



## Complete Summary

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### GUIDELINE TITLE

Clinical policy: indications for reperfusion therapy in emergency department patients with suspected acute myocardial infarction.

### BIBLIOGRAPHIC SOURCE(S)

Fesmire FM, Brady WJ, Hahn S, Decker WW, Diercks DB, Ghaemmaghami CA, Nazarian D, Jagoda AS, American College of Emergency Physicians Clinical Policies Subcommittee. Clinical policy: indications for reperfusion therapy in emergency department patients with suspected acute myocardial infarction. *Ann Emerg Med* 2006 Oct;48(4):358-83. [86 references] [PubMed](#)

### GUIDELINE STATUS

This is the current release of the guideline.

## COMPLETE SUMMARY CONTENT

SCOPE  
METHODOLOGY - including Rating Scheme and Cost Analysis  
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## SCOPE

### DISEASE/CONDITION(S)

Acute myocardial infarction

### GUIDELINE CATEGORY

Evaluation  
Risk Assessment  
Treatment

### CLINICAL SPECIALTY

Cardiology  
Emergency Medicine

## **INTENDED USERS**

Physicians

## **GUIDELINE OBJECTIVE(S)**

- To provide recommendations on indications for emergent fibrinolytic therapy in emergency department (ED) patients with suspected acute myocardial infarction (AMI)
- To address the following critical questions:
  - What are the electrocardiographic indications for emergent fibrinolytic therapy?
  - What are the indications for fibrinolytic therapy in patients being treated at or transferred to a percutaneous coronary intervention center?

## **TARGET POPULATION**

Adult patients presenting to the emergency department (ED) with suspected acute myocardial infarction (AMI)

**Note:** This guideline is not intended for pediatric patients, patients with contraindications to fibrinolytic treatment, or patients in cardiogenic shock.

## **INTERVENTIONS AND PRACTICES CONSIDERED**

1. Electrocardiographic indications for fibrinolytic therapy
2. Emergent fibrinolytic therapy
3. Emergent percutaneous coronary intervention therapy
4. Fibrinolytic therapy in patients treated at or being transferred to a center performing percutaneous coronary intervention

## **MAJOR OUTCOMES CONSIDERED**

- Mortality
- Nonfatal reinfarction, stroke, or cardiogenic shock
- Adverse events

## **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 writing subcommittee knowledgeable in acute myocardial infarction (AMI)-related literature and clinical guidelines was selected to review the 2000 American College of Emergency Physicians (ACEP) clinical policy in order to select key areas on which to focus this current policy. Two critical questions in the management of patients with AMI of current interest and/or controversy were chosen by the subcommittee:

1. What are the electrocardiographic (ECG) indications for emergent fibrinolytic therapy?
2. What are the indications for fibrinolytic therapy in patients being treated at or transferred to a percutaneous coronary intervention center?

Multiple MEDLINE searches were done. The medical literature was reviewed for articles that pertained to each critical question posed, and pertinent articles were selected. Subcommittee members also supplied articles from bibliographies of initially selected articles or from their own files.

For Question 1, the ACEP Clinical Policies Subcommittee performed a MEDLINE search of clinical trials using a combination of the key words "acute myocardial infarction," "ECG/electrocardiogram," and "thrombolytics/fibrinolytics." A review of potentially relevant abstracts was performed for possible inclusion in this policy. References from the 2000 ACEP clinical policy and the 2004 American College of Cardiology/American Heart Association (ACC/AHA) AMI guidelines were also reviewed for inclusion in this policy. Finally, a detailed review of the Fibrinolytic Therapy Trialists' (FTT) Collaborative Group and the 9 references included in this report was performed.

For Question 2, the ACEP Clinical Policies Subcommittee performed a MEDLINE search utilizing the following key words/phrases in combination with myocardial infarction: "facilitated angioplasty," "facilitated coronary intervention," "transfer," "transport," "rescue PCI," "rescue angioplasty," "prehospital fibrinolytics," and "prehospital thrombolytics." The subcommittee also reviewed all meta-analyses on the use of fibrinolytics and percutaneous coronary intervention (PCI) in the treatment of AMI as well as current guidelines from the ACC/AHA for the treatment of ST-segment elevation myocardial infarction (STEMI). A review of potentially relevant abstracts was performed for possible inclusion in this policy. Chosen papers were subsequently graded by ACEP criteria according to the weight of evidence as it applies to the critical question.

#### **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**

##### **Literature Classification Schema<sup>^</sup>**

<b>Design/Class</b>	<b>Therapy*</b>	<b>Diagnosis**</b>	<b>Prognosis***</b>
1	Randomized, controlled trial or meta-analyses of randomized trials	Prospective cohort using a criterion standard	Population prospective cohort
2	Nonrandomized trial	Retrospective observational	Retrospective cohort Case control
3	Case series Case report Other (e.g., consensus, review)	Case series Case report Other (e.g., consensus, review)	Case series Case report Other (e.g., consensus, review)

^ Some designs (e.g., surveys) will not fit this schema and should be assessed individually.

\*Objective is to measure therapeutic efficacy comparing  $\geq 2$  interventions.

\*\*Objective is to determine the sensitivity and specificity of diagnostic tests.

\*\*\* Objective is to predict outcome including mortality and morbidity.

### **Approach to Downgrading Strength of Evidence\***

	<b>Design/Class</b>		
	1	2	3
Downgrading			
None	I	II	III
1 level	II	III	X
2 levels	III	X	X
Fatally flawed	X	X	X

\*See "Description of Methods Used to Analyze the Evidence" field for more information.

## **METHODS USED TO ANALYZE THE EVIDENCE**

Review of Published Meta-Analyses  
Systematic Review with Evidence Tables

## **DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE**

All articles used in the formulation of this clinical policy were graded by at least 2 subcommittee members for strength of evidence and classified by the subcommittee members into 3 classes of evidence on the basis of the design of the study, with design 1 representing the strongest evidence and design 3 representing the weakest evidence for therapeutic, diagnostic, and prognostic clinical reports, respectively. See Appendix A in the original document and the "Rating Scheme for the Strength of the Evidence" field.) Articles were then graded on 6 dimensions thought to be most relevant to the development of a clinical guideline: blinded versus nonblinded outcome assessment, blinded or randomized allocation, direct or indirect outcome measures (reliability and validity), biases (e.g., selection, detection, transfer), external validity (i.e., generalizability), and sufficient sample size. Articles received a final grade (I, II, III) on the basis of a predetermined formula taking into account design and quality of study. (See

Appendix B in the original document and the "Rating Scheme for the Strength of the Evidence" field.) Articles with fatal flaws were given an "X" grade and not used in the creation of this policy. Evidence grading was done with respect to the specific data being extracted, and the specific critical question being reviewed. Thus, the level of evidence for any 1 study may vary according to the question, and it is possible for a single article to receive different levels of grading as different critical questions are answered. Question-specific level of evidence grading may be found in the Evidentiary Table included in the original guideline document.

## **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 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:

**Level A recommendations.** Generally accepted principles for patient management that reflect a high degree of clinical certainty (i.e., based on strength of evidence Class I or overwhelming evidence from strength of evidence Class II studies that directly address all the issues)

**Level B recommendations.** 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 Class II studies that directly address the issue, decision analysis that directly addresses the issue, or strong consensus of strength of evidence Class III studies)

**Level C recommendations.** Other strategies for patient management that are based on preliminary, inconclusive, or conflicting evidence, or in the absence of any published literature, based on panel consensus

There are certain circumstances in which the recommendations stemming from a body of evidence should not be rated as highly as the individual studies on which they are based. Factors such as heterogeneity of results, uncertainty about effect magnitude and consequences, strength of prior beliefs, and publication bias, among others, might lead to such a downgrading of recommendations.

### **COST ANALYSIS**

A formal cost analysis was not performed and published cost analyses were not reviewed.

## METHOD OF GUIDELINE VALIDATION

External Peer Review  
Internal Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Expert review comments were received from individual emergency physicians and from individual members of the American College of Cardiology and the Society of Chest Pain Centers. Their responses were used to further refine and enhance this policy.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

Definitions for the strength of evidence (Class I-III) and strength of recommendations (Level A-C) are repeated at the end of the "Major Recommendations" field.

#### **What Are the Electrocardiographic (ECG) Indications for Emergent Fibrinolytic Therapy?**

##### *Patient Management Recommendations*

**Level A recommendations.** Assess for fibrinolytic therapy in patients with symptoms suggestive of acute myocardial infarction (AMI) and presenting within 12 hours of symptom onset if ECG reveals:

1. ST elevations greater than or equal to 0.1 millivolts (mV) (1 mm) in 2 or more contiguous *limb* leads or greater than or equal to 0.2 mV (2 mm) in 2 or more contiguous *precordial* leads lacking features of non-infarction causes of ST-segment elevation (e.g., early repolarization, pericarditis, left ventricular hypertrophy [LVH], incomplete bundle branch block [BBB]).
2. Any type of BBB (right, left, and atypical – new or old) thought to be obscuring ST-segment analysis in patients with clinical presentation *strongly suggestive* of AMI.

**Level B recommendations.** Assess for fibrinolytic therapy in patients with symptoms suggestive of AMI and presenting within 12 hours of symptom onset if ECG reveals:

1. ST elevations greater than or equal to 0.1 mV (1 mm) in 2 or more contiguous *precordial* leads lacking features of non-infarction causes of ST-segment elevation (e.g., early repolarization, pericarditis, LVH, incomplete BBB).
2. New or presumably new left bundle branch block (LBBB).

3. LBBB with concordant ST-segment deviations greater than or equal to 0.1 mV (1 mm) towards the major QRS deflection or discordant ST-segment deviations greater than or equal to 0.5 mV (5 mm) away from the major QRS deflection in 2 or more contiguous leads.
4. ST depressions greater than or equal to 0.2 mV (2 mm) with upright T-waves in 2 or more contiguous anterior precordial leads (V<sub>1</sub> to V<sub>4</sub>) in patients with clinical presentation suggestive of AMI involving the posterior left ventricular wall.

**Level C recommendations.** Assess for fibrinolytic therapy in patients with symptoms suggestive of AMI and presenting within 12 hours of symptom onset if ECG reveals:

1. New or presumably new right bundle branch block (RBBB).
2. RBBB, atypical BBB, or ventricular paced and concordant ST-segment deviations greater than or equal to 0.1 mV (1 mm) towards the major QRS deflection or discordant ST-segment deviations greater than or equal to 0.5 mV (5 mm) away from the major QRS deflection in 2 or more contiguous leads.

### **What Are the Indications for Fibrinolytic Therapy in Patients Being Treated at or Transferred to a Percutaneous Coronary Intervention (PCI) Center?**

*Exclusion Criteria:* Patients undergoing facilitated PCI with glycoprotein IIb/IIIa platelet inhibitors alone or in combination with half dose fibrinolytics

#### *Patient Management Recommendations*

**Level A recommendations.** None specified.

**Level B recommendations.** Administer fibrinolytic therapy to patients whose ST-segment elevation myocardial infarction (STEMI) is identified less than 3 hours after symptom onset and expected delay time from initial STEMI identification in the emergency department (ED) until PCI (i.e., balloon time) is greater than 90 minutes.\*

**Level C recommendations.** Administer fibrinolytic therapy to high-risk patients whose STEMI is identified less than 6 hours after symptom onset and expected delay time from initial STEMI identification in the ED until PCI time (i.e., balloon time) is greater than 90 minutes.\*

\* There is insufficient evidence to make any recommendations in non-high-risk STEMI patients presenting greater than 3 hours after symptom onset, and high-risk patients presenting greater than 6 hours after symptom onset. Time of symptom onset, extent and location of injury, patient risk, and availability of timely PCI need to be taken into consideration.

#### **Definitions:**

#### **Literature Classification Schema<sup>^</sup>**

Design/Class	Therapy*	Diagnosis**	Prognosis***
1	Randomized, controlled trial or meta-analyses of randomized trials	Prospective cohort using a criterion standard	Population prospective cohort
2	Nonrandomized trial	Retrospective observational	Retrospective cohort Case control
3	Case series Case report Other (e.g., consensus, review)	Case series Case report Other (e.g., consensus, review)	Case series Case report Other (e.g., consensus, review)

^ Some designs (e.g., surveys) will not fit this schema and should be assessed individually.

\*Objective is to measure therapeutic efficacy comparing  $\geq 2$  interventions.

\*\*Objective is to determine the sensitivity and specificity of diagnostic tests.

\*\*\* Objective is to predict outcome including mortality and morbidity.

### Approach to Downgrading Strength of Evidence\*

	Design/Class		
	1	2	3
Downgrading	1	2	3
None	I	II	III
1 level	II	III	X
2 levels	III	X	X
Fatally flawed	X	X	X

\*See "Description of Methods Used to Analyze the Evidence" field for more information.

### Strength of Recommendation

**Level A recommendations.** Generally accepted principles for patient management that reflect a high degree of clinical certainty (i.e., based on strength of evidence Class I or overwhelming evidence from strength of evidence Class II studies that directly address all the issues)

**Level B recommendations.** 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 Class II studies that directly address the issue, decision analysis that directly addresses the issue, or strong consensus of strength of evidence Class III studies)

**Level C recommendations.** Other strategies for patient management that are based on preliminary, inconclusive, or conflicting evidence, or in the absence of any published literature, based on panel consensus

There are certain circumstances in which the recommendations stemming from a body of evidence should not be rated as highly as the individual studies on which

they are based. Factors such as heterogeneity of results, uncertainty about effect magnitude and consequences, strength of prior beliefs, and publication bias, among others, might lead to such a downgrading of recommendations.

## **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**

- Appropriate utilization of emergent fibrinolytic therapy based on electrocardiographic assessment
- Appropriate utilization of fibrinolytic therapy in patients being treated at or transferred to a percutaneous coronary intervention center

### **POTENTIAL HARMS**

- Current evidence strongly indicates that fibrinolytic therapy should not be used routinely in patients with ST-segment depression on the 12-lead electrocardiogram unless the evaluating physician suspects isolated posterior acute myocardial infarction. Mortality rate may actually be increased by administration of fibrinolytics in this electrocardiographically diverse patient subgroup. In the Fibrinolytic Therapy Trialists' Collaborative Group meta-analysis, mortality in patients with ST-segment depression was 15.2% in the fibrinolytic therapy group versus 13.8% in the control group.
- Adverse effects of fibrinolytic therapy, including bleeding complications.

## **QUALIFYING STATEMENTS**

### **QUALIFYING STATEMENTS**

- There are certain circumstances in which the recommendations stemming from a body of evidence should not be rated as highly as the individual studies on which they are based. Factors such as heterogeneity of results, uncertainty about effect magnitude and consequences, strength of prior beliefs, and publication bias, among others, might lead to such a downgrading of recommendations.
- Recommendations offered in this policy are not intended to represent the only diagnostic and management options that the emergency physician should consider. The American College of Emergency Physicians clearly recognizes the importance of the individual physician's judgment. Rather, this guideline

defines for the physician those strategies for which medical literature exists to provide support for answers to the crucial questions addressed in this 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)

Fesmire FM, Brady WJ, Hahn S, Decker WW, Diercks DB, Ghaemmaghami CA, Nazarian D, Jagoda AS, American College of Emergency Physicians Clinical Policies Subcommittee. Clinical policy: indications for reperfusion therapy in emergency department patients with suspected acute myocardial infarction. *Ann Emerg Med* 2006 Oct;48(4):358-83. [86 references] [PubMed](#)

### ADAPTATION

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

### DATE RELEASED

2006 Oct

### GUIDELINE DEVELOPER(S)

American College of Emergency Physicians - Medical Specialty Society

### SOURCE(S) OF FUNDING

American College of Emergency Physicians

### GUIDELINE COMMITTEE

Clinical Policies Subcommittee on Reperfusion Therapy in Emergency Department Patients with Suspected Acute Myocardial Infarction

ACEP Clinical Policies Committee

**COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE**

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**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, P.O. Box 619911, Dallas, TX 75261-9911, or call toll free: (800) 798-1822.

**AVAILABILITY OF COMPANION DOCUMENTS**

None available

**PATIENT RESOURCES**

None available

## **NGC STATUS**

This NGC summary was completed by ECRI on November 29, 2006. The information was verified by the guideline developer on March 12, 2007.

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