



Complete Summary

GUIDELINE TITLE

Clinical policy: critical issues in the evaluation and management of adult patients presenting with suspected acute myocardial infarction or unstable angina.

BIBLIOGRAPHIC SOURCE(S)

American College of Emergency Physicians (ACEP). Clinical policy: critical issues in the evaluation and management of adult patients presenting with suspected acute myocardial infarction or unstable angina. Ann Emerg Med 2000 May; 35(5):521-44. [184 references] [PubMed](#)

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SCOPE

DISEASE/CONDITION(S)

- Acute myocardial infarction
- Unstable angina

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Risk Assessment

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Family Practice
Internal Medicine

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To present recommendations (clinical policy) for the evaluation and management of patients with acute myocardial infarction or unstable angina, including:

- Electrocardiogram (ECG) eligibility criteria for emergent fibrinolytic therapy
- The role of primary angioplasty in patients with acute myocardial infarction
- Use of serum markers to diagnose acute myocardial infarction
- Use of serial 12-lead electrocardiograms in the emergency department (ED)
- Chest pain evaluation units

TARGET POPULATION

Adult patients presenting to the emergency department (ED) with suspected acute myocardial infarction or unstable angina

INTERVENTIONS AND PRACTICES CONSIDERED

1. Electrocardiogram (ECG) and serial 12-lead electrocardiograms (SECGs)
2. Serum marker analysis (creatinine kinase isoenzyme MB [CK-MB] activity, creatine kinase isoenzyme MB mass, creatine kinase isoenzyme MB subforms, cardiac troponin T [cTnT], cardiac troponin I [cTnI]), myoglobin
3. Primary coronary angioplasty
4. Fibrinolytic therapy
5. Establishment of chest pain evaluation units (CPEUs)

MAJOR OUTCOMES CONSIDERED

- Sensitivity, specificity, and positive predictive value of electrocardiogram (ECG) and serial 12-lead electrocardiogram findings for acute myocardial infarction and unstable angina
- Mortality, reinfarction rates, infarct size, and/or complication rates after fibrinolytic therapy or primary angioplasty
- Reliability of serum marker analysis (creatinine kinase isoenzyme MB [CK-MB] activity, creatine kinase isoenzyme MB mass, creatine kinase isoenzyme MB subform, myoglobin, cardiac troponin T [cTnT], cardiac troponin I [cTnI]) for identification and exclusion of acute myocardial infarction
- Safety, reliability, and cost efficiency of chest pain evaluation units (CPEUs) in risk stratification of patients

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A MEDLINE search for articles published between January 1993 and December 1998 was performed using combinations of the key words chest pain, acute myocardial infarction, unstable angina, thrombolytics, primary angioplasty, 12-lead electrocardiogram (ECG), ST-segment monitoring, cardiac serum markers, and chest pain centers.

Pertinent articles were selected from the reviewed abstracts and from bibliographies of initially selected papers. Committee members and expert reviewers also supplied papers from their own knowledge base.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Strength of Evidence

A. Interventional studies including clinical trials, observational studies including prospective cohort studies, aggregate studies including meta-analyses of randomized clinical trials only.

B. Observational studies including retrospective cohort studies, case-controlled studies, aggregate studies including other meta-analyses.

C. Descriptive cross-sectional studies, observational reports including case series, case reports; consensual studies including published panel consensus by acknowledged groups of experts.

Strength of Evidence A and B papers were then rated on elements the committee believed were most important in creating a quality work. A and B papers with significant flaws or design bias were downgraded from 1 to 3 levels based on a set formula. Strength of Evidence C articles were downgraded 1 level if they demonstrated significant flaws or bias. Articles downgraded below a "C" strength of evidence were given an "X" rating and were not used in formulating this policy.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

All publications were stratified by at least 2 of the subcommittee members into 1 of 3 categories of strength of evidence, and some were downgraded 1 or more levels as necessary based on a standardized formula that graded papers on size, methodology, validity of conclusions, and potential sources of bias.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

This policy is a product of the American College of Emergency Physicians (ACEP) clinical policy development process, including expert review, and is based on the existing literature; where literature was not available, consensus of emergency physicians was used.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Clinical findings and strength of recommendations regarding patient management were made according to the following criteria:

Strength of Recommendations

Evidence-based standards. Generally accepted principles for patient management that reflect a high degree of clinical certainty (i.e., based on "strength of evidence A" or overwhelming evidence from "strength of evidence B" studies that directly address all the issues).

Guidelines. Recommendations for patient management that may identify a particular strategy or range of management strategies that reflect moderate clinical certainty (i.e., based on "strength of evidence B" that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of "strength of evidence C").

Options. Other strategies for patient management based on preliminary, inconclusive, or conflicting evidence, or, in the absence of any published literature, based on panel consensus.

COST ANALYSIS

Chest Pain Evaluation Units (CPEU)

A prospective observational study designed to assess the cost-effectiveness of mandatory stress testing found that the utilization of stress testing in a CPEU setting was safe and cost-effective.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Expert review comments were received from emergency physicians, physicians from other specialties, such as cardiologists, and specialty societies including members of the American Academy of Family Physicians, American Association for Clinical Chemistry, and the American Society of Nuclear Cardiologists. Their responses were used to further refine and enhance this policy.

The American College of Emergency Physicians (ACEP) Board of Directors approved this guideline on January 17, 2000.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions for the strength of evidence (A-C) and strength of recommendations (evidence-based standards, guidelines, and options) are repeated at the end of the Major Recommendations.

Patient Management Recommendations: Electrocardiogram (ECG) Eligibility Criteria for Emergent Reperfusion Therapy

Evidence-based standards. Assess for fibrinolytic therapy in patients presenting within 12 hours of symptom onset if ECG reveals:

1. ST-segment elevations greater than 0.1 mV in 2 or more contiguous leads that are not characteristic of early repolarization or pericarditis, nor of a repolarization abnormality from left ventricular hypertrophy (LVH) or bundle branch block (BBB) in patients with clinical presentation suggestive of acute myocardial infarction (AMI).
2. Any type of BBB (right, left, paced, and atypical--new or old) in patients with clinical presentation suggestive of AMI.

Guidelines. Assess for fibrinolytic therapy if ECG reveals left bundle branch block (LBBB) and ST-segment deviations of 1 mm or more toward the major QRS deflection or 5 mm or more away from the major QRS deflection in 2 or more contiguous leads in patients with atypical presentation of AMI.

Options. Assess for fibrinolytic therapy if ECG reveals:

1. ST-segment depressions of 1 mm or more with upright T waves in 2 or more contiguous anterior precordial leads in patients with clinical presentation suggestive of posterior AMI.
2. ST elevations of 1 mm or more in 2 or more contiguous nonstandard leads (V_4R through V_6R , V_7 through V_9) in patients with clinical presentation suggestive of isolated right ventricular or posterior AMI.
3. Right bundle branch block (RBBB), atypical BBB, or paced BBB and ST-segment deviations of 1 mm or more toward the major QRS deflection or of 5

mm or more away from the major QRS deflection in 2 or more contiguous leads in patients with atypical presentation of AMI.

Patient Management Recommendations: Role of Primary Angioplasty in Patients with AMI

Evidence-based standards. Primary coronary angioplasty when performed by experienced personnel within 90 minutes of diagnosis of AMI is as effective as fibrinolytic therapy in AMI patients meeting standard criteria for emergency reperfusion therapy.

Guidelines. If resources are available, consider primary coronary angioplasty as an alternative to fibrinolytic therapy in AMI patients meeting standard criteria for emergent reperfusion therapy providing it can be performed within 90 minutes of diagnosis of AMI.

Options. None specified.

Patient Management Recommendations: Serum Marker Analysis in AMI

Evidence-based standards. No single determination of one serum biochemical marker of myocardial necrosis reliably identifies* or reliably excludes** AMI less than 6 hours of symptom onset. No serum biochemical marker identifies or excludes unstable angina at any time after symptom onset.

Guidelines. In patients presenting with acute chest pain and a negative baseline serum marker level, consider repeat serum marker testing at the following time intervals from symptom onset*** before making an exclusionary diagnosis of non-AMI chest pain:

- Creatine kinase isoenzyme MB (CK-MB) activity at 8–12 hours
- CK-MB mass at 6–10 hours
- CK-MB subforms at 6–10 hours
- Cardiac troponin T (cTnT) at 8–12 hours
- Cardiac troponin I (cTnI) at 8–12 hours

*Reliably identifies = sensitivity $\geq 90\%$ with positive likelihood ratio ≥ 10 .

**Reliably excludes = specificity $\geq 90\%$ with negative likelihood ratio ≤ 0.1 .

***If time of symptom onset is unknown, unreliable, or more consistent with preinfarctional angina, then time of symptom onset should be referenced to the time of emergency department presentation.

The exact timing of the repeat determination of the serum marker value should take into account the sensitivity, precision, and institutional norms of the assay being used, as well as the release kinetics of the marker being measured. CK-MB activity, CK-MB mass, cTnT, and cTnI all reliably identify and exclude AMI 12 to 24 hours after symptom onset. Because of its rapid release kinetics, myoglobin alone does not reliably identify or exclude AMI at any time interval after symptom onset and is best used in conjunction with the other common serum markers.

cTnT and cTnI are the preferred serum markers in patients presenting greater than 24 hours after symptom onset.

Options. Consider repeat determination of CK-MB mass 2 to 3 hours after baseline or repeat myoglobin at 1 to 2 hours after baseline for utilization of the delta (i.e., change in) CK-MB or delta (change in) myoglobin when the repeat serum marker level is drawn at a time interval before the time intervals discussed in the Guidelines recommendation above.

Patient Management Recommendations: Serial 12-lead Electrocardiograms (SECGs) in the Emergency Department (ED)

Evidence-based standards. Performing serial 12-lead electrocardiograms or repeat ECGs at select time intervals after presentation results in an incremental increase in identification of injury or ischemia in patients with AMI and unstable angina compared with the baseline ECG. Its greatest value appears to be when it is used in patients with intermediate or high clinical likelihood of AMI or unstable angina who are spending at least 1 hour in the ED or in identification of successful reperfusion from fibrinolytic treatment.

Guidelines. Perform repeat ECG at a set time interval after presentation or automated serial 12-lead electrocardiogram monitoring during the ED evaluation of patients in whom the initial ECG is nondiagnostic for injury and who have symptoms consistent with ongoing or recurrent ischemic chest pain.

Options. Perform repeat ECG at a set time interval after presentation or automated serial 12-lead electrocardiogram monitoring during the ED evaluation of patients with a low suspicion of AMI or unstable angina.

Patient Management Recommendations: Chest Pain Evaluation Units (CPEUs)

Evidence-based standards. Chest pain evaluation units are a safe and effective alternative to routine admission for evaluation of low-to-intermediate-risk chest pain patients. Further investigation needs to be performed to determine the most cost-effective and efficient utilization of available diagnostic modalities.

Guidelines. As an alternative to admission, consider use of a chest pain evaluation unit protocol consisting of serial serum marker determinations, serial ECGs, and selective stress testing for evaluation and risk stratification of patients at low- to intermediate-risk for AMI and acute coronary syndrome (ACS).

Options. None stated.

Definitions:

Strength of Evidence

A. Interventional studies including clinical trials, observational studies including prospective cohort studies, aggregate studies including meta-analyses of randomized clinical trials only.

B. Observational studies including retrospective cohort studies, case-controlled studies, aggregate studies including other meta-analyses.

C. Descriptive cross-sectional studies, observational reports including case series, case reports; consensual studies including published panel consensus by acknowledged groups of experts.

Strength of Recommendations

Evidence-based standards. Generally accepted principles for patient management that reflect a high degree of clinical certainty (i.e., based on "strength of evidence A" or overwhelming evidence from "strength of evidence B" studies that directly address all the issues).

Guidelines. Recommendations for patient management that may identify a particular strategy or range of management strategies that reflect moderate clinical certainty (i.e., based on "strength of evidence B" that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of "strength of evidence C").

Options. Other strategies for patient management based on preliminary, inconclusive, or conflicting evidence, or, in the absence of any published literature, based on panel consensus.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Overall Benefits

Appropriate evaluation and management of patients with suspected acute myocardial infarction or unstable angina.

Specific Benefits

- Fibrinolytic therapy. Large randomized trials involving fibrinolytic therapy have demonstrated that fibrinolytic therapy reduces mortality in some patients with acute myocardial infarction (AMI).

- Primary coronary angioplasty versus fibrinolytic therapy. Primary coronary angioplasty when performed by experienced personnel within 90 minutes of diagnosis of acute myocardial infarction is as effective as fibrinolytic therapy in acute myocardial infarction patients meeting standard criteria for emergency reperfusion therapy.
- Serial 12-lead electrocardiograms (SECGs) in the emergency department (ED). Performing serial 12-lead electrocardiograms or repeat electrocardiograms at select time intervals after presentation results in an incremental increase in identification of injury or ischemia in patients with acute myocardial infarction and unstable angina compared with the baseline electrocardiogram.
- Chest pain evaluation units (CPEUs). Chest pain evaluation units are a safe and effective alternative to routine admission for evaluation of low- to intermediate-risk chest pain patients.

Subgroups Most Likely to Benefit:

Serial 12-lead electrocardiograms (SECGs) in the emergency department (ED). Its greatest value appears to be when it is used in patients with intermediate or high clinical likelihood of acute myocardial infarction (AMI) or unstable angina who are spending at least 1 hour in the emergency department or in identification of successful reperfusion from fibrinolytic treatment.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

This policy is not intended to be a complete manual on the initial evaluation and management of patients with acute myocardial infarction (AMI) and unstable angina. Some areas suggested by expert peer reviewers for addition of further discussion included utilization of serum markers to risk stratify unstable angina patients, use of combinations of serum markers to exclude acute myocardial infarction, risk stratification tools such as the acute time-insensitive predictive instrument (ACI-TIPI) and Goldman criteria for predicting need of intensive care admission, and discussion of multiple technologies for identifying acute coronary syndromes (ACS). These areas have been discussed to some degree in other clinical policies and represent areas that American College of Emergency Physicians (ACEP) may address in future updates of this current policy.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American College of Emergency Physicians (ACEP). Clinical policy: critical issues in the evaluation and management of adult patients presenting with suspected acute myocardial infarction or unstable angina. Ann Emerg Med 2000 May;35(5):521-44. [184 references] [PubMed](#)

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000

GUIDELINE DEVELOPER(S)

American College of Emergency Physicians - Medical Specialty Society

SOURCE(S) OF FUNDING

American College of Emergency Physicians

GUIDELINE COMMITTEE

American College of Emergency Physicians (ACEP) Clinical Policies Subcommittee on Acute Myocardial Infarction (MI) and Unstable Angina

ACEP Clinical Policies Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Members of the Clinical Policies Subcommittee on Acute MI or Unstable Angina:
Francis M. Fesmire, MD (Chair); Melody Campbell, RN, MSN, CEN, CCRN (ENA Representative); Wyatt W. Decker, MD; John M. Howell, MD; Jeffrey A. Kline, MD

Members of the Clinical Policies Committee: Stephen V. Cantrill, MD (Chair); Melody Campbell, RN, MSN, CEN, CCRN (ENA Representative 1996-1998); Stephen A. Colucciello, MD; William C. Dalsey, MD; Wyatt W. Decker, MD; Francis M. Fesmire, MD; John M. Howell, MD; Andy S. Jagoda, MD; Stephen Karas, Jr., MD; Edwin K. Kuffner, MD; Thomas W. Lukens, MD; Peter J. Mariani, MD; David L. Morgan, MD; Barbara A. Murphy, MD; Michael P. Pietrzak, MD; Scott M. Silvers, MD (EMRA Representative 1999-2000); Suzanne Wall, RNC, MS, CEN (ENA Representative 1999); Robert L. Wears, MD, MS; George W. Molzen, MD (Board Liaison 1997-2000); Rhonda Whitson, RHIA, Staff Liaison, Clinical Policies Committee and Subcommittees

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Emergency Physicians Web site](#).

Print copies: Available from the American College of Emergency Physicians, ACEP Customer Service Department, P.O. Box 619911, Dallas, TX 75261-9911, or call toll free (800) 798-1822, touch 6.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on January 29, 2003. The information was verified by the guideline developer on March 13, 2003.

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