

Mountain-Valley Emergency Medical Services Agency
12 Lead Pilot Project

(Signature on File in MVEMSA Office)

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Introduction and Background

In the article entitled “Emergency Medical Services: At the Crossroads”, the Institute of Medicine (IOM) proposed that Emergency Medical Services (EMS) systems are “fragmented”, there was tremendous variability in quality, and there was a lack of a national standard (Committee On The Future Of Emergency Care In The United States Health System , 2006). Additionally, the IOM recommended that EMS become regionalized, coordinated, and accountable. Part of this regionalization and coordination includes systematic approaches to patients suffering from acute coronary syndrome.

Current American Heart Association guidelines, as well as numerous consensus statements, recommend that pre-hospital personnel acquire and utilize 12 lead electrocardiograms (ECGs) to evaluate patients for suspected ST Elevation Myocardial Infarction (STEMI) (American Heart Association, 2008).

Several EMS systems in California have successfully implemented pre-hospital ECGs as a tool to identify patients with STEMI for the purpose of transporting those patients directly to a hospital capable of emergent interventional cardiac catheterization procedures. There is a preponderance of evidence that clearly demonstrates positive effects on both morbidity and mortality when the time from symptom onset to intervention is less than 90 minutes.

Ting et. al. identified four distinct time intervals for patients with STEMI in a system without pre-hospital ECG capabilities: symptom onset to EMS arrival, EMS arrival to hospital arrival, hospital arrival to ECG, and ECG to reperfusion (American Heart Association, 2008).

Studies have shown that in an EMS system capable of pre-hospital 12 lead ECG, the second time interval (EMS arrival to hospital arrival) is reduced due to an urgency

given to those patients identified in the field as having a STEMI. The third time frame (hospital arrival to ECG) is essentially eliminated because of the pre-hospital ECG. And the fourth time interval is dramatically reduced because of pre-arrival activation of the catheterization lab team. Data on the difference a pre-hospital ECG makes is still forthcoming in many areas of the country.

However, in 2008, the first set of real time data became available out of Ottawa, Canada where researchers measured the door to balloon times in patients who received pre-hospital ECGs and were then transported to the city's only Percutaneous Coronary Intervention (PCI) center, compared to those that did not receive a pre-hospital ECG and were transferred at a later time from one of the city's 4 non-PCI hospitals (Le May et al., 2008). Patients with pre-hospital ECGs arrived at the PCI center 44 minutes sooner than those that did not have pre-hospital ECGs because they were taken directly to the PCI center and bypassed non-PCI hospitals. Similar policies are now in place throughout California, including Sacramento, Los Angeles, and San Diego.

Barriers to implementation of a pre-hospital 12 lead ECG program in MVEMSA's region include equipment availability, costs associated with equipment, training, policy revision, maintaining competency, continuous quality improvement, and identification of STEMI Receiving Centers within the MVEMSA region and the surrounding communities. On many levels, however, each of these barriers is being systematically addressed. In an informal survey of MVEMSA providers, more than 90% currently have 12 lead ECGs capabilities with the monitors that are currently deployed. Training is being addressed by MVEMSA in a program that has been written and utilized in other EMS systems in California to train medics on the acquisition and utilization of 12 lead ECGs. Policy revision is undergoing initial consideration at MVEMSA as to which policies will be impacted by implementation of 12 lead ECGs. Additionally, one of the major hospital systems within the MVEMSA region is currently pursuing accreditation as

a Chest Pain Center. There are others that have 24/7 catheterization lab teams available, including some hospitals just outside the boundaries of our counties.

With the above information, it becomes clear that now is the time to consider a pre-hospital 12 lead ECG program in the Mountain Valley EMS region. Because this monumental project will impact all parts of the EMS system, approaching these changes incrementally and methodically makes sense. The first steps are included in this Pilot.

Pilot Design

A) Definitions:

- 1) **STEMI Receiving Center:** a hospital in the MVEMSA region that has an interventional cardiology catheterization lab licensed by the Department of Health Services which provides emergent primary interventional cardiac catheterization services 24 hours a day, 7 days a week, 365 days a year, with an established quality assurance program and a written commitment by the hospital administration supporting the center's interventional cardiology mission for STEMI patients.
- 2) **STEMI Referral Center:** any hospital in the MVEMSA region that lacks the availability or continuous availability of 24/7/365 primary PCI. These hospitals will have the ability of administering thrombolytics to a STEMI patient. These hospitals will also have written transfer policies for STEMI patients to STEMI Receiving Centers.
- 3) **STEMI Patient:** a patient 18 years of age or greater who has received a 12 lead electrocardiogram in the pre-hospital environment that stipulates *****Acute MI***** or "ECG Suggestive of Acute MI" on the computer interpretation on the ECG
- 4) **Facilitated Percutaneous Coronary Intervention (PCI):** cardiac catheterization that is performed after a patient has already received thrombolytics for the purpose of intervening in acute coronary syndrome.

B) Participation in this pilot project will include:

- 1) MVEMSA providers who have 12 lead ECG capabilities and who have completed MVEMSA approved 12 lead training
- 2) STEMI Receiving Centers who:

- a) Provide interventional cardiac catheterization lab services 24 hours a day, 7 days a week.
- b) Develop Emergency Department policies for the rapid pass through to the catheterization lab for STEMI patients brought in by ambulance from the field.
- c) Freely exchanges information with the EMS agency regarding any STEMI patient brought from the field for the purposes of tracking door to balloon times and essential patient information (Attachment 2).
- d) For the purposes of this pilot project, the STEMI Receiving Centers serving the MVEMSA region will be Doctors Medical Center (DMC), Modesto and Memorial Medical Center (MMC), Modesto.

3) STEMI Referral Centers who:

- a) Are capable of administering thrombolytic medications to appropriate patients within 30 minutes of arrival.
- b) Have rapid transfer policies in place for patients who require rescue or facilitated PCI or who are not candidates for thrombolytic medications.
- c) Freely exchange information with the EMS agency regarding any STEMI patient brought from the field for the purposes of tracking door to thrombolytic times and essential patient information including transfer information (Attachment 3).
- d) For the purposes of this pilot project, STEMI Referral Centers will include all hospitals in the MVEMSA region that are not STEMI Receiving Centers

C) Duration of Pilot Project:

- 1) December 1, 2009 to November 30, 2010

D) Patient Selection Criteria

- 1) Patients 18 years of age or older
- 2) One or more of the following:
 - a) Chest pain, suspected cardiac etiology
 - b) Moderate or severe respiratory distress
 - c) Paramedic Discretion

E) Patient Exclusion Criteria

- 1) Patients 17 years of age or younger
- 2) Patients who are pregnant
- 3) Patients with traumatic mechanisms

F) Destination Decisions for Patients Identified as STEMI Patients:

- 1) All STEMI patients shall be transported to a STEMI Receiving Center if ground transport is estimated to be sixty (60) minutes or less. If the patient has a preference or has a cardiologist associated with either DMC or MMC, the patient shall be transported to their preferred hospital. If the patient does not have a preference, the patient shall be transported to the NEAREST STEMI Receiving Center.
- 2) If ground transport time to a STEMI Receiving Center is estimated to be greater than sixty (60) minutes, the patient shall be transported to the nearest STEMI Referral Center.
- 3) Unstable STEMI patients shall be diverted to the nearest emergency department. Unstable STEMI patients are defined as any ONE of the following:
 - a) Patient's under CPR

- b) Inability to ventilate and/or oxygenate the patient with BLS maneuvers

NOTE: Hypotensive STEMI patients should be transported to STEMI Receiving Centers

- 4) A STEMI Receiving Center may request diversion of a STEMI patient to another STEMI Receiving Center only when:
 - a) The STEMI Receiving Center is unable to perform emergent percutaneous coronary intervention because the Cardiac Catheterization Team is already committed caring for another patient ; or
 - b) The STEMI Receiving Center is on internal disaster.
 - c) The Cardiac Catheterization laboratory is closed for repair or upgrade

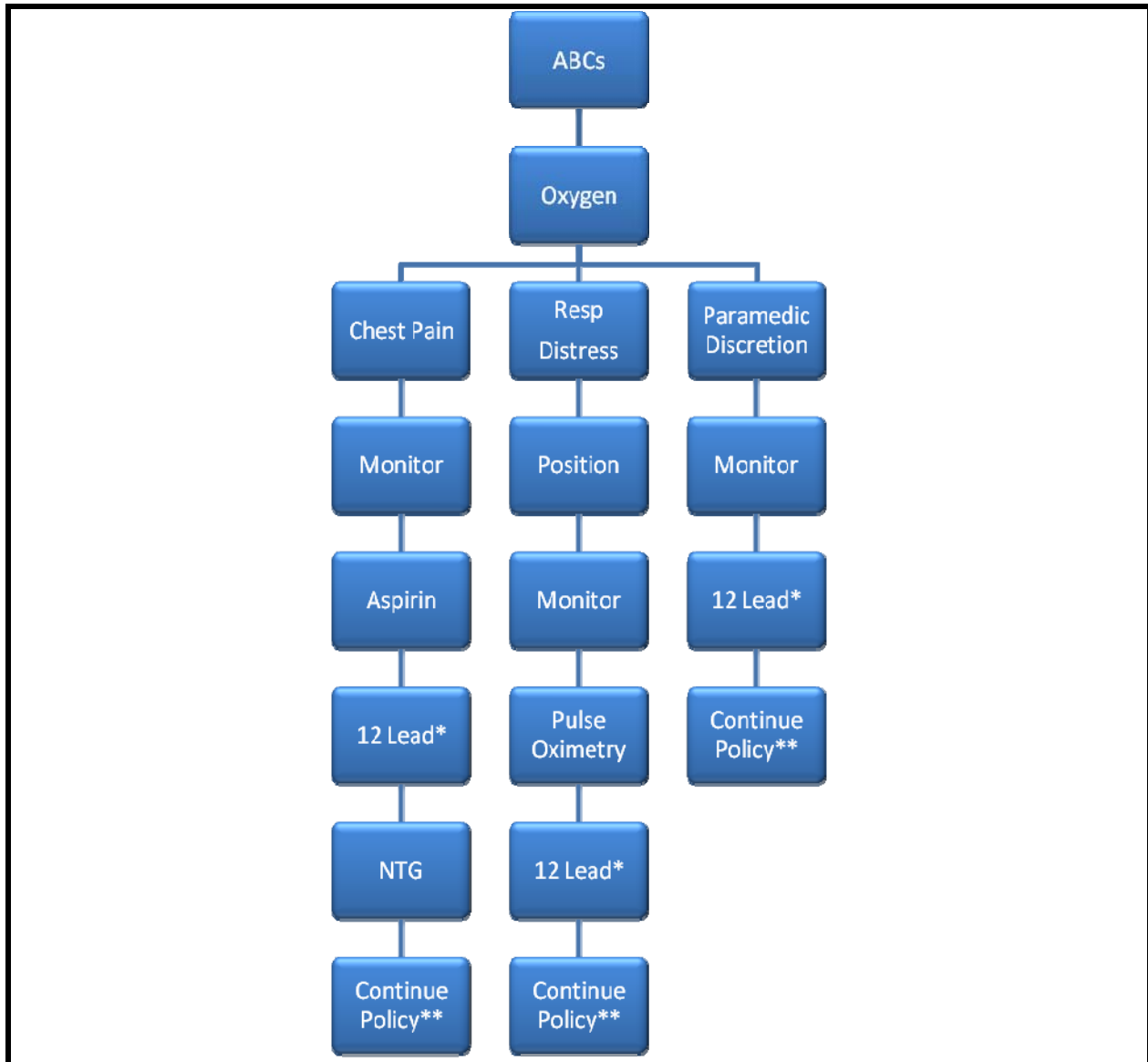
NOTE: ED diversion does not prohibit a STEMI patient's transport to a STEMI Receiving Center.

- G) A "Prehospital Fibrinolytic Checklist" (Attachment 4) should be completed by EMS personnel on all patients transported to STEMI Referral Centers, as time permits. Completed forms should be submitted directly to the receiving physician or nurse.
- H) All EMS personnel who perform 12 lead ECGs shall complete and submit, along with the Patient Care Report, a 12 lead Patient Encounter Report (Attachment 5) on every patient who receives a 12 lead ECG. A copy of the 12 lead shall be attached to the form and both the form and the ECG shall be either submitted to

the provider quality coordinator (non-transport) or deposited in envelopes marked “**COMPLETED**” located in each emergency department (transport).

- I) Data reporting on this project will be conducted by MVEMSA. Data elements to be collected and reviewed are outlined in Attachments 1, 2 and 3. MVEMSA reserves the right to adjust or change these data elements at any time during the project with prior notice or consent.

Pilot Protocol



* 12 Lead ECGs should be obtained in the course of normal patient care. Never delay medical care in order to obtain a 12 lead. This includes oxygenation, ventilation and patient transportation.

** Continue with appropriate corresponding policy

Attachment 1

PRE-HOSPITAL DATA ELEMENTS

Provider Agency
Incident Number/Run Number
Date and time of chest pain onset
Call Received by dispatch
Call Dispatched
First ALS Unit Scene Arrival Time
Date and time of First ECG
Chief Complaint: C=chest pain, S=shortness of breath, P=paramedic discretion
STEMI Documented in PCR (Y/N)
Lowest Blood Pressure
Transport Time
Hospital Arrival Time
Total EMS Contact Time
Interventions (A=ASA, I=IV, M=Morphine, N=Nitroglycerine, O=Oxygen,
C=CPAP, P=Albuterol)
Destination Decision Documented (Y/N)
Comments

Attachment 2

STEMI RECEIVING CENTER DATA ELEMENTS

A. For Patients Transported by EMS ONLY

Incident Number/Run Number

Transporting Agency

Date and Time of ED Arrival

Patient Age

Patient Gender

Time of Patient Arrival to Catheterization Lab

Cardiologist call back time

Cardiologist arrival time

Cardiac Catheterization Team arrival time

Date of Cardiac Catheterization

Door to Needle Time

Door to Balloon Time

Date of CABG

Discharge Disposition (Alive/Dead)

Date of hospital discharge

(Data elements are subject to change as the program progresses)

B. For Interfacility Transports ONLY

PCR Number

Transporting Agency

Fibrinolytics Given Prior to Arrival to STEMI Receiving Center?

Time of Arrival at STEMI Receiving Center

Patient Age

Patient Gender

Time of Patient Arrival to Catheterization Lab

Cardiologist call back time

Cardiologist arrival time

Cardiac Catheterization Team arrival time

Date of Cardiac Catheterization

Door to Needle Time

Door to Balloon Time

Date of CABG

Discharge Disposition (Alive/Dead)

Date of hospital discharge

(Data elements are subject to change as the program progresses)

Attachment 3

STEMI REFERRAL CENTER DATA ELEMENTS

A. For Patients Transported by EMS ONLY

Incident Number/Run Number

Transporting Agency

Date and Time of ED Arrival

Patient Age

Patient Gender

Contraindications to Thrombolytics (Y/N)

Time Thrombolytics Given

Time of Contact with STEMI Receiving Center

Time Patient Accepted by STEMI Receiving Center

Name of STEMI Receiving Center

Time Transport Called

Interfacility Transporting Agency Name

Time Transport Arrived

Time Transport Departed ED

(Data elements are subject to change as the program progresses)

B. For Walk-In STEMI Patients

Patient Age

Patient Gender

Time of First ECG

Time STEMI Identified

Contraindications to Thrombolytics (Y/N)

Time Thrombolytics Given

Time of Contact with STEMI Receiving Center

Time Patient Accepted by STEMI Receiving Center

Time Transport Called

Interfacility Transporting Agency Name

Time Transport Arrived

Time Transport Departed ED

(Data elements are subject to change as the program progresses)

Attachment 4
Mountain Valley EMS Agency
Pre-hospital Thrombolytic Checklist

Patient Name: _____

Birth Date: _____

Step 1: Does ECG show a STEMI?

Yes

No

If No, STOP! Thrombolytic Checklist is not necessary

Step 2: Are There Contraindications to Thrombolytics?

If any of the following are marked YES, Thrombolytics **MAY BE** Contraindicated

- | | | |
|---|---------------------------|--------------------------|
| Systolic Blood Pressure >180 | <input type="radio"/> Yes | <input type="radio"/> No |
| Diastolic Blood Pressure >110 | <input type="radio"/> Yes | <input type="radio"/> No |
| Right vs. Left Arm SBP Difference > 15 mmHg | <input type="radio"/> Yes | <input type="radio"/> No |
| History of Structural Central Nervous System Disease | <input type="radio"/> Yes | <input type="radio"/> No |
| Significant Head or Facial Trauma in Last 3 Months | <input type="radio"/> Yes | <input type="radio"/> No |
| Recent (last 6 weeks) Major Trauma or Surgery | <input type="radio"/> Yes | <input type="radio"/> No |
| Current GI/GU Bleed (hematuria, melena, hematochezia) | <input type="radio"/> Yes | <input type="radio"/> No |
| Bleeding or Clotting Problems or on Blood Thinners | <input type="radio"/> Yes | <input type="radio"/> No |
| Pregnant | <input type="radio"/> Yes | <input type="radio"/> No |
| CPR Duration > 10 minutes | <input type="radio"/> Yes | <input type="radio"/> No |
| Serious Systemic Disease (Metastatic Cancer,
Severe Liver or Kidney Disease) | <input type="radio"/> Yes | <input type="radio"/> No |
| Known Allergy to Thrombolytics | <input type="radio"/> Yes | <input type="radio"/> No |

PRESENT THIS COMPLETED FORM TO ED STAFF

Attachment 5

MVEMSA 12 Lead Patient Encounter Report

Complete this Form for EVERY 12 lead that is acquired. Leave this completed form with 12 lead attached at the receiving hospital in the designated **“COMPLETED FORMS”** folder located in the medic room or at the nurse’s station. For non-transports, submit this form to your agency’s quality coordinator or supervisor.

Patient Name: _____

DOB: _____

Date: _____/_____/_____

Provider Agency: _____

Run #: _____

Medic: _____

Does ECG Indicate Acute MI?		YES (<u>attach copy of PCR</u>)			No	
If Yes, which segments are elevated (Circle)						
I	II	III	avR	avL	avF	
V1	V2	V3	V4	V5	V6	
Comments:						

**Attach COPY of 12 Lead (and PCR, if applicable)
to BACK of this Document**

References

- American Heart Association (2008). Implementation and Integration of Pre-hospital ECGs Into Systems of Care for Acute Coronary Syndrome. *Circulation*, 108(190402), 118. doi:10.1161/CIRCULATIONAHA.108.190402
- Committee On The Future Of Emergency Care In The United States Health System (2006). Emergency Medical Services: at the Crossroads. *Institute of Medicine of the National Academies*, doi:http://www.iom.edu/?id=48898
- Le May, M. R., So, D. Y., Dionne, R., Glover, C. A., Froeschl, M. P.V, Wells, G. A., et al. (2008). A Citywide Protocol for Primary PCI in ST-Segment Elevation Myocardial Infarction. *New England Journal of Medicine*, 358, 231-240. Retrieved from <http://content.nejm.org/cgi/content/full/358/3/231>