Contra Costa Emergency Medical Services
STEBMI System Performance

Executive Report: Quarter III, 2009

Advisory Body
Contra Costa County STEMI Oversight CQI Committee and Advisory Group

Mission
To reduce the total time from field ST-Elevation Myocardial Infarction (STEMI) identification to cardiac intervention high-risk heart attack patients. The National Benchmark for STEMI treatment is < 90 minutes from door to intervention 75% of the time. For every 15-minute delay beyond these 90 minutes there is an increased risk of death for the patient.

Membership
The STEMI Oversight CQI Committee and Advisory Group consists of representatives from Contra Costa Designated STEMI Receiving Centers, Hospital Emergency Departments, First Responders and Emergency Ambulance Services. This interdisciplinary group includes hospital administrators, emergency physicians, cardiologists, cardiac intervention specialists, nursing and prehospital providers. These groups are active participants in the quality oversight of the Contra Costa STEMI System in partnership with Contra Costa Emergency Medical Services.

Medical Director Oversight: Joseph Barger, MD, EMS Medical Director

STEBMI Project Manager: Patricia Frost, RN, MS, PNP, Assistant EMS Director

Adapted from: Antman, et. al. “Management of Patients with STEMI: Executive Summary” Circulation, Oct. 2007 at http://circ.ahajournals.org/cgi/content/full/110/5/588
Background
The Contra Costa STEMI System was launched on September 8, 2008. At that time there were only 11 STEMI Systems in California and 148 in the entire United States. Contra Costa has eight designated STEMI Centers in our STEMI system, six in Contra Costa and two in Alameda County. STEMI Receiving Centers must provide 24/7/365 specialized cardiac interventional services to participate in the program. These are:

- Doctors Medical Center San Pablo
- John Muir Health - Walnut Creek Campus
- John Muir Health - Concord Campus
- Kaiser Permanente Medical Center – Walnut Creek
- San Ramon Regional Medical Center
- Sutter Delta Medical Center - Antioch
- Valley Care Pleasanton
- Oakland Summit Medical Center

As of January 2010 Contra Costa was one of 12 STEMI Systems in California and one of 379 in the United States. Contra Costa STEMI System is an active participant in the American Heart Association (AHA) “Mission Lifeline.” Mission Lifeline is a national program whose mission it is to improve rapid access to cardiac intervention through development of STEMI systems nationwide and public education to “Act in Time” by calling 911 at the first sign of chest pain.
# Contra Costa STEMI Overall System Performance Q III 2009

**July 1, 2009 to September 31, 2009**

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Performance Benchmarks</th>
<th>Contra Costa Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS* to Intervention (PCI) Median Time</td>
<td>&lt;90 minutes (National)</td>
<td>74 minutes</td>
</tr>
<tr>
<td>EMS* Scene Median Time</td>
<td>&lt;15 minutes (Local EMS)</td>
<td>12 minutes</td>
</tr>
<tr>
<td>911 Call to Intervention (PCI) Median Time</td>
<td>&lt;90 minutes (National)</td>
<td>85 minutes</td>
</tr>
<tr>
<td>Door to first PCI Time with Field Activation</td>
<td>&lt;60 minutes (National)</td>
<td>48 minutes</td>
</tr>
<tr>
<td>Percentage of Time Door to PCI &lt; 90 minutes</td>
<td>&gt; 75% of time (National)</td>
<td>100%</td>
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</tbody>
</table>

EMS* = First contact with EMS provider

Current National Statistics from the American Heart Association Mission Lifeline Program

- This year, an estimated 1.4 million people will suffer a heart attack
- Every year some 400,000 people experience will experience a STEMI heart attack—the deadliest type of heart attack
- The vast majority (>50%) of chest pain victims enter the hospital by taking themselves or having a family member drive them to the hospital
- 30% of STEMI victims do not receive reperfusion treatment
- 25% of hospitals nationally are equipped to perform PCI Intervention
- Recent data from the National Registry of Myocardial Infarction found median delays of 180 minutes from arrival at the non-PCI hospital to balloon inflation at the primary PCI-capable hospital. Only 4.2 percent of transferred patients achieved door-to-balloon times within the recommended 90-minute window.
- Only 40% of STEMI patients are treated within the 90-minute standard

It is important to keep these national statistics in mind when evaluating STEMI System performance in Contra Costa.
Key Time Intervals for STEMI System Patients (Minutes)
Prehospital Times Include All Patients with Confirmed STEMI Alert and Primary PCI Done (21)
PCI Times Includes only those with no exclusion criteria for immediate PCI (20)

<table>
<thead>
<tr>
<th>Time Interval (Minutes)</th>
<th>Average</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Prehospital Time (911 Call to Hospital Arrival)</td>
<td>37</td>
<td>35</td>
<td>21</td>
</tr>
<tr>
<td>Scene Time</td>
<td>13</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>911 Dispatch to First PCI Time</td>
<td>89</td>
<td>85</td>
<td>20</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>80</td>
<td>74</td>
<td>20</td>
</tr>
<tr>
<td>ECG to First PCI Time*</td>
<td>73</td>
<td>66</td>
<td>20</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>54</td>
<td>48</td>
<td>20</td>
</tr>
</tbody>
</table>

*First contact with EMS provider

Fractile Performance
PCI Times Includes only those with no exclusion criteria for immediate PCI (20)

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>≤75 min</th>
<th>≤90 min</th>
<th>≤120 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>911 Dispatch to First PCI Time</td>
<td>30%</td>
<td>65%</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>6 of 20</td>
<td>13 of 20</td>
<td>17 of 20</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>55%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>11 of 20</td>
<td>13 of 20</td>
<td>20 of 20</td>
</tr>
<tr>
<td>Diagnostic ECG to First PCI Time</td>
<td>55%</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>11 of 20</td>
<td>15 of 20</td>
<td>20 of 20</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>16 of 20</td>
<td>20 of 20</td>
<td>20 of 20</td>
</tr>
</tbody>
</table>

Benchmarks for Prehospital Care
(All STEMI Alerts)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin Administered or Noted as Contraindicated</td>
<td>93%</td>
</tr>
<tr>
<td>ECG Acquired in STEMI Patient</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>42 of 45</td>
</tr>
<tr>
<td>Identified STEMI Delivered to PCI Center</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>20 of 20</td>
</tr>
<tr>
<td>Diagnostic ECG to PCI &lt;90 Minutes</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>15 of 20</td>
</tr>
</tbody>
</table>
Contra Costa EMS
STEMI System Outcomes
3rd Quarter 2009

STEMI Alerts
45

ED ECG Verifies STEMI
28 (62%)

ED ECG Does Not Verify STEMI
17 (38%)

To Cath Lab
25 (89%)

Not to Cath Lab
3 (11%)

No Field STEMI ECG (alert in error)
2 (12%)

Artifact
7 (41%)

Machine Overread
6 (35%)

Unknown
2 (12%)

PCI Done
23 (92%)

No PCI Done
2 (8%)

Cardiology Overread of ED (3)

1 – Abnormal Rhythm / Fast Rate
1 – QRS Widening with ST elevation
1 – Multiple PVC’s
1 – Pacemaker
1 – Unknown
1 – LVH / Strain pattern

20 Immediate PCI cases
Average / Median – EMS Contact to PCI = 80 minutes / 74 minutes
Percent <90 minutes = 65%  Percent <120 minutes = 100%

Average / Median – Door to PCI = 54 minutes / 48 minutes
Percent <90 minutes = 100%
Today we are reviewing our Q3 2009 STEMI System Performance for Contra Costa County

- This data is collected through the collaborative efforts of all our STEMI Center Hospital Coordinators and our Prehospital Provider Agency CQI Coordinators
- Data presented reflects non-risk adjusted data collected throughout the system
- Risk adjusted data reporting has yet to be established as part of STEMI System performance and is likely to show improvements beyond the data that is presented
Contra Costa STEMI System
Consistently Outperforms National Benchmarks!

- Quarter 3 2009 System Performance
  - System wide: 62 patients to Intervention
  - 25 Field Activations to Intervention
  - Walk-in + Field Activations (All STEMIs)
    - 65 minutes D2I (median)
  - Field Activations (Prehospital STEMIs)
    - 48 minutes D2I (median)
  - Field Activations 100% < 90min
  - Walk-in + Field Activations 88% < 90 min

Contra Costa EMS

• This quarter’s data recognizes the tremendous efforts of Contra Costa TEAM STEMI from dispatch to the cath lab!

• The data reflects the “hands on” efforts of all EMS system providers including first responders, prehospital transport providers, emergency department and cath lab personnel

• These efforts reflect the focused strong collaboration and team work between our STEMI system stakeholders
Dr. Barger’s STEMI program report reflects prehospital STEMI system activations and allows us to look critically at our successes and opportunities for improvement. Our STEMI system data collection processes offer an enhanced ability to “drill down” and identify root causes of false alerts and false positives. This root cause approach is allowing us to “target” feedback for positive corrections.

**Quarter III data continues to demonstrate a significant number of false positives due to numerous factors**

- Some are in our control such as artifact and others are not in our control such as patient factors (unknown) and some of the machine overreads
- During this quarter EMS provider agencies launched additional targeted educational efforts directed at decreasing false positives throughout the system
- Results of these educational efforts are likely not be seen until 2010 due to the low frequency of the STEMI population in our system
- EMS is moving forward with a prehospital transmission pilot study to determine the efficacy and cost effectiveness of 12-lead transmission
- The pilot is being conducted in partnership with John Muir Medical Center-Concord Campus, AMR and Physio-Control
- The pilot will help us understand the role of transmission could play in our EMS System from a patient, end-user and system perspective
Contra Costa Emergency Medical Services

STEMI System Performance: Prehospital Statistics

Prehospital Performance Intervals

<table>
<thead>
<tr>
<th>Time Indicator</th>
<th>Q4 2008</th>
<th>Q1 2009</th>
<th>Q2 2009</th>
<th>Q3 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>911 to ED Arrival</td>
<td>36</td>
<td>35</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Scene Time</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>EMS (Prehospital Provider Pt Contact) to PCI</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>ECG to PCI</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Pt Contact to PCI</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Door to PCI</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
</tr>
</tbody>
</table>

Overall STEMI System Performance Statistics are based on the following Benchmarks

- National Benchmark: EMS (First Patient Contact with EMS Provider) to Intervention of < 90 minutes
- National Benchmark: 911 Call to Intervention < 90 minutes for the ideal STEMI System
- National Benchmark: EMS Transport time < 30 minutes in an ideal STEMI System
- Local EMS Agency Benchmarks of EMS Scene time < 15 minutes

Overall Quarter III STEMI System Performance demonstrated the following:

- 911 to ED arrival time consistently ranges between 31-38 minutes and averaged 37 minutes this quarter
- Scene time consistently averages 12-15 minutes. This quarter it was 13 minutes, 2 minutes below our local benchmark
- 911 to PCI time averaged 89 minutes
- EMS (Prehospital Provider Pt Contact) to PCI averaged 80 minutes
- Diagnostic ECG to PCI averaged 71 minutes
- Door to PCI averaged 52 minutes with a median time of 48 minutes
On the national level STEMI System “Door to Intervention” performance benchmarks MAY be reduced from of 90 minutes to 75 minutes 75% of the time

• In an ideal system some national experts are recommending that first EMS provider time to intervention should be 90 minutes
• This graph demonstrates how our system would perform if performance measures become more rigorous

From Q3 2008 to Q3 2009 Overall STEMI System % performance < 75 minutes statistics show:

• 911 to PCI time was < 75 minutes 17% of the time
• EMS (Pt Contact) to PCI was < 75 minutes 55% of the time
• ECG to PCI was < 75 minutes 55% of the time
• Door to PCI was < 75 minutes 80% of the time

Contra Costa STEMI System is well positioned to be successful with future benchmarks!
The Current National Performance Measure for STEMI Systems is measured as a median time < 90 minutes 75% of the time.

Nationally only 40% of STEMI patients are treated within 90 minutes.

Quarter III Contra Costa Performance

- Q3 2009 STEMI System % performance < 90 minutes statistics show that STEMI field (prehospital) activation has consistently demonstrated 100% < 90 minutes D2I (Door to Intervention)
- Although there were some overall drops in some of the prehospital times, this did not affect overall door to intervention which likely due to the strong process improvement programs of our STEMI Centers!

System-wide Data

- 911 (dispatch call received time) to Intervention (PCI) is < 90 minutes 65% of the time which is a remarkable achievement given that EMS is not able to control for STEMI patient location or presentation
- EMS (Pt Contact) to PCI < 90 minutes occurred 65% and EMS to PCI < 120 minutes 100% of the time
- Diagnostic ECG to PCI < 90 minutes occurred 75%
Contra Costa EMS providers strive towards 100% compliance across all prehospital care indicators however many factors can contribute to gaps in achieving desired outcomes

- Data source is the electronic patient care records of the prehospital provider agencies. Accuracy of data is dependent on the completeness of the record
- Each STEMI case is then reviewed for compliance with these data measures
- Feedback and corrective recommendations are communicated with the providers through the Fire EMS Transport Agencies CQI STEMI Coordinators

**Quarter III Compliance with Prehospital Patient Care Benchmarks**

- ASA administered or noted as contraindicated 93% compliance
- ECG acquired in STEMI patient 100% compliance
- Identified STEMI patient delivered to a PCI Center 100% compliance
- Prehospital-12 lead < 5 minutes from arrival 55%

12-lead < 5 minute compliance is calculated based on first EMS transport provider time at patient to time of first 12 lead. Patient factors that can delay prehospital 12 lead acquisition include:

- Atypical or unstable patient presentation
- Patient cooperation with application of leads or other aspects of prehospital care
- Interference of bystanders
- Traffic conditions and location of the patient from a STEMI Center
- Difficulty in removing the patient from their residence due to stairs, patient size or other physical barriers at the residence
Data sources are from STEMI Receiving Center summary reports submitted quarterly to Contra Costa EMS

Data presented is blinded and reflects non-risk adjusted data
Contra Costa STEMI System continues to distinguish itself as a “High Performance STEMI System”

- Each of our facilities have demonstrated consistent outstanding performance well below the national standard of 90 minutes door to intervention benchmarks
- Note that data presented is non-risk adjusted data

Quarter III data demonstrates that our median door to intervention for all STEMI patients (walk-in and prehospital) to be 65 minutes

- This is 25 minutes lower than the 90 minute national benchmark
- Contra Costa STEMI Receiving Centers have consistently exceeded national standards since the start of our STEMI System on 9/8/08! A remarkable achievement!
- If the national benchmark for door to intervention changes to 75 minutes or are reduced further to 60 minutes many of our STEMI Centers are already achieving that objective!
The current door to intervention national benchmark of 90 minutes (median time) should be achieved 75% of the time.

- Overall center performance for Quarter 3 demonstrates 90 minute door to intervention was achieved 88% of the time for both walk-in and field STEMI patients
- STEMI Center statistics showed that 5 out of 6 STEMI centers have soundly beat the national standard for the last 4 quarters!
- All STEMI Centers have demonstrated consistent outstanding performance since STEMI System Launch on 9/8/09

Data Limitations
- This reflects non-risk adjusted data in our system at this time
- Patients with prolonged cath times may be due to factors that might exclude them in risk adjusted data
- With risk adjustment it would be likely this data would further improve
Contra Costa STEMI System

Opportunities for Improvement

Even with all our success there are many opportunities for improvement and in 2010 our efforts are directed at the following:

• Focused educational efforts directed at reducing 12-lead false positives (JOB ONE!)
• 12-lead transmission pilot
• Expanded direct to cath lab entry
• Expanded chest pain public education efforts to “Call 911 first”
• Maintaining quality prehospital patient care while achieving low scene times
• Maintaining strong team focus between prehospital, emergency department and cath lab providers
• Continued support for recognition and excellence
Total Patients this Quarter
- 62 STEMI patients
- 25 (40%) via EMS
- 37 (60%) walk-in
- Nationally > 50% of all patients walk in with chest pain

Public Education Lagging

Act in Time
- Our standard for Public Education

The following is identified by Mission Lifeline as what ideal public education in a STEMI System would be able to do

Within the ideal STEMI system of care, patients and the public would:
- Recognize the symptoms of a heart attack
- Realize the importance of activating emergency medical services (EMS) via 911 promptly and getting treatment quickly
- Be familiar with their local hospital's role in the delivery of STEMI care
- Understand the implications involved in inter-hospital (rapid) transfer for the purpose of getting the patient percutaneous coronary intervention (PCI), the preferred method of treatment for a STEMI attack

The ideal system would:
- Promote culturally competent educational efforts with clear and consistent messages
- Include patient representatives on community planning coalitions
- Provide highly coordinated and patient-centered care

Contra Costa County has adopted the “Act in Time” evidenced based education materials to promote public education. STEMI Centers play a critical role in disseminating a strong message of public education as part of their STEMI Center Designation. Contra Costa EMS recommends that all STEMI Centers incorporate these materials in their public education efforts via their websites, media, print,
Acknowledgements

- Prehospital Care Providers
- Fire EMS CQI Coordinators
- STEMI Center Coordinators
- Cath Lab Teams
- ED physicians and nurses
- Cardiologists
- AHA Mission Lifeline

Thanks to the many providers and stakeholder agencies for supporting this collaborative effort.

• Our 2010 STEMI System Oversight meetings will be in March (hosted by John Muir Medical Center-Concord Campus) and in September (hosted by Kaiser Walnut Creek)
• Dates and times have yet to be determined and will be distributed when available

If you have questions about this report contact Pat Frost, RN, MS, PNP, Assistant EMS Director or Joe Barger, MD, EMS Medical Director
• This report will be posted on our STEMI webpage under the link STEMI System Performance
• Visit our website at www.cccems.org and click on the STEMI webpage for resources and information on our Contra Costa STEMI System

Congratulations TEAM STEMI for another outstanding quarter of excellence in patient care!
Moving Forward in 2010…. 

**Opportunities for Improvement**

- Reduce False Activations
- Implement 12-Lead Transmission Pilot
- Improve and expand public education efforts
- Maintain excellence in prehospital and STEMI Center performance
- Intrafacility STEMI Transfer from Non STEMI Centers
- Maintain system teamwork, collaboration and confidence

**Acknowledgements:**

This performance report reflects the efforts of an outstanding team of prehospital, emergency department and cardiovascular providers/specialists working in close collaboration. These professionals have successfully brought a new standard of cardiac care to Contra Costa County. Without these individual and team efforts our STEMI System could not achieve this level of excellence. We thank all our stakeholders for their strong support of this program.

For more information on the Contra Costa STEMI system visit our website at [www.cccems.org](http://www.cccems.org)

This report is respectfully submitted by Patricia Frost, RN, MS, STEMI Project Manager, and Assistant EMS Director Contra Costa. Questions and comments are always welcome. Please send them to pfrost@hsd.cccounty.us