

POSITION PAPER

NATIONAL ASSOCIATION OF EMS PHYSICIANS

PREHOSPITAL TRIAGE OF CHEST PAIN PATIENTS

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Emergency medical services (EMS) personnel are commonly called upon to assess, treat, and transport patients with chest pain. The National Association of EMS Physicians (NAEMSP) recommends an organized approach to the treatment of patients with the chief complaint of chest pain.

- Emergency medical services systems should be staffed by personnel trained in the assessment and management of patients with nontraumatic chest pain as well as defibrillation for cardiac arrest victims.
- A protocol should exist in every community/region that identifies appropriate destination facilities for chest pain patients.
- Cardiac arrest patients, if transported, should be triaged to the nearest available emergency department.
- An online medical direction

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physician should be immediately consulted in any situation where EMS personnel are uncertain regarding the most appropriate hospital destination.

A growing body of literature and

recommendations from national organizations is causing urban and suburban EMS systems to consider implementing 12-lead electrocardiogram (ECG) programs in the prehospital setting. The NAEMSP

TABLE 1. Chest Pain Checklist*

Thrombolytic Criteria

Check each finding below. If all boxes () are checked and 12 lead ECG indicates ST elevation or bundle branch block, reperfusion therapy with thrombolysis or primary PTCA may be indicated. Thrombolysis is generally not indicated if any underscores () are checked or if the systolic blood pressure is > 180/110 mm Hg. However emergency angiography and PTCA may still be indicated. Consult with medical control in those cases.

	Yes	No
Ongoing chest discomfort (> 20 min and < 12 hour)	<input type="checkbox"/>	___
Oriented, can cooperate	<input type="checkbox"/>	___
Age > 25 years	<input type="checkbox"/>	___
History of stroke	___	<input type="checkbox"/>
Known bleeding disorder	___	<input type="checkbox"/>
Active internal bleeding in past 2 weeks	___	<input type="checkbox"/>
Surgery or trauma in past 2 weeks	___	<input type="checkbox"/>
Terminal illness	___	<input type="checkbox"/>
Jaundice, hepatitis, kidney failure	___	<input type="checkbox"/>
Use of anticoagulants such as Coumadin®	___	<input type="checkbox"/>
Systolic/diastolic blood pressure		
Right arm: ___ / ___		
Left arm: ___ / ___		
12 lead ECG acquired	<input type="checkbox"/>	___

High Risk Profile

If any of the following are present and the 12 lead ECG indicates ST elevation or bundle branch block, transport to a hospital capable of acute intervention.

	Yes	No
Heart rate > 100 beats per minute	<input type="checkbox"/>	___
Systolic BP < 100 mm Hg	<input type="checkbox"/>	___
Pulmonary edema (rales greater than one half way up)	<input type="checkbox"/>	___
Shock	<input type="checkbox"/>	___

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TABLE 2. Cardiac Care Facility Description and Responsibilities*

Level I (Tertiary Cardiac Care Facility)

Tertiary cardiac care facilities must have the equipment and staff necessary to provide intensive care, open heart surgery, cardiac catheterization, coronary angiography, and coronary angiography. Physician, nurse, and technical staffing should be sufficient to provide rapid and quality care. The presence of appropriate subspecialists is mandatory. Cardiac patients in shock, with refractory recurrent ventricular tachycardia, or with chest pain with pulmonary edema should be preferentially brought to tertiary care facilities as soon as possible.

Level II (Secondary Cardiac Care Facility)

A secondary cardiac care facility should have an intensive care unit for the treatment of cardiovascular patients. Physicians and nurses caring for such patients must be trained in basic life support and advanced cardiac life support. They should know how to utilize monitoring equipment, including that necessary for the monitoring of hemodynamics. A secondary cardiac care facility should be able to administer thrombolytic agents and to insert Swan-Ganz catheters and transvenous pacemakers when indicated. The facility should be able to diagnose, treat, and care for patients with myocardial infarction, unstable angina pectoris, congestive heart failure, cardiac arrhythmias, pericarditis, cardiomyopathy, and other routine cardiac problems, both emergently and thereafter.

Adequate staffing and continuing education should be available to ensure that longer-term care can be provided for the majority of these patients in the secondary cardiac care facility. It is the responsibility of the secondary facility to have a plan to ensure that patients requiring cardiac catheterization, open heart surgery, or angioplasty can be expeditiously transferred to an appropriate facility.

Level III (Primary Cardiac Care Facility)

A primary cardiac care facility should be able to stabilize cardiac patients for transfer to a higher level of care. The primary care facility should have an emergency department staffed 24 hours per day by physicians and nurses capable of resuscitating or stabilizing cardiovascular patients. Personnel should be trained in basic life support and advanced cardiac life support. In areas where a higher level of care is available within a reasonable transport time, the emergency medical services (EMS) system should transport all cardiac patients, except for those with cardiac arrest, to the appropriate higher level of care. Hence, the primary care facility should only care for walk-in cardiac patients and those who are severely unstable, including those in cardiac arrest. In more rural settings, where a larger number of unstable patients may be brought to the primary care facility, facilitated arrangements for transfer to a more appropriate facility should be in place. It is acknowledged that in some areas even unstable cardiac patients might receive continuing care at a primary facility if transfer is not feasible. These facilities should be upgraded to a secondary level of cardiac care as soon as possible.

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recognizes that the literature indicates that field 12-lead ECGs have been shown to decrease time to revascularization for acute myocardial infarction (AMI) patients and may improve patient outcome. Given available evidence suggesting that the ideal management of the AMI patient may include a prehospital 12-lead ECG, NAEMSP recommends urban and suburban paramedic EMS system should consider implementing 12-lead ECG programs. The decision to develop field 12-lead ECG programs is multifaceted and includes such factors as availability of clinical and financial resources and locally competing EMS system needs. For those systems with intent to use field 12-lead ECGs, NAEMSP recommends the following guidelines:

- All patients older than 25 years with nontraumatic chest pain should have a prehospital 12-lead ECG obtained unless the patient is hemodynamically or electrically unstable.
- Results of the prehospital ECG should be communicated to the destination facility's receiving physician prior to patient arrival.
- Emergency medical services personnel should use an assessment checklist to determine eligibility for thrombolysis unless the patient is hemodynamically or electrically unstable. Hospital personnel should be encouraged to use that information, when obtained, in their decision-making process.
- Emergency medical services systems should evaluate all hospitals based upon their demonstrated capability to deliver emergency cardiac care.
- Patients with ECG evidence of AMI and who have either contraindications to thrombolytic therapy or high-risk criteria (Table 1) should be transported by ground to a hospital capable of providing percutaneous coronary intervention unless the additional transport time exceeds 30 minutes.
- A patient's choice of destination hospital, if appropriate, should be honored whenever possible.
- Cardiac patients (with potentially cardiac-related complaints) should be preferentially transported to secondary or tertiary care facilities (Table 2) whenever possible.

The importance of appropriate prehospital triage of chest pain patients is underscored by the prevalence of ischemic heart disease in the United States. Approximately 1.3 million people within the United States experience an AMI annually. Each year, more than 500,000 deaths occur annually in the United States secondary to ischemic heart disease. Most of these deaths occur in the prehospital setting.¹

There exists a wide array of treatment modalities available to chest pain patients. These include medical therapies (such as oxygen, aspirin, nitrates, beta-blockers, thrombolysis, and others), interventional strategies (such as angio-

plasty, coronary artery stenting, and coronary bypass grafting), or a combination of these. Depending on the underlying cause of a patient's chest pain, the in-hospital management of these patients can require varying degrees of medical attention and skill level. The ability of a hospital to provide cardiac monitoring, intensive care unit management, cardiac catheterization and placement of intracoronary stents, and operative intervention are important considerations in the prehospital triage of these patients.

SIMILAR RECOMMENDATIONS

The American College of Cardiology (ACC) and American Heart Association (AHA) Guidelines for the Management of Patients with Acute Myocardial Infarction support the use of EMS systems capable of obtaining a targeted history and physical examination as well as providing appropriate initial treatment to chest pain patients.² Undirected assessments and management of chest pain patients may result in prolonged evaluation times and delay of more definitive therapy.^{2,3} Patients with AMI are at greatest risk of sudden cardiac death within the first hours of symptom onset. Subsequently, the ACC/AHA recommends that all EMS systems provide defibrillation capability.^{2,4}

The National Heart Attack Alert Program (NHAAP), which was initiated by the National Heart, Lung, and Blood Institute in 1991 and consists of representatives from numerous professional organizations, supports the use of curricula pertaining to the management of nontraumatic chest pain and sudden cardiac death by all levels of prehospital provider levels.⁵ Emergency medical services systems should be capable of providing rapid monitoring, stabilization, and transport of chest pain patients.⁶ Additionally, the NHAAP recommends training in the opera-

tion of automated external defibrillators (AEDs) by all levels of EMS providers.^{5,6}

PREHOSPITAL 12-LEAD ECG

The acquisition of prehospital 12-lead ECGs has been demonstrated to be both feasible and practical by paramedic systems.⁷ In general, patients who are eligible for prehospital 12-lead ECGs include: cooperative patients with nontraumatic chest pain, systolic blood pressure greater than 90 mm Hg, and no evidence of malignant dysrhythmias (ventricular fibrillation/tachycardia and second/third-degree atrioventricular block).^{8,9} Delaying transport in order to perform a prehospital 12-lead ECG cannot be recommended in the setting of hemodynamically or electrically unstable patients unless the information will be utilized to rapidly triage and transport the patient to a tertiary care facility.⁸ Prehospital 12-lead ECG programs should implement continuous quality improvement policies and process monitoring to ensure acceptable accuracy.¹⁰ The remaining discussion in this position paper presumes that the chest pain patients have been determined to be stable by EMS personnel.

The ACC/AHA guidelines recommend the acquisition of prehospital 12-lead ECGs in patients with nontraumatic chest pain.² The prehospital ECG can assist prehospital personnel in the earlier triage of chest pain patients.¹¹ The presence of an acute injury pattern, for example, should prompt an attempt to transport the patient to the highest level of care possible based upon regional triage protocols. Even in the absence of an acute injury pattern, the prehospital ECG is useful for triage, treatment, diagnostic, and comparison purposes by the receiving physician.⁹ Furthermore, the acquisition of a prehospital ECG has minor impact on average on-scene time (average scene delay of 4 to 5 min-

utes).^{8,11} Obtaining the prehospital ECG should not preclude efficient management and transport of the patient to the hospital.¹²

As previously noted, the prehospital acquisition of 12-lead ECGs can be useful in the triage, treatment, and transport of chest pain patients. Additional benefit can be garnered from the electronic transmission of the ECG tracing to the receiving physician prior to patient arrival. Acquiring a 12-lead ECG leads to a significant reduction in time delays to diagnosis and administration of thrombolytic therapy.^{2,13,14} Reducing delay to treatment is most often achieved when transmission of the 12-lead ECG tracing occurs.^{8,15} The advanced transmission offers emergency department staff additional time for preparation and ECG analysis¹⁵ and, subsequently, decreased time to treatment. In the setting of AMI, advanced notification allows reduction in the door-to-decision time.^{6,12,14-16} Prehospital ECG acquisition without transmission of the tracing to the destination hospital does not appear to significantly impact delays to treatment.¹⁵ Current technology has improved to the point where any fax machine can receive the prehospital ECG. So, as long as EMS has access to a telephone, transmission of the ECG tracing should be feasible in the vast majority of cases.

CHEST PAIN CHECKLIST

The ACC/AHA guidelines and the NHAAP support the use of prehospital checklists in the evaluation of nontraumatic chest pain patients.^{2,5} The checklists can assist EMS personnel in stratifying a patient's likelihood of having a myocardial infarction. Furthermore, they can help determine the presence or absence of comorbid conditions that may preclude the use of thrombolytic therapy.² The use of a prehospital chest pain checklist can help health care providers' patient

assessments become more complete and consistent without prolonging assessment time.¹⁷ Table 1 provides a sample chest pain checklist.² The chest pain checklist may be used as a time-saving history-gathering tool collected on all chest pain patients and based on system protocol, or based on specific ECG criteria that may be interpreted by the paramedic, interpreted electronically by the ECG machine, or based on online interpretation.

DESTINATION PROTOCOLS

Regional protocols should be developed to assist EMS agencies in the management and triage of nontraumatic chest pain patients. These protocols should provide direction to EMS personnel on the following issues: appropriate use of chest pain checklists; instructions (dose and frequency) for medication administration; circumstances mandating online medical direction; impact of triage considerations such as patients' hospital preferences, previous physician-patient relationships, and insurance coverage plans.⁵ All community and regional EMS agencies should be integrally involved in triage protocol development and review. Due to the heterogeneous distribution of hospital services nationally, a single protocol is not suitable for all communities and regions.

As a part of every community/regional protocol, receiving facilities should be evaluated regarding their ability to deliver cardiac care services and the 24-hour availability of these services. The NHAAP recommends that receiving facilities be categorized in a fashion similar to that used for trauma patient destination decisions. Specifically, receiving facilities should be classified into one of three levels of care: Level I (tertiary cardiac care facility), Level II (secondary cardiac care facility), and Level III (primary cardiac care facility). Table 2 provides

the definitions and responsibilities of each institution level as set forth in Appendix C of the 1998 NHAAP report, *Access to Timely and Optimal Care of Patients with Acute Coronary Syndromes—Community Planning Considerations*.⁵

The categorization process is the responsibility of the committee formulating the regional chest pain patient triage protocols. This committee should include representatives from the following disciplines: EMS, emergency medicine, and cardiology. Finally, the cardiac care services available at each receiving facility should be well known to each EMS agency within the region.

There is some evidence that patients with signs of cardiogenic shock have significantly reduced mortality when they are treated with angioplasty, coronary artery stent placement, or coronary artery bypass grafting.¹⁸ Therefore, consideration should be given to the transport of patients with signs of cardiogenic shock to a hospital capable of acute intervention if practical. The high-risk criteria include a heart rate greater than 100 beats/min, a systolic blood pressure less than 100 mm Hg, pulmonary edema, or obvious cardiogenic shock.²

Patients with ECG evidence of AMI and who have either contraindications to thrombolytic therapy or high-risk criteria should be transported to a receiving facility capable of providing percutaneous coronary intervention unless the additional transport time exceeds 30 minutes. The 30-minute recommendation is arbitrary. It is reasonable to presume that at least 30 minutes is needed in most receiving facilities to mobilize the cardiac catheterization team. Therefore, this degree of transport time is not "wasted" but would be needed even if the patient were already at the receiving hospital, assuming that the receiving hospital receives prior notification of the patient's condition and impending arrival.

Additional studies are needed to support the above recommendations and to determine whether prehospital treatment is useful during the longer transport time. Treatment options might include administration of a platelet glycoprotein IIb/IIIa receptor antagonist,¹⁹ administration of thrombolytic therapy in eligible patients,¹³ or both.

Whenever logistically possible, chest pain patients should be triaged to the receiving facility of their choice in order to facilitate continuity of care. As noted previously, patient preference should be a consideration included in all regional chest pain triage protocols. These protocols should explicitly state under what circumstances patient preferences should be honored as well as situations in which patient preferences should be deferred. Emergency medical services systems need to recognize that transport of all patients only to the closest hospital may impair patient care when physicians unfamiliar with the patient are asked to provide acute care. Inappropriate triage practices may increase overall health care costs (e.g., secondary transfers, insurance coverage issues) and potentially worsen patient outcome. Emergency medical services diversion of patients from their hospital of choice must be based upon factors including patient stability, time and distance variables, and availability of necessary services for optimal patient care. Acceptable EMS diversion practices should be strictly defined in any regional chest pain triage protocols.

Regional protocols should incorporate this strategy of prehospital triage of chest pain patients whenever and wherever possible. In those regions where timely transport to secondary or tertiary cardiac care facilities is not available, the highest level of cardiac care should be sought as directed by the regional protocols.

The prehospital triage of chest

pain patients is complex. Therefore, an online medical direction system in which a trained physician is available (on a 24-hour basis) for consultation with regard to appropriate patient triage and patient management should be available to every EMS agency. Online physicians should be thoroughly familiar with regional EMS system capabilities as well as cardiac care capacity of hospitals within the region. The roles and responsibilities of the online medical direction system should be specifically defined within community/regional chest pain patient triage protocols.

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