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### RESEARCH ARTICLE

## EARLY RECOGNITION AND MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION IN THE EMERGENCY DEPARTMENT: A SYSTEMATIC REVIEW

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Acute myocardial infarction; emergency department; early diagnosis; reperfusion therapy; systematic review.

### Abstract

**Background:** Acute myocardial infarction (AMI) remains a leading cause of mortality worldwide. Early recognition and prompt management in the emergency department (ED) are critical determinants of patient outcomes.

**Objective:** To systematically review evidence on early recognition and initial management of AMI in the ED.

**Methods:** A systematic search of PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar (2000–2025) was conducted according to PRISMA 2020 guidelines.

**Results:** Rapid ECG acquisition, high-sensitivity troponin assays, and structured risk scores improved early diagnosis. Timely initiation of evidence-based medical therapy and reperfusion significantly reduced mortality.

**Conclusion:** Integrated diagnostic and management pathways in the ED are essential to improve survival and reduce AMI-related complications.

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**Introduction:-**

Acute myocardial infarction (AMI) represents a medical emergency requiring rapid recognition and immediate intervention. Despite advances in cardiovascular care, AMI remains a major contributor to global morbidity and mortality. The emergency department serves as the primary point of care for patients with acute coronary syndromes. Delays in diagnosis or treatment initiation are associated with larger infarct size, higher complication rates, and increased mortality. Early recognition of AMI relies on prompt clinical assessment, rapid electrocardiography, and timely measurement of cardiac biomarkers. The introduction of high-sensitivity cardiac troponin assays has significantly improved diagnostic accuracy in the ED setting. Management strategies focus on early stabilization, initiation of antiplatelet and anticoagulant therapy, and rapid reperfusion using primary percutaneous coronary intervention or fibrinolytic therapy when PCI is unavailable. Understanding evidence-based strategies for both early recognition and management of AMI in the ED is essential to optimize outcomes and improve emergency cardiovascular care systems.

**Methods:-**

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.

**Search Strategy:-**

Electronic databases including PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar were searched for studies published between January 2000 and March 2025. Search terms included combinations of "acute myocardial infarction", "emergency department", "early diagnosis", "troponin", "electrocardiography", and "reperfusion therapy".

**Eligibility Criteria:-**

Studies were included if they addressed early recognition or initial management of AMI in the emergency department. Case reports, pediatric studies, and non-English publications were excluded.

**Results:-**

**Table 1. Early diagnostic tools for AMI in the emergency department**

Diagnostic tool	Recommended timing	Clinical role	Evidence strength
12-lead ECG	≤10 minutes	STEMI recognition	Strong
High-sensitivity troponin	0–1 hour	Early biochemical diagnosis	Strong
Risk scores (HEART, TIMI)	At presentation	Risk stratification	Moderate
Point-of-care ultrasound	Early ED phase	Complication assessment	Moderate

**Table 2. Early management strategies for acute myocardial infarction in the ED**

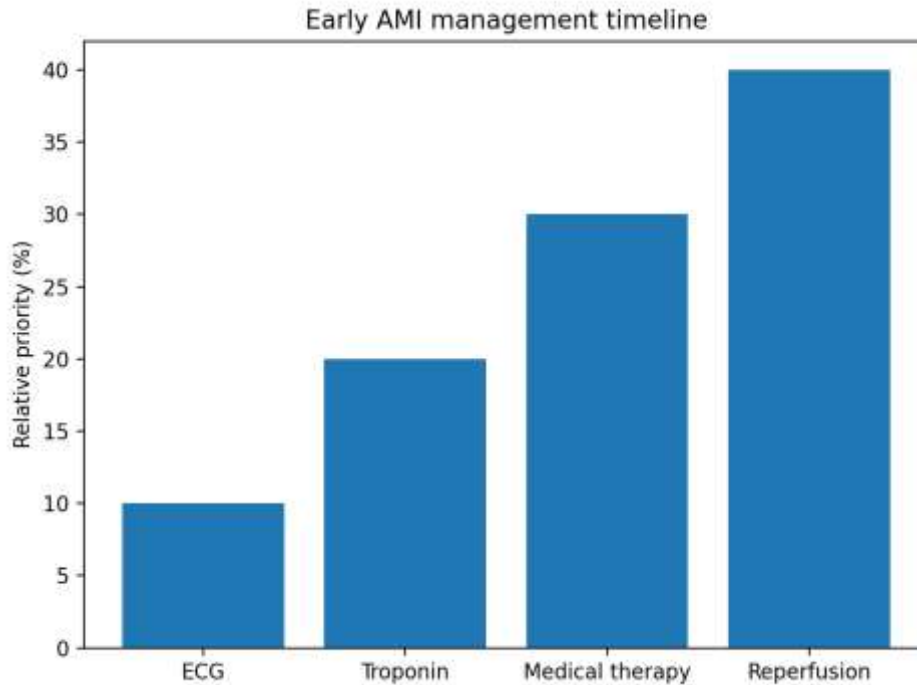
Management strategy	Indication	Target time	Clinical benefit
Aspirin	Suspected AMI	Immediately	Mortality reduction
Dual antiplatelet therapy	Confirmed AMI	Early	Reduced reinfarction
Anticoagulation	STEMI/NSTEMI	Early	Thrombus prevention
Primary PCI	STEMI	≤90 min door-to-balloon	Improved survival
Thrombolysis	No PCI access	≤30 min door-to-needle	Reduced mortality

**Table 3. Causes of delay in recognition and management of AMI in the ED**

Cause of delay	Category	Effect on care	Evidence strength
Atypical symptoms	Patient-related	Delayed ECG and diagnosis	Strong
ED overcrowding	System-related	Delayed assessment	Strong

Delayed troponin turnaround	System-related	Late confirmation	Moderate
Cath-lab unavailability	System-related	Delayed reperfusion	Strong
Incomplete triage	Provider-related	Missed early recognition	Moderate

Figure 1. Timeline for early recognition and management of AMI in the ED



**Discussion:-**

This systematic review underscores the critical role of early recognition and timely management of AMI in the emergency department. Rapid ECG acquisition and use of high-sensitivity troponin assays significantly enhance early diagnostic accuracy. System-level barriers such as ED overcrowding and delayed access to reperfusion facilities remain major challenges. Implementation of standardized pathways and multidisciplinary coordination are essential to minimize delays and improve outcomes.

**Conclusion:-**

Early recognition and prompt management of acute myocardial infarction in the emergency department significantly improve survival. Adherence to evidence-based protocols and system-level optimization are essential components of high-quality emergency cardiac care.

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