omitted from the analysis. Thus, because all patients in the analysis are considered ideal candidates for the therapy, the target rate for the indicator is 100 percent. The results indicate that guideline-based therapies are substantially underutilized:

- Aspirin administration on admission, 83%
- Aspirin prescribed at discharge from the hospital, 84%
- Beta blocker prescribed at discharge, 78%
- ACE inhibitor prescribed at discharge, 71%
- Smoking cessation advice given during hospitalization, 39%

Because the use of these therapies is associated with improved survival, increasing use nationwide could save 3,000 lives per year.
References

Additional References


5. Fibrinolytic Therapy Trialists’ (FTT) Collaborative Group. Indications for fibrinolytic therapy in suspected acute myocardial infarction: collaborative overview of early mortality and major morbidity results from all randomised trials of more than 1000 patients. Lancet. 1994;343:311-32. (refers to Indicators 7 and 7a)


