

# **STEMI System Hospital Orientation Self Study**

**July 2009**





- This PowerPoint provides a basic introduction to Contra Costa County STEMI System
- For questions contact Contra Costa EMS Medical Director Joe Barger MD or Pat Frost RN, MS, PNP STEMI Project Manager

## Contra Costa County STEMI Hospital Training

### LESSON PLAN

COURSE: “STEMI System Hospital Orientation”

Overview of STEMI Center designation/destination for Contra Costa County.

Audience: Emergency department and STEMI program support personnel including physicians, nurses, cardiac cath lab personnel. This program may be adapted and is designed as a tool for use at all emergency departments in Contra Costa County.

TOPIC: STEMI System Orientation

Educational Approach: This training may be accomplished using a variety of strategies. Traditional lecture presentation or adapted to self study. If adapted to self study it is recommended that post-test questions be developed specific to the facility.

OBJECTIVES: At the completion of the training session, the student will be able to:

1. Identify why STEMI Centers are necessary.
2. Identify requirements for a STEMI Center.
3. Identify triage and destination goals for patients with chest pain in Contra Costa County.
4. Identify how your Emergency Department patient intake changes in a STEMI system.
5. Describe how EMS providers identify STEMI patients in the field.
6. Describe EMS communication to be included in a radio and hospital report of a patient with a STEMI.
7. Identify appropriate hand off of 12-lead ECG to hospital personnel.

8. Accurately describe Emergency Department personnel role in facilitating triage of EMS STEMI-Alert patients.
9. Describe the benefits and challenges of STEMI systems.

MATERIALS NEEDED:

Projection Screen

LCD Projector

Laptop/Computer with PowerPoint Presentation:  
"STEMI System Hospital Orientation"

Handouts -

PowerPoint Presentation - "STEMI System Hospital Orientation"

CCC EMS Policy #25 – "STEMI Triage and Destination"

CCC EMS Policy #26- "STEMI Receiving Center Designation"

Contra Costa County STEMI Hospital Training Post-test and annotated answer key

References:

All educational resources are available at our EMS website at : [www.cccems.org](http://www.cccems.org)

STEMI

Contra Costa County Health Services Prehospital Care Manual

Contra Costa County Health Services EMS Policies and Procedures

Please contact EMS if you have questions about this training.

**Welcome to our STEMI System!**



**Together we are Contra Costa  
Team STEMI!**

- You are joining a collaborative network of designated STEMI Receiving Centers (SRC) with 24/7 operations who receive EMS triaged high risk heart attack patients for rapid cardiovascular intervention.
- Time is muscle in a STEMI System and participating in this program enhances the quality of emergency care provided in our community.

# What you need to know!

- What is a STEMI System?
- How EMS helps improve STEMI outcomes.
- STEMI destination and how it works.
- How medics identify STEMI patients.
- What a STEMI Alert is.
- What type of radio and bedside report to anticipate.
- How the STEMI System quality process works.
- How do positive corrections improve performance?

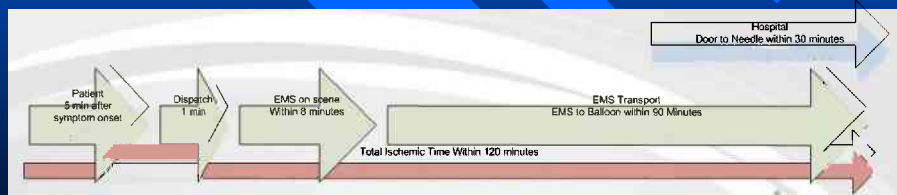
•The purpose of this educational PowerPoint is to help you understand and describe to others how the Contra Costa STEMI System works.

•By the end of this presentation/self study you should be able to answer the objectives listed above.

# STEMI Systems

## “Fast Tracks” to STEMI Intervention

- Contra Costa STEMI System 2009
  - 1 of 11 STEMI Systems in California
  - 1 of 148 STEMI Systems in the US
  - Many more in the development across the US and CA



•A STEMI System is a collaborative network of EMS providers and specialized hospitals willing to provide 24/7/365 cardiac intervention for an entire community. The system is supported by protocol and continuous process improvement with the goal of rapid reperfusion of the heart to prevent mortality and morbidity in Chest Pain Patients. It relies on the accurate identification of STEMI patients in the field with the use of prehospital 12-lead.

•STEMI Systems have a mandate to work with the community to educate patients about healthy lifestyles, knowing how to identify a heart attack and calling 911 first in the event of chest pain.

The 2005 AHA Conference Proceedings on STEMI Systems of Care called on health care providers to create STEMI Systems based on the following findings:

- 30% of STEMI patients receive no reperfusion therapy despite availability and absence of contraindications
- <50% of patients treated with fibrinolysis have a door to needle within 30 minutes
- 35% have PCI door to intervention within 90 minutes
- 20% of STEMI patients have contraindications to fibrinolytic therapy, but 70% of these do not receive reperfusion with PCI
- EMS activation of the cardiac catheterization laboratory speeds the time to diagnosis and reperfusion therapy
- But >75% of patients drive themselves or are transported to the hospital by a family member

STEMI Systems create a FAST TRACK direct to the cath lab in some STEMI systems including ours

## STEMI System Development

- 1999 Prehospital 12 lead piloted by Fire Transport
- 2006 Prehospital 12 lead implemented EMS system-wide by ALS first responders & transport
- 2006-2007 STEMI System Advisory Council
- April 2008 STEMI designation process started
- Sept 8, 2008 STEMI System was launched

**Aug 17 2009 at 0800**

**Sutter Delta Medical Center joins  
Contra Costa County STEMI System**

- The development of the Contra Costa STEMI System required participation and support of all stakeholders in the EMS system.
- The STEMI System of Contra Costa was developed under the medical leadership of Dr. Joe Barger EMS Medical Director in collaboration with hospital, ED, cardiology, nursing and prehospital provider leadership.
- It took a number of years and there has been a huge investment in prehospital training, 12 lead equipment and time by all those who have participated.



## STEMI Systems of Care National Goals of Therapy

- Rapid reperfusion
- Prevent or minimize myocardial damage
- Prevent major adverse cardiac events/complications
- Anticipate and treat life-threatening complications



•These are the goals of STEMI reperfusion in STEMI Systems of care as described by the American Heart Association.

## STEMI Receiving Center (SRC)



- Hospital requirements
  - Personnel, Policy, Equipment Requirements
  - Site Survey
  - Contract with EMS
  - STEMI System Oversight
- 24/7/365 cath lab capability
  - No STEMI diversion

•In a STEMI System the EMS Agency designates STEMI Receiving Centers based on a set of criteria.

•Contra Costa criteria for STEMI Center Designation is on our website at [www.cccems.org](http://www.cccems.org) and includes:

- STEMI Centers provide 24/7/365 cath lab capability--**NO diversion process**
  - If the cath lab is down or busy the STEMI Center would manage the patient with thrombolytics as they do now with walk-in patients when this event occurs
  - Contra Costa EMS reserves the right to modify the STEMI destination in the rare event of hospital internal disaster or prolonged Cath lab malfunction
- Each Center must meet rigorous requirements, enter into contract with EMS and commit to providing:
  - Personnel
  - Policy/Protocols
  - Equipment
  - Participation in a collaborative program of STEMI System Oversight in partnership with the EMS Agency.
  - Rapid transfer plan when cardiovascular surgical services are required in facilities who do not have CV surgery support.

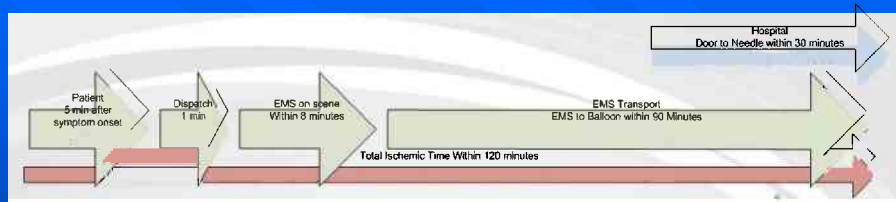
## STEMI Receiving Centers

- **Doctors San Pablo**
- **John Muir Medical Center – Concord**
- **John Muir Medical Center – Walnut Creek**
- **Kaiser – Walnut Creek**
- **San Ramon Regional Medical Center**
- **Sutter Delta Medical Center \*\*\*NEW\*\*\***
  
- **Out of County Centers**
  - **Valley Care Pleasanton**
  - **Oakland Summit Medical Center**

•With Sutter Delta joining our STEMI System Network in August 2009 there are now 6 strategically located STEMI Centers in Contra Costa County.

•We also have 2 out of county STEMI Centers. These Centers are part of the Alameda County STEMI System.

# STEMI Destination



- **Paramedics decide destination when a STEMI patient is identified based on the protocol**
  - Patient choice is preserved
  - Condition of the patient is considered (stable airway)
  - Closest STEMI Centers are identified
- **Goal: EMS transport should not exceed 30 minutes**

•Please review EMS Policy 25: STEMI Triage and Destination

•In our destination policy patients with an identified STEMI are to go to the closest STEMI Receiving Center unless

•The patient requests another facility

•A STEMI Center that is not the closest is acceptable if the estimated additional time does not exceed 15 minutes. This allows for the patient to get to their desired facility and physician.

•Patient has an unmanageable airway. In those cases the patient goes to the closest ED.

•In addition we are enhancing our STEMI destination policy to enable patients with cardiac arrest who have a STEMI identified before or after the arrest to be triaged to a STEMI Receiving Center and NOT the closest ED. These patients require rapid reperfusion with intervention to improve their chance for survival.

## **STEMI Destination Flexibility on Destination**



- **Gets patient to their desired facility and physician**
- **Cath lab startup is most time-consuming step**
- **ED arrival delay does not impact final time to cath lab or intervention**

There is some flexibility in our destination protocol for the following reasons:

- Get patient to their desired facility and physician
- Cath lab startup is most time-consuming step and if it takes a while to get to the ED, the delay has been demonstrated not to impact final time to cath lab or intervention when the cath lab is activated from the field.

## What happens to patients who do not go directly to a STEMI Center?



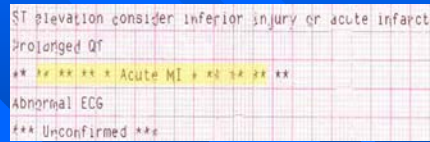
- **Thrombolytics**
- **ED triage to STEMI Center if this fails**
- **ED-SRC Center coordinated interfacility transport**

- Patients may enter the STEMI system through a non-STEMI center in a number of ways:
  - The patient always has a choice although they are advised of what resources we have available in our STEMI system. That choice has to be respected.
  - The patients may walk into a non-STEMI center. All STEMI Centers are required to accept patients from non-STEMI centers and work with those facilities to create effective mechanisms for rapid transport. Contra Costa STEMI System is working to improve rapid interfacility transport of these patients between our STEMI and non-STEMI Centers.
  - Finally the non-STEMI centers are capable of administering first line therapy to treat MI's as they do and have done for many years prior to triaging the patient to a STEMI center.

# STEMI Triage and Destination

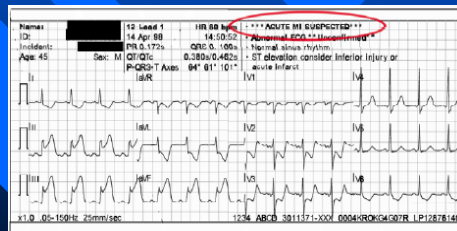
- Depends on early prehospital 12-lead identification
  - Chest Pain Patient
  - Device identifies
  - Medic assures quality 12 lead
  - Medic may do additional interpretation

(Zoll) \*\*\* ACUTE MI \*\*\*



- STEMI Alert applies only to STEMI identified by 12 lead.

- Other messages
  - Do not qualify as STEMI
  - Do not merit transport to STEMI Center



(LP-12) \*\*\* ACUTE MI SUSPECTED \*\*\*

- Prehospital paramedics use Zoll 12 lead and LP-12 (Physio-Control) devices that “diagnose rhythm”.
- By EMS protocol, prehospital providers rely primarily on 12 lead device algorithm identification which has good reliability **IF** artifact is minimized.
- Other messages – e.g., possible MI, possible ischemia, MI age undetermined **do not** qualify as STEMI and do not merit transport to STEMI Center
- All prehospital providers are trained in this protocol and have supplemental training in 12 lead interpretation and evaluating the quality of the 12-lead.
- Eventually we hope to include 12 lead transmission in our system but the technology is expensive and is difficult to implement county-wide.
- In the future you may be involved in a 12 lead transmission pilot.

# STEMI Prehospital Triage and Destination

- 12-lead needs to be rapidly obtained
  - Acceptable quality
    - » good QRS in all 12 leads
    - » no significant artifact
- STEMI determined by 12 lead
  - Determine destination
  - Perform “STEMI Alert”
  - Transport-Load and Go
- STEMI Alert needs to give critical information to STEMI Center



•This is what we want to happen in the field. However in all STEMI Systems there are no perfect circles and this may not happen every time. That is why there is a STEMI QI review process involved. **One of the biggest challenges in ANY STEMI System is the task of reducing false positives.**

•At the STEMI Receiving Center all STEMI QI issues should go through the STEMI RN project manager for your facility. If you do not know who that person is, contact your cath lab manager.

•The STEMI Center QI/Program Coordinator is responsible for submitting a STEMI Report to EMS for each “STEMI ALERT” that enters a STEMI Receiving Facility (whether an actual STEMI or not). This allows EMS to track the root causes of false positives in the system and provides an opportunity for the STEMI Center to give timely constructive feedback (positive and corrective) to the prehospital providers.

•The expectations for the prehospital providers in the field are defined by EMS protocol for ACS and include

- Treatment of Chest pain
- 12-lead needs to be rapidly obtained
  - Must be of acceptable quality with good QRS complexes in all 12 leads and no significant artifact
- Once obtained destination needs to be determined and contact of STEMI center by “STEMI Alert” should happen as soon as possible.
- Prehospital providers are trained not wait until ready for transport or after departure.
- As soon as the paramedics determine this is a STEMI patient the STEMI Alert call goes out.
  - Understand that the prehospital providers are doing many things simultaneously en route under at times, challenging circumstances.
  - STEMI patients can be quite ill and unstable.
  - Contra Costa has had numerous instances where a STEMI patient deteriorates at the scene or en route.
  - The number of cardiac arrests associated with STEMI patients has prompted an additional change in our policy to triage those patients to a STEMI Center instead of just the closest ED.
- STEMI Report needs to give critical information to hospital



## The STEMI Alert Radio Report - SBAR



### ■ Situation

- “STEMI Alert” confirmed by 12-lead
  - » \*\* ACUTE MI\*\* (ZOLL)
  - » \*\*\*ACUTE MI SUSPECTED\*\*\* (LP-12)
- ETA, patient Age and gender

### ■ Background

- Presenting complaint, Past Cardiac Hx, pacemaker

### ■ Assessment

- Stable or unstable
- If unstable – why
  - » Vital Signs, Shock; SOB; ALOC, Uncontrolled Pain

### ■ Rx & Recap

- Treatments given and patient response

- Upon STEMI patient identification in the field the medic is to alert the closest STEMI Center with a “STEMI Alert”
- EMS has chosen to use SBAR to assure effective communication during radio and bedside report.
- SBAR has been adapted to meet the field needs of prehospital, but is essentially the same as what you do in the hospital.
- It brings urgent essential information to the forefront to assure things do not get missed.
- Pacemakers are included since pacer spikes can interfere with the reliability of the machine interpretation.
  - This may help STEMI Centers decide if they want to activate their Cath Lab teams or not
  - The decision to activate from the field is an individual STEMI Center’s decision
  - EMS, AHA, ACC and the Society of Chest Pain all recommend that activation from the field should be the “Gold Standard”
  - Most STEMI Center’s in our System activate from the field
    - This is why Contra Costa County has achieved such outstanding STEMI System Performance Metrics
- A variable we have to deal with as part of the system.
- If the medic does not offer this information ask about the quality of the 12 lead and if the patient has a pacer.
- For EMS the R in SBAR stands for RX which means treatment and Recap of patient response

## **Report at Hospital – SBAR should include:**

### **Situation**

Repeated including patient identification with urgent concerns up front.

### **Background**

Repeated including past history if known (e.g. history of MI, clot busters, cath, or surgery, cardiologist). High risk medications (especially anticoagulants, insulin, erectile dysfunction drugs), allergies, advanced directives

### **Assessment**

Repeated pertinent VS, ALOC Pain level

### **Rx/Recap**

Prehospital treatments given and patient response.  
Concerns repeated and questions addressed

- Once the patient arrives they are rapidly triaged through the ED in most cases where a confirmatory 12 lead is done.
- If the prehospital 12 lead is of good quality some STEMI Centers do not repeat the 12 lead to save time.
- The medics will then give another SBAR report with additional information as described above.
  - This is the report you should expect about the patient during ED handoff.
  - Some of the information may not be known to the medic but if it is they will tell you e.g.the name of cardiologist.
- Prehospital SBAR looks a little different from your hospital SBAR report....since SBAR report flows like a conversation you should not notice a big difference between how prehospital uses SBAR and how it is used in your ED.
- In STEMI Centers who offer EMS direct to cath lab access this report may be done on the way or in the cath lab.
- Prehospital providers are encouraged and allowed to follow the patient into the cath lab when those opportunities arise unless they are urgently needed to return to service.

# Prehospital 12-Lead ECG



- **First responders (Fire medics)**
  - May do the STEMI Alert 12-lead
  - Can activate from the field prior to transport arrival
- **STEMI 12-lead copies**
  - » 1 to STEMI Center
  - » 1 to Transport Agency Pt Record
- **Multiple 12-leads may be done**
- **12-lead handoff directly to STEMI Team MD/Nurse caring for patient**

- We direct the prehospital providers to give the STEMI Receiving Center the following:
  - A copy of 12-lead must be left at ED (if multiple valid tracings are done, all should be left)
  - First responders doing 12-lead should provide 2 copies for transport (one for hospital and one for transport agency)
  - The field personnel giving report to the hospital on arrival should hand the 12 lead directly to the nurse caring for patient
  - Copy of 12-lead should be submitted to your agency if not uploaded into record
  
- EMS understands that in the excitement of getting the patient to the cath lab patient care records and 12 leads can get misplaced or lost. We need your help to assure these documents stay with the patient and get into the patients record.

# Required Prehospital Documentation



- All prehospital providers create an electronic patient care record (ePCR)
- ePCR documentation is very important and all cases reviewed by EMS
- Can't evaluate STEMI system performance without this!

- Each prehospital provider is required to document in an electronic patient care record (ePCR) specific things about the STEMI alert and activation
- This documentation is reviewed for each and every STEMI alert in the system and is a critical part of the STEMI CQI process.
- You should expect a draft or complete prehospital PCR before the prehospital providers leave.

## Contra Costa STEMI System Performance



- 911 Call to intervention time average 83 minutes
- EMS to Intervention time averages 75 minutes
- Door to balloon median is 62 minutes (all SRC centers)
- Door to intervention time < 90 minutes 100%

Contra Costa STEMI Data Q1 2009

- Share STEMI newsletter here. Goal is share with all stakeholders to keep them informed of our STEMI program process.
- Being part of a STEMI System helps each facility achieve amazing outcomes due to the strong partnership with EMS.
- Our statistics demonstrate that consistently.
- Visit our website at [www.cccems.org](http://www.cccems.org) for more STEMI information

# STEMI System Lessons Learned

## The Evolving STEMI

- The evolving STEMI
- Instances where initial ECG is abnormal but second ECG confirms MI



- One of the events that we did not expect to find in our STEMI System were the number of evolving STEMIs identified in the field.
- These are cases where the initial 12-lead does not indicate a STEMI but en route the patient condition changes and our process of repeating 12-leads en route catches the event.
- In these situations the paramedics will change destination to the appropriate STEMI facility.
- These cases demonstrate the dynamic process of how STEMIs can evolve in an individual chest pain patient and is why we now train our paramedics to perform multiple 12-leads whenever possible.

# STEMI Lessons Learned

## We need to multitask

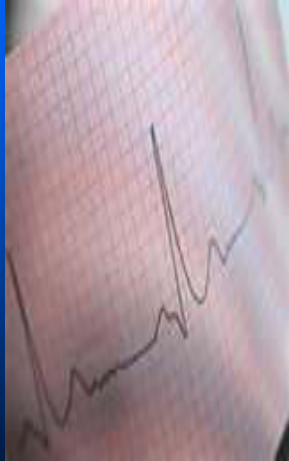
- EMS Scene Time
- Benchmark
  - < 15 minutes
- Q4 2008 13-14 min
- Q1 2009 12 minutes



- Our current prehospital data demonstrate a significant reduction in average scene times
- If cases have scene times >20 minutes – want to minimize this but usually associated with complicated patient or difficulty at the scene.
- QI program coordinators in each of our EMS provider agencies, our STEMI RN program managers and EMS will be working together to capture this information and work to shorten our times and do our best to eliminate delays.
- We need your cooperation to get information to the appropriate parties and work cooperatively giving positive and constructive feedback so we can improve.

## STEMI Lessons Learned

### False positives need to be actively addressed



- False positive rate around 20-38%
- What is a False positive
  - When 12-lead ECG says **\*\*\*Acute MI\*\*\*** and the patient turns out not to be a STEMI
- Most common reasons:
  - Baseline artifact
    - » Poor skin contact
    - » Motion artifact
  - Rapid rates sometimes fool device
  - Paced rhythms
  - Patient factors
    - » Normal variant ST elevation
    - » Electrolyte imbalances

- Our current statistics suggest that if we can eliminate artifact that we can reduce our false positive rate to 13-14%
- ECG says **\*\*Acute MI\*\*** but is NOT
  - Baseline artifact most common cause
  - Tachycardia may fool machine
  - Paced rhythms
- Occasionally computer reading is just wrong despite no artifact or other finding (rare)



## **STEMI Lessons Learned**

### **We need a high index of suspicion**



- **STEMI patients with classic presentations of chest pain are typically male and younger (30-50's)**
- **Atypical presentations present commonly in older patients, diabetics and women.**

- Atypical presentations have been extreme sudden fatigue, weakness, syncope, SOB
- The average false positive rate for prehospital 12 leads is about 20% when looking at STEMI systems that are established and we are constantly looking at trying to reduce our false positive rate.
- However be aware that there are only about 150 to 200 STEMI activations annually in Contra Costa at the present time.
- STEMI patients are a high risk low frequency population where as Chest Pain patients make up a much high percentage of our calls
- We have over 600 paramedics in the Contra Costa System and many have still not gone on a call with a STEMI patient.
- EMS has been working with all our prehospital providers to do a 12 lead in ALL Chest Pain patients and be alert to atypical presentations. In other words have that high index of suspicion!

# Atypical Presentations

## ■ Who is at risk?

- Diabetics....Women.....Elderly

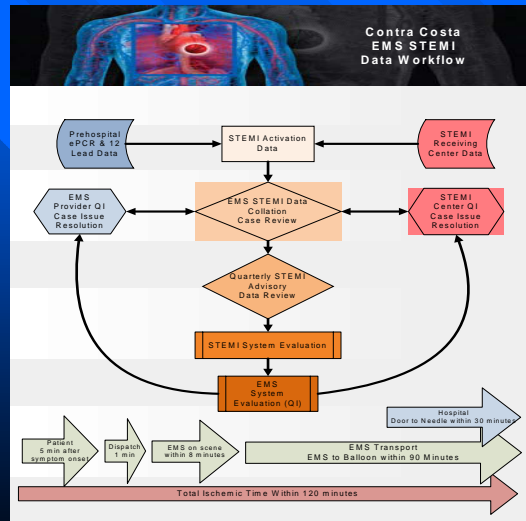
## ■ Chest pain may not be their chief complaint

- Shortness of Breath
- Nausea & Abdominal discomfort
- Weakness or Syncope
- Neck, jaw, shoulder or upper back pain.
- Indigestion
- Unexplained Fatigue

- Diabetics and the Elderly experience pain differently and may not report “classic symptoms” of Acute Coronary Syndrome (ACS).
- Women also present frequently with atypical symptoms.
- These symptoms can occur in combination or be isolated.
- Sometimes atypical patients are difficult to pick up in the field.
- Be alert for these patients if they are brought to you from EMS and were not assessed as a potential ACS.
- Not all STEMIs are picked up in the field!
  - Sometimes the presentation of the patient is so atypical it is missed in the field.
  - In these cases report this to your STEMI coordinator who will submit a STEMI report so EMS can review the case for opportunities to improve.

# STEMI Lessons Learned

## STEMI Systems require collaborative oversight



- Contra Costa STEMI System Oversight Process involves
  - Case Review for each STEMI Alert
  - Data Collection on outcome of each STEMI Alert.
  - Quarterly STEMI Center Coordinator Meetings.
  - Biannual STEMI System Oversight Meetings with all stakeholders.
  - Routine performance reporting based on local and national metrics.
    - Prehospital quarterly data reports
    - STEMI Center data reports
    - STEMI System data reports
  - The EMS agency coordinates this effort and EMS provider agencies and STEMI Centers have a designated individual that is the lead for the process.
  - The CQI process is extensive, accountable and focused on respectful positive corrections to enhance problem resolution when required.

# Overall Experience



- **Contra Costa has achieved outstanding STEMI System performance!**
- **Prehospital has made a significant difference in decreasing time to intervention.**
- **EMS providers are committed and accountable throughout the system!**

- Based on all national metrics the Contra Costa STEMI System has demonstrated outstanding performance in a short time.
- EMS have been instrumental in allowing our STEMI Centers to decrease time to intervention to significantly better than national standards.
- Contra Costa is a high performer by all STEMI System performance measures!
- You will be an active part of that program and because of this we will save even more lives throughout our community!

## But we need your help....



- An effective STEMI system relies on good communication!
- Make sure ECG's get into the patient's chart.
- Give constructive timely feedback.
- Report issues

**One of the most important opportunities that STEMI Center providers have is to give constructive feedback when a STEMI Alert is not properly identified in the field.**

- These are “teachable moments” for the prehospital providers involved and they respond positively to explanations about why the patient was not a STEMI patient after all.
- When these situations occur take a few minutes to review the case and 12 lead with the prehospital providers involved.
- They are eager to learn from your experience and expertise.
- This is how each individual can “make that difference” in improving the system for the next patient.
- We understand false positives are frustrating for all involved but with the current technology and limitations in our system, training and appropriate feedback are our best tools to decrease false positives.
- All STEMI prehospital issues should be reported to your STEMI Program Coordinator & ED Manager so EMS can appropriately review and support positive corrections.

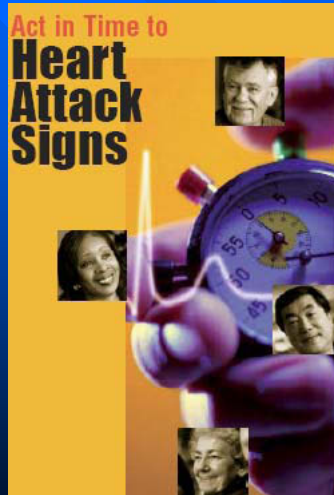
# Constructive Timely Feedback

- Fundamental to process improvement
- Timely
- Respectful
- Specific
- Directed toward improvement
- Helps prevent the same problem from occurring in the future
- Considerate
- Requires practice



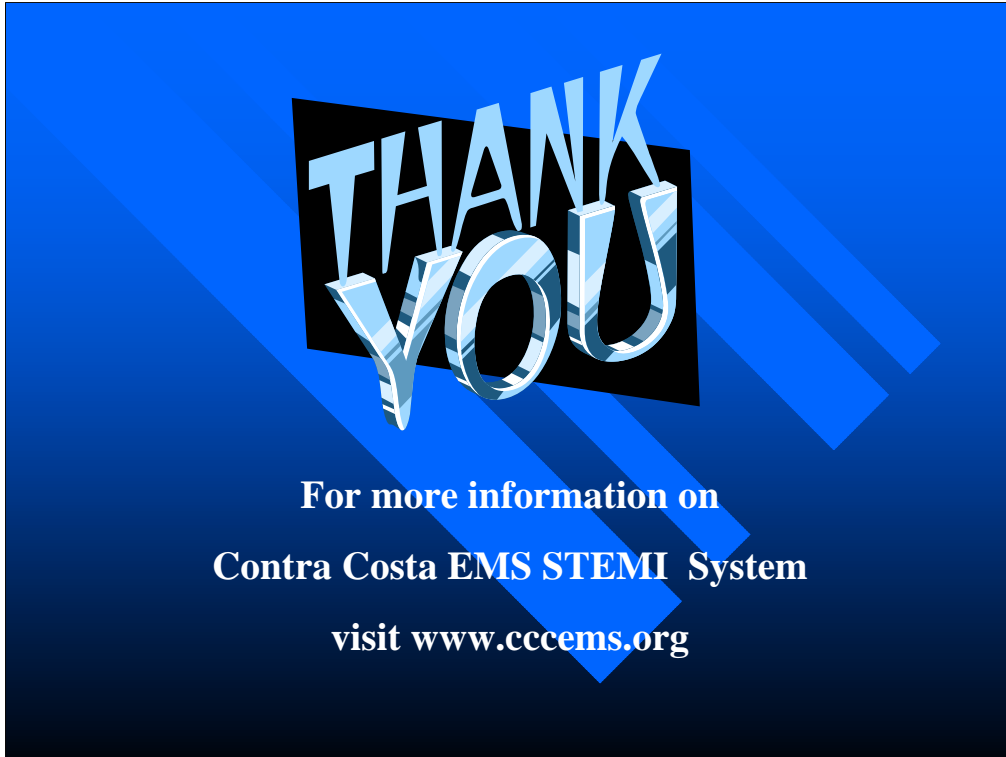
- In the heat of the moment when things go sideways it is easy to let emotions and frustrations take over.
- Letting frustrations get in the way undermines the collaboration and teamwork that is required to manage a high performance STEMI System.
- There are numerous factors to look at when an event does not go as planned and rarely is it due to just one thing.
  - Technology limitations.
  - Training issues.
  - Experience of the provider.
  - Instability of the patient.
  - Some of these factors are controllable and some of them are situational and are not due to human error.
- STEMI Systems provide an opportunity to establish a new level of teamwork and collaboration between the ED and Prehospital providers.
- This new level of teamwork will spill over to other aspects of care.

## Community Education



- Call 911 First
- Signage making it easy to find your STEMI Center
- Public Service Announcements
- Community events
- Newsletters
- Patient Education

- Finally one of the most important parts of a STEMI System is that it helps to create a strong base of community education around heart disease.
- Contra Costa EMS recommends using the NIH best practice patient education materials at our STEMI Centers.
- These materials are available from the NIH and are posted on our website at [www.cccems.org](http://www.cccems.org).
- Duplication of these materials does not require special permissions.
- EMS is committed to working with all our STEMI Centers to support community education about what to do in the event of chest pain.
- Make sure your family members and community know to call 911 first in event of chest pain.



- Contra Costa EMS looks forward to working with you on this important community program.
- This presentation was developed by Contra Costa EMS STEMI Project Manager Pat Frost RN, MS, PNP





Field, J.M. (ed) et. al. STEMI Provider Manual, American Heart Association, 2008.

ACC/AHA, Management of Patients with ST-Elevation Myocardial Infarction, ACC/AHA Pocket Guideline. July 2004.

Rokos, I.C., et. al. "Rationale for establishing regional ST-elevation myocardial infarction receiving center (SRC) networks" American Heart Journal, Oct 2006, Vol. 152, Number 4, pp 661-667

Bradley, E. H., et. al. "Strategies for Reducing the Door-to-Balloon Time in Acute Myocardial Infarction." N Engl J Med, Nov 13, 20006. 355, pp 2308-2320.

Moscucci, M. & Eagle, K.A., "Reducing the Door-to-Balloon Time for Myocardial Infarction with ST-Segment Elevation" N Engl J Med, Nov 30, 20006. 355:22, pp 2364-2365.

Kostis, W. J., et. al. "Weekend versus Weekday Admission and Mortality from Myocardial Infarction" N Engl J Med, Mar 15, 20007. 356:11, pp 1099-1109.

Contra Costa Emergency Medical Services STEMI System Program Information is available on our website at [www.cccems.org](http://www.cccems.org).

## STEMI TRIAGE AND DESTINATION

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### I. PURPOSE

Utilizing prehospital 12-lead electrocardiograms (P12ECG), patients presenting with ST-segment elevation myocardial infarction (STEMI) shall be triaged and transported, with patient consent, directly to STEMI centers for rapid intervention. This policy outlines the process of triage and transport of STEMI patients.

### II. DEFINITIONS

Prehospital 12-lead ECG (P12ECG): A 12-lead electrocardiogram obtained by EMS crews or in rare circumstances by a medical facility or office other than a hospital.

ST-Segment Elevation Myocardial Infarction (STEMI): A specific finding on P12ECG showing ST-segment elevation of 1 mm or greater in anatomically contiguous leads, indicating this specific type of myocardial infarction.

Computer Interpretation of STEMI: With printout of P12ECG done, a patient with a STEMI is identified distinctly with **\*\*\*Acute MI\*\*\*** or **\*\*\*Acute MI Suspected\*\*\*** by a computerized algorithm present in the monitor-defibrillator unit (wording varies by manufacturer). Other abnormalities of P12 ECG do not signify STEMI.

STEMI Receiving Center (SRC): Hospitals designated by Contra Costa EMS as those to which patients with identified STEMI on P12ECG will be transported based on the center's prompt availability of invasive cardiac care.

STEMI Alert: Report from prehospital personnel that notifies a STEMI Receiving Center as early as possible that a patient has a computer-interpreted P12ECG indicating a STEMI. The alert allows the SRC to prepare equipment and personnel for arrival of the patient in order to provide intervention in the most rapid fashion possible.

### III. TRIAGE

- A. Patients with chest pain or other symptoms suggestive of Acute Coronary Syndrome (ACS) should have a P12ECG performed.
1. Exceptions include patients who are not cooperative with the procedure, or patients in whom the need for critical resuscitative measures preclude performance of the P12ECG.
  2. Paramedic personnel should review the P12ECG tracing in all instances to assure that little or no artifact exists (steady baseline, lack of other electrical interference, complete complexes present in all 12 leads). Repeat P12ECG may be necessary to obtain an accurate tracing.
- B. If computerized interpretation of accurately performed P12ECG indicates either **\*\*\*Acute MI\*\*\*** or **\*\*\*Acute MI Suspected\*\*\***, the patient qualifies as a candidate for transport to a STEMI Receiving Center. Patients without these findings should be transported per the EMS "Patient Destination Determination" policy.

### IV. DESTINATION

- A. Patients with an identified STEMI shall be transported to a STEMI Receiving Center (SRC).
1. Patients shall be transported to the closest SRC unless they request another facility.
  2. A SRC that is not the closest SRC facility is an acceptable destination if estimated additional transport time does not exceed 15 minutes.

- B. Patients with cardiac arrest who have a STEMI identified by 12-lead ECG before or after arrest shall be transported to the closest SRC.
- C. Patients with unmanageable airway en route shall be transported to the closest basic emergency department

**V. STEMI ALERT/PATIENT REPORT**

- A. In patients with identified STEMI, desired destination shall be promptly determined after the P12 ECG is completed and read, and that hospital shall be contracted as soon as possible after destination determined.
- B. The STEMI Alert should contain the following essential information:
  - 1. Situation:
    - a. Identify the call as a “STEMI Alert.”
    - b. Give estimated time of arrival (ETA) in minutes.
    - c. Patient age and gender.
    - d. State ECG findings and any urgent concerns.
      - 1) P12ECG shows \*\*\*Acute MI\*\*\* (ZOLL) or
      - 2) P12ECG shows \*\*\*Acute MI Suspected\*\*\* (LP12).
    - e. If patient elects to go to a facility that is not STEMI designated inform receiving facility.
  - 2. Background:
    - a. Presenting/chief complaint and symptoms.
    - b. Pertinent past cardiac history.
    - c. Pacemaker placement.
  - 3. Assessment:
    - a. General impression.
    - b. Pertinent vital signs and physical exam.
    - c. Pain level.
  - 4. Rx-Recap:
    - a. Prehospital treatments given.
    - b. Patient response to prehospital treatments.
- C. Emergency Room Patient handoff report should repeat STEMI Alert information and include:
  - 1. Patient identification.
  - 2. Presenting complaint.
  - 3. Additional background information:
    - a. Past medical history.
    - b. Advanced directives if known.
  - 4. Allergy and medication history including high risk medications.
    - a. Anticoagulants
    - b. Insulin
    - c. Digoxin



- d. Erectile Dysfunction Drugs (ERDs)
- 5. Previous history of Coronary Artery Surgery or thrombolytic (clot busting) therapy.
- 6. Cardiologist if known.

**VI. DOCUMENTATION**

- A. A copy of the P12ECG (multiple if performed) shall be delivered to the nurse caring for the patient at arrival in the Emergency Department.
- B. A copy of the P12ECG (multiple if performed) shall be generated for inclusion in the prehospital Patient Care Record or incorporated via electronic means into the record. The finding of STEMI on P12ECG and confirmation of the STEMI Alert shall also be recorded in the Patient Care Record.

**VII. LIST OF STEMI CENTERS**

IN-COUNTY STEMI CENTERS	OUT-OF-COUNTY STEMI CENTERS
Doctors Medical Center San Pablo	ValleyCare - Pleasanton
John Muir Medical Center – Concord Campus	Oakland Summit Medical Center
John Muir Medical Center – Walnut Creek Campus	
Kaiser Permanente Medical Center– Walnut Creek	
San Ramon Regional Medical Center – San Ramon	
Sutter Delta Medical Center - Antioch	

## **Contra Costa County STEMI Hospital Training Post-test**

*Building a STEMI System is a process and your active participation is invited.*

1. A STEMI System is a collaborative network of EMS providers and specialized hospitals offering 24/7/365 cardiac intervention for an entire community.
  - a. True
  - b. False
  
2. How does EMS help improve STEMI outcomes?
  - a. Allows for activation of the catheterization lab from the field.
  - b. Triage patients to designated STEMI receiving centers to improve access to life saving care.
  - c. Improves time to intervention supporting rapid reperfusion of the heart.
  - d. Significantly improves STEMI patient's chance of survival.
  - e. All of the above.
  
3. STEMI Receiving Center Designation requires:
  - a. 24/7-365 day a year STEMI coverage
  - b. Performance Improvement (QI) plan
  - c. Rapid transfer plan if surgical services are unavailable
  - d. All of the above
  
4. STEMI Receiving Centers will have a diversion process if their cardiac catheterization lab is down.
  - a. True
  - b. False
  
5. STEMI patients are identified by EMS in the field by
  - a. 12-Lead ECG that "diagnoses" the rhythm
  - b. \*\*\*ACUTE MI\*\*\* or \*\*\*ACUTE MI SUSPECTED\*\*\*
  - c. \*\*\*POSSIBLE MI\*\*\*
  - d. Answer a and b
  - e. Answer a and c
  
6. The false positives rate of 20% is typical in experienced STEMI systems.
  - a. True
  - b. False
  
7. STEMI patient destination is determined at the scene after the 12 lead ECG meets the appropriate criteria by the EMS provider.
  - a. True
  - b. False

8. Factors that influence prehospital destination decisions in a STEMI system include:
  - a. Location of nearest STEMI Receiving Centers.
  - b. Patient Family Preference.
  - c. If facilities are with 15 minutes difference of each other (equidistant).
  - d. If the patient's airway is unstable.
  - e. All of the above
  
9. Contra Costa County STEMI destination protocol is designed to be flexible and honors the patient's right to choose.
  - a. True
  - b. False
  
10. Radio contact of a STEMI patient should include the following
  - a. Situation: "STEMI ALERT" confirmed by 12 lead, ETA and patient age and gender
  - b. Background: Presenting complaint, past cardiac history, history of pacemaker
  - c. Assessment: Patient stable or unstable. If unstable why
  - d. RX and Recap: Treatments given and patient response.
  - e. All of the above
  
11. Handoff of the patient at the hospital should include
  - a. Patient report:
    - i. Patient identification
    - ii. Recap of radio report with any updates
    - iii. Allergies and medications
    - iv. Other pertinent past medical history
    - v. Name of patient cardiologist-if known
  - b. Hardcopies of all prehospital 12 leads
  - c. Draft or completed patient care record.
  - d. Answer a, b, c
  
12. An effective STEMI system relies on good communication, timely constructive feedback and effective problem solving.
  - a. True
  - b. False
  
13. Hospital providers can support the STEMI system in the following ways
  - a. Making sure ECG's get into the patient's chart.
  - b. Reporting issues when they occur to STEMI Program Manager or ED Manager.
  - c. Giving constructive solution focused feedback.
  - d. Being respectful in your communications.
  - e. All of the above.