Contra Costa Emergency Medical Services
STEMI System Performance

Executive Report: Quarter 4 and Year to Date 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 inter disciplinary 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

STEMI Project Manager: Patricia Frost, RN, MS, PNP, Assistant EMS Director
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 (as of August 17, 2009)
- 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.
Oct 1, 2009 to December 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>80 minutes</td>
</tr>
<tr>
<td>EMS* Scene Median Time</td>
<td>&lt;15 minutes (Local EMS)</td>
<td>15 minutes</td>
</tr>
<tr>
<td>911 Call to Intervention (PCI) Median Time</td>
<td>&lt;90 minutes (National)</td>
<td>88 minutes</td>
</tr>
<tr>
<td>Door to first PCI Time with Field Activation</td>
<td>&lt;60 minutes (National)</td>
<td>57.5 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>
</tr>
</tbody>
</table>

EMS* = First contact with EMS provider

January 1, 2009 to December 31, 2009

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<tbody>
<tr>
<td>EMS* to Intervention (PCI) Median Time</td>
<td>&lt;90 minutes (National)</td>
<td>78 minutes</td>
</tr>
<tr>
<td>EMS* Scene Median Time</td>
<td>&lt;15 minutes (Local EMS)</td>
<td>14 minutes</td>
</tr>
<tr>
<td>911 Call to Intervention (PCI) Median Time</td>
<td>&lt;90 minutes (National)</td>
<td>87 minutes</td>
</tr>
<tr>
<td>Door to first PCI Time with Field Activation</td>
<td>&lt;60 minutes (National)</td>
<td>53 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>
</tr>
</tbody>
</table>

EMS* = First contact with EMS provider
Current National Statistics  
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

National statistics help benchmark STEMI System performance
# Quarter IV 2009: Oct 1, 2009 to December 31, 2009

Key Time Intervals for STEMI System Patients (Minutes)
Prehospital Times Include All Patients with Confirmed STEMI Alert and Primary PCI Done (36)
PCI Times Includes only those with no exclusion criteria for immediate PCI (32)

<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>35</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Scene Time</td>
<td>14</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>911 Dispatch to First PCI Time</td>
<td>92</td>
<td>88</td>
<td>32</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>82</td>
<td>80</td>
<td>32</td>
</tr>
<tr>
<td>ECG to First PCI Time*</td>
<td>74</td>
<td>72</td>
<td>31</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>55</td>
<td>58</td>
<td>32</td>
</tr>
</tbody>
</table>

Fractile Performance
PCI Times Includes only those with no exclusion criteria for immediate PCI (32)

<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>22%</td>
<td>53%</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>7 of 32</td>
<td>17 of 32</td>
<td>31 of 32</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>41%</td>
<td>63%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>13 of 32</td>
<td>20 of 32</td>
<td>32 of 32</td>
</tr>
<tr>
<td>Diagnostic ECG to First PCI Time*</td>
<td>52%</td>
<td>84%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>16 of 31</td>
<td>26 of 31</td>
<td>31 of 31</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>88%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>28 of 32</td>
<td>32 of 32</td>
<td>32 of 32</td>
</tr>
</tbody>
</table>

* ECG time unavailable in one case

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>95%</td>
</tr>
<tr>
<td></td>
<td>62 of 65</td>
</tr>
<tr>
<td>ECG Acquired in STEMI Patient</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>36 of 37</td>
</tr>
<tr>
<td>Identified STEMI Delivered to PCI Center</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>36 of 36</td>
</tr>
<tr>
<td>Diagnostic ECG to PCI &lt;90 Minutes</td>
<td>84%</td>
</tr>
<tr>
<td></td>
<td>26 of 31</td>
</tr>
<tr>
<td>Percent ECG within 5 minutes of ambulance arrival (STEMI Alerts with PCI)</td>
<td>47%</td>
</tr>
</tbody>
</table>
### 2009 YTD: January 1, 2009 to December 31, 2009

Key Time Intervals for STEMI System Patients (Minutes)
Prehospital Times Include All Patients with Confirmed STEMI Alert and Primary PCI Done (99)
PCI Times Includes only those with no exclusion criteria for immediate PCI (88)

<table>
<thead>
<tr>
<th>Time Interval (Minutes)</th>
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<td>99</td>
</tr>
<tr>
<td>Scene Time</td>
<td>14</td>
<td>14</td>
<td>99</td>
</tr>
<tr>
<td>911 Dispatch to First PCI Time</td>
<td>90</td>
<td>87</td>
<td>88</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>81</td>
<td>78</td>
<td>88</td>
</tr>
<tr>
<td>ECG to First PCI Time*</td>
<td>74</td>
<td>74</td>
<td>85</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>54</td>
<td>53</td>
<td>88</td>
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**Fractile Performance**

PCI Times Includes only those with no exclusion criteria for immediate PCI (88)

<table>
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<tr>
<th>Time Interval</th>
<th>≤75 min</th>
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<td>22%</td>
<td>64%</td>
<td>94%</td>
</tr>
<tr>
<td>Patient Contact to First PCI Time</td>
<td>43%</td>
<td>70%</td>
<td>99%</td>
</tr>
<tr>
<td>Diagnostic ECG to First PCI Time*</td>
<td>54%</td>
<td>86%</td>
<td>100%</td>
</tr>
<tr>
<td>Door to First PCI Time</td>
<td>88%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

* ECG time unavailable in 3 cases

**Benchmarks for Prehospital Care**

<table>
<thead>
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<th>Criteria</th>
<th>Number</th>
</tr>
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<tbody>
<tr>
<td>Aspirin Administered or Noted as Contraindicated (All STEMI Alerts)</td>
<td>93%</td>
</tr>
<tr>
<td>ECG Acquired in STEMI Patient</td>
<td>99%</td>
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<tr>
<td>Identified STEMI Delivered to PCI Center</td>
<td>100%</td>
</tr>
<tr>
<td>Diagnostic ECG to PCI &lt;90 Minutes</td>
<td>86%</td>
</tr>
<tr>
<td>Percent ECG within 5 minutes of ambulance arrival (STEMI Alerts with PCI)</td>
<td>58%</td>
</tr>
</tbody>
</table>
Today we are reviewing our 2009 year-end STEMI System Performance for Contra Costa County.

Performance measured is through data collected from prehospital electronic patient care records and STEMI Receiving Center Reports.

Each STEMI alert in Contra Costa is reviewed and feedback is given to appropriate parties recognizing success and implementing corrective actions as needed.

Contra Costa EMS thanks our STEMI Center Coordinators and EMS prehospital CQI Coordinators who support this system of accountable Continuous Quality Improvement (CQI).
Our agenda today will include:

- STEMI System Performance
  - System-wide and Prehospital Data
- STEMI Center Presentations
  - Doctors San Pablo
  - John Muir Walnut Creek and Concord
  - Kaiser Walnut Creek
  - San Ramon Regional
  - Sutter Delta Medical Center
- NSTEMI Center Presentation
  - CCRMC
- Opportunities for Improvement
- Moving Forward
• This is our Quarter IV, 2009 data covering October through December of 2009.
• The data reflects non-risk adjusted or “raw” data.
• Risk adjustments are done as part of a STEMI Center’s participation in national cardiac intervention registries, such as the American College of Cardiology-NCDR Cath PCI Registry, and can take up to 6 months to receive after the quarter has ended.
• During risk adjustment certain patients would be eliminated from the final numbers to “control” for variables known to bias the results.
• STEMI patients are a low-frequency, high-risk population and as such any percentages, calculated from small numbers, should be limited in their significance.
• This chart summarizes our Contra Costa Calendar Year (CY) 2009 STEMI data.
• The data also reflects non-risk adjusted or “raw” data.
• All Contra Costa STEMI Centers have demonstrated median Door to Intervention Times of < 90 minutes since beginning of our System on 9/8/08.
• All STEMI Centers have demonstrated outstanding performance.
• Remember this reflects non-risk adjusted data in our system at this time.
• With risk adjustment, Contra Costa STEMI system median minute performance would further improve.
Contra Costa Emergency Medical Services
STEMI System Performance: STEMI Center Statistics
Door to Intervention Percentage < 90 minutes

Nationally only 40% of patients receive PCI within 90 minutes!

• Contra Costa STEMI System continues to demonstrate a consistent track record of excellence from the Field to the Cath Lab.
Contra Costa: 53 minute Median Door to Intervention with Field Activation

- Year to date 2009 Contra Costa STEMI System Door to Intervention (PCI) performance averaged a remarkable 53 minutes.
Contra Costa Emergency Medical Services
Quarterly STEMI System Prehospital Performance < 75 minutes

- Door to PCI
- Diagnostic ECG to PCI
- Pt Contact to PCI
- 911 to PCI

Contra Costa: 89% Field STEMIs receive PCI within 75 minutes

- Contra Costa STEMI System is well positioned to be successful if national standards become more stringent.
- Door to intervention (PCI) times could be lowered to less than 75 minutes at some point in the future.
Contra Costa Emergency Medical Services
Quarterly STEMI System Prehospital Performance < 90 minutes

Contra Costa: 100% Field Activated STEMI receive PCI within 90 minutes

Contra Costa STEMI System has 100% compliance with the door to intervention metric of less than 90 minutes for all EMS triaged STEMI patients.
•Our prehospital performance indicators for 2009 reflect the following:
  - EMS Patient Contact to STEMI Receiving Center Door averages 27 minutes; 3 minutes less than the national goal for prehospital goal of 30 minutes
  - ASA administered 93%
  - ECG acquired 99%
  - STEMI Triage Correct 100%
  - Diagnostic ECG to PCI < 90 minutes  86%
  - Prehospital 12 Lead < 5 minutes from arrival is 58% (up 23% from when we started in Fall of 2008)
• STEMI PCI Demographics in 2009 showed:
  • 64% Male with an average age of 63.7 years
  • 36% Female with an average age of 68.4 years
• Age Ranges are as listed for the 2009 calendar year.
• Note that females are present in all age categories.
• Where do our STEMI patients requiring intervention come from?
  • Central County is disproportionately affected.
  • Reasons could include a wide variety of factors; e.g., access to health care, ethnicity that we are not able to fully define at this time.
### City of Origin – PCI Patients

<table>
<thead>
<tr>
<th>City</th>
<th>#</th>
<th>City</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond</td>
<td>13</td>
<td>Oakley</td>
<td>5</td>
</tr>
<tr>
<td>Walnut Creek</td>
<td>10</td>
<td>Hercules</td>
<td>5</td>
</tr>
<tr>
<td>Concord</td>
<td>9</td>
<td>Bay Point</td>
<td>4</td>
</tr>
<tr>
<td>Danville</td>
<td>9</td>
<td>San Pablo</td>
<td>4</td>
</tr>
<tr>
<td>Pittsburg</td>
<td>9</td>
<td>Antioch</td>
<td>4</td>
</tr>
<tr>
<td>Brentwood</td>
<td>7</td>
<td>Moraga</td>
<td>4</td>
</tr>
<tr>
<td>Martinez</td>
<td>6</td>
<td>Pinole</td>
<td>3</td>
</tr>
<tr>
<td>Lafayette</td>
<td>6</td>
<td>Pacheco</td>
<td>3</td>
</tr>
<tr>
<td>Pleasant Hill</td>
<td>6</td>
<td>San Ramon</td>
<td>2</td>
</tr>
<tr>
<td>Orinda</td>
<td>6</td>
<td>El Cerrito</td>
<td>2</td>
</tr>
</tbody>
</table>

2009 data as to city of origin for all PCI patients show that all communities are affected.
EMS triaged STEMI patients were transported to the following STEMI Centers during 2009:

- Doctors San Pablo and John Muir Concord continue to be our highest volume centers.
- Sutter Delta joined the STEMI System in August and their numbers do not reflect a full year of data.
- However more than 60-70% of patients still “self-transport” to the emergency department.
The following STEMI Centers presented their STEMI performance data for Quarter IV and year-end 2009 as part of the meeting.
• Contra Costa has three Non-STEMI Centers in our county.
• They are Kaiser Richmond, Kaiser Antioch and Contra Costa Regional Medical Center (CCRMC).
• We would like to applaud the strong leadership of CCRMC and JMMC-Concord for entering this next phase of STEMI System Expansion.
• We encourage all STEMI Centers to reach out to their near-by Non-STEMI Centers to assure walk-in STEMI patients receive the same level of care as their EMS counterparts.
• Although we celebrate our success as a high performance STEMI System we understand that there are always opportunities for improvement.
• One of our biggest challenges has been false positive rates that have exceeded our projections.
• During 2009 every paramedic in the Contra Costa EMS System was re-trained in enhanced 12-lead interpretation focused on reducing false positives.
• In 2010 Contra Costa STEMI System will be performing a 12-lead ECG transmission pilot.
• Our 12-Lead Transmission Pilot is ready to be launched and is led by Prehospital Care Coordinator, Mark Buell, RN at Contra Costa EMS.

• This is a tentative timeline for the transmission pilot program.

• Delays in implementation were due to un-anticipated costs, equipment and technical issues than had to be resolved prior to launching the pilot.

• If the transmission project is successful it will increase our STEMI Centers ability to take the patient directly to the cath lab for intervention.

• Reduce/eliminate false positives.

• Start date is targeted for May/June 2010 so we hope to have results of the pilot by our next STEMI Oversight meeting in September 2010.

• If the pilot is successful the EMS STEMI System Goal is to assure that every patient in Contra Costa has access to this resource and that the implementation would be system-wide.
“Act in Time” Public Education
Stronger Efforts Needed....

Total Patients Q4 2009
- 73 STEMI patients
- 43 (59%) via EMS
- 30 (41%) walk-in

- Nationally > 50% of all patients walk-in with chest pain

- Public Education Lagging

- Act in Time
  - Our standard for Public Education

- As stated previously one of our biggest challenges is addressing the issue of public education.

- The American Heart Association Mission Lifeline criteria for STEMI systems of care state that patient and public education should include the ability to:
  - Recognize the symptoms of a heart attack.
  - Realize the importance of activating emergency medical services (EMS) via 9-1-1 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 heart attack.
  - 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” evidence-based education materials to promote public education. STEMI Centers play a critical role in disseminating strong messages to their communities.

- Contra Costa EMS recommends that all STEMI Centers incorporate these materials in their public education efforts via their websites, media, print, community outreach and public service announcements.
Contra Costa STEMI System
Moving Forward

- Opportunities
  - Community Education Partnerships
    - HeartSafe Communities
  - Intra-facility Transfers from Non-STEMI Centers
  - Mission Lifeline
    - STEMI System Accreditation process being developed
    - www.americanheart.org/presenter.jhtml?identifier=3050213
  - Support for Publication and Presentation
  - Patient and Public Education

- Contra Costa EMS Prehospital
  - Pam Dodson, RN, is the HeartSafe Community lead at Contra Costa EMS supporting public education.

- STEMI Centers are strongly encouraged to work with their communities and EMS to support the Mission Lifeline Public Education Goals.

- Any public information on chest pain in the print or media should include a strong public message to call 9-1-1 for chest pain.

- Contra Costa County is well positioned to have continued success and we credit this to our strong collaborative partnerships.
• STEMI Center Coordinators will be having a follow-up meeting to refine our STEMI Center data collection tools and summary sheet at a later date to be announced.

• Kaiser Walnut Creek will be our host for the next oversight meeting in September 2010.
Acknowledgements

- Prehospital Care Providers
- Fire EMS CQI Coordinators
- STEMI Center Coordinators
- Cardiac Intervention Teams
- ED physicians and nurses
- Cardiologists

• Thanks to the many providers and stakeholder agencies for supporting Contra Costa high performance STEMI System.
• It is truly a collaborative effort.
• If you have any questions regarding this presentation please contact Contra Costa EMS or visit our website at www.cccems.org.
Moving Forward in 2010….

Opportunities for Improvement

- Reduce False Activations
- 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

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