EMS Subspecialty Certification
Review Course

1.3.2 Cardiovascular
1.3.2.1 STEMI
1.3.2.1.1 Utilization of electrocardiogram in the field

1.4.2 Procedures
1.4.2.4 Prehospital Administration of Thrombolytics in the Field
1.4.2.5 Transport Directly to Percutaneous Coronary Intervention (PCI) Capable Hospital
1.4.2.5.1 Helicopter (HEMS) Activation

Revision Date: 8/7/15

Learning Objectives

Upon the completion of this program participants will be able to:

• Provide an overview of an integrated systems of care approach to EMS patients with STEMI.
• Discuss strategies for reducing the time to reperfusion therapy for STEMI patients.
• Describe the requirements for successful 12-lead ECG diagnostic programs, prehospital fibrinolysis programs and direct to PCI programs.

Question 1

Which of the following statements is true with respect to pre-hospital thrombolytics vs. transport directly to a PCI capable hospital?

a. Less than 50% of the adult population lives within 60min of a PCI capable facility.

b. When compared to thrombolytics, PCI has lower rates of re-infarction and stroke.

c. Mandatory elements for a pre-hospital thrombolytic program include, 12 lead acquisition, completion of a fibrinolytic checklist, and the ability to measure prothrombin times (PT) in the field.

d. After studies showed that the strategy of pre-hospital thrombolysis was feasible, many EMS systems in the United States have initiated fibrinolytic protocols.
ST Elevation Myocardial Infarction & EMS

- A well-organized approach to out-of-hospital STEMI care requires integration of community, EMS, physician and hospital resources.
- EMS providers should be familiar with the presentation of STEMI and trained to determine symptom onset.
- ‘Time sensitive emergency’ – ‘time is muscle’
- Goals of treatment are for first medical contact to drug < 30 minutes or first medical contact to balloon inflation < 90 minutes.
- First medical contact now extends to paramedics:
  - FMC2N < 30 minutes and FMC2B < 90 minutes (where FMC is EMS arrival with patient on scene)

Key Speaking Points

[1] patient-based delay in recognition of STEMI and activation of the EMS system often constitutes the longest period of delay to treatment. This is compounded by incremental delays during transport, in the ED and onwards into the hospital system.

[2] A well functioning STEMI system integrates these four systems of community, EMS, ED and hospital (ie PCI lab) in a seamless integrated manner where clinicians work together. This is analogous to a STEMI Sprint Reperfusion Relay. “Hand offs and smooth transitions are critical. It is not a turf battle, as we are each expected to move fast”.

[3] Two ways to treatment the STEMI based on evidence and available resources – Fibrinolysis or PCI. Regardless of the type of therapy, reperfusion of the infarct related artery is of time 

F2N = EMS 2 Needle

Emergency Medical System STEMI Roles
Prehospital 12 lead ECG

- **Evidence**: prehospital 12-lead ECGs speed the diagnosis and shorten the time to reperfusion for fibrinolysis and primary PCI through prehospital identification of STEMI and pre-notification of ‘STEMI Alert’.
- Prehospital ECG = AHA Class I recommendation
- Integrated Systems of Care Approach
  - Requires structured platform for ECG management and prehospital notification of hospital
- BLS and ALS skillset (EKGs, ASA)

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Prehospital 12 lead ECG

- **ECG Acquisition**: first medical contact to ECG less than 10 minutes. Serial EKGs increase sensitivity
- **ECG Interpretation/Transmission**: The ECG may be transmitted for remote interpretation by a physician or screened for STEMI by properly trained paramedics with or without assistance of computer interpretation
- **ECG Storage**: reconciliation with patient care record

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Prehospital fibrinolysis

- **Evidence**: Clinical trials and systematic reviews demonstrate reduced time to treatment with decreased mortality rates with prehospital fibrinolysis.
- **Goal**: FMC2N < 30 minutes
- In patients within 2 hours of symptom onset or when delays to PCI are anticipated, fibrinolytic therapy is recommended.
- Mandatory elements: 12-lead acquisition and interpretation; fibrinolytic checklists; experience in advanced life support; communication with receiving institution; medical oversight; CQI STEMI program.
**Prehospital fibrinolysis**

- Advanced Life Support Procedure
- Requires accurate estimation of weight within 10 kg
- Patient disclosure of risk and benefits
- Unique drug storage and exchange environment

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**Transport Directly to PCI Hospital**

- 80% of adult population of US lives within 60 minutes of PCI capable center
- Evidence: reduced time to treatment with reduced mortality rate when transport time was less than 60 minutes
- STEMI Alert Components: prehospital ECGs, notification of receiving facility, and prehospital activation of PCI team shorten reperfusion times

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**Transport Directly to PCI Hospital**

- Integrated CQI, real-time provider feedback and healthcare provider education, and hospital leadership collaboration/buy-in are critical elements of success
- System Performance Measure: FMC2B, EMS to balloon inflation time.
- System Benchmark: Goal: FMC2B < 90 minutes.
- False positive activation rate: 0-14% in contemporary STEMI systems
Air Medical Evacuation: STEMI

• An option for a successful regional STEMI system of care is ready access to air medical transport.
• Some air medical programs are working closely with referring hospitals and ground EMS systems to dispatch helicopters before the arrival of a STEMI patient at a referring hospital.

Air Medical Evacuation: STEMI

• Hospital and ED protocols should clearly identify criteria for expeditious transfer of patients to PCI capable centers.
  – Patients ineligible for lytic therapy
  – Cardiogenic shock patients
• Door to departure time (DIDO) of < 30 minutes is recommended.

Take-Home Points

• EMS professional must extend the roles of both the BLS provider (eg ECG, PCI activation) and ALS provider (eg prehospital lytic or PCI activation) in STEMI care.
• EMS Medical Directors must integrate with both community and hospital systems of STEMI care.
• EMS Medical Directors must actively engage in integrated educational and CQI programs for STEMI care.
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Answer B