Memorandum

Date: June 22, 2012

To: Members of the Public Safety Committee

Subject: Emergency Medical Services Improving STEMI Patient Outcome

The Public Safety Committee will be briefed on Emergency Medical Services Improving STEMI Patient Outcome on Monday, June 25, 2012.

A.C. Gonzalez
First Assistant City Manager

Attachment

c: Honorable Mayor and Members of the Dallas City Council
    Mary K. Suhm, City Manager
    Rosa Rios, City Secretary
    Thomas P. Perkins, Jr., City Attorney
    Craig D. Kinton, City Auditor
    C. Victor Lander, Administrative Judge
    Jill A. Jordan, P.E., Assistant City Manager
    Ryan S. Evans, Assistant City Manager
    Forrest E. Turner, Assistant City Manager
    Joey Zapata, Assistant City Manager
    Jeanne Chipperfield, Chief Financial Officer
    Frank Librio, Public Information Office
    Stephanie Cooper, Assistant to the City Manager

"Dallas, the City that works: Diverse, Vibrant and Progressive"
EMERGENCY MEDICAL SERVICES
Improving STEMI Patient Outcome
(ST-Segment Elevation Myocardial Infarction)

Public Safety Committee
June 25, 2012
PURPOSE

• To present improvements made in STEMI care from prehospital to cardiac catheterization lab
• To provide recent data documenting the improvement in patient care in Dallas
• To review future Public Safety Committee briefing topic
OUTLINE

• ST-Segment Elevation MI (STEMI)
• Identification and Treatment
• Improvements in Care
• Future Briefing Highlight
DFRD RESPONSES

- EMS: 83%
- Fire: 17%

Special Operations: (385)
- Fire Only: (36, 123)
- EMS & Fire: (29,536)
- EMS Only: (155,950)

Total Incidents: 221,994
Almost 250,000 Americans experience **STEMI**, the deadliest form of heart attack each year.

### EMS Response Types

<table>
<thead>
<tr>
<th>Top 5 Calls for Service</th>
<th>07/08</th>
<th>08/09</th>
<th>09/10</th>
<th>10/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year</td>
<td>07/08</td>
<td>08/09</td>
<td>09/10</td>
<td>10/11</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td>157,910</td>
<td>149,610</td>
<td>151,211</td>
<td>155,950</td>
</tr>
<tr>
<td><strong>Motor Vehicle Accident</strong></td>
<td>9,547</td>
<td>12,247</td>
<td>12,679</td>
<td>12,128</td>
</tr>
<tr>
<td><strong>Breathing Difficulty</strong></td>
<td>8,581</td>
<td>9,023</td>
<td>9,005</td>
<td>9,528</td>
</tr>
<tr>
<td><strong>Chest Pain (Cardiac)</strong></td>
<td>6,776</td>
<td>6,676</td>
<td>7,039</td>
<td>7,614</td>
</tr>
<tr>
<td><strong>Fall Victim</strong></td>
<td>5,404</td>
<td>6,236</td>
<td>6,487</td>
<td>7,433</td>
</tr>
<tr>
<td><strong>Abdominal (Medical)</strong></td>
<td>5,166</td>
<td>5,521</td>
<td>5,856</td>
<td>6,214</td>
</tr>
</tbody>
</table>
Metrics

D2B – Door To Balloon
The time from patient arrival at the hospital until restoration of blood flow by mechanical means; balloon inflation.

FMC2B – First Medical Contact To Balloon
The time from patient’s first interaction with medical system (EMS) until restoration of blood flow by mechanical means.
Time to Treatment (vs ≤90)

Every 15-minutes of Delay ↑ Mortality
STEMI

ST Segment Elevation Myocardial Infarction
What is a Myocardial Infarction (MI)?

• An MI, or heart attack, occurs when the coronary arteries that feed blood and oxygen to the heart itself become blocked. Blood flow is decreased or stopped damaging the heart muscle.
What is a STEMI?

• MI – This heart attack does not cause changes on ECG. In NSTEMI (Non-STEMI), the blockage may be partial or temporary. Extent of damage relatively minimal.

• STEMI – This heart attack is caused by a prolonged period of blocked blood supply. It affects a large area of the heart muscle causing changes on the ECG.
STEMI Symptoms

- Chest pain/pressure; may radiate to shoulder, back, neck and jaw
- Shortness of breath or difficulty breathing
- Sweating
- Dizziness, weakness, fainting
- Nausea
- Sense of impending doom
Blocked Coronary Artery

Opened Coronary Artery
IDENTIFICATION

TREATMENT
Identification of STEMI

- History
- Symptoms
- 12 Lead ECG
**Anterior View**

- Lateral wall ischemia, injury, or infarct – I, aVL, V₅, V₆
- Inferior wall ischemia, injury, or infarct – aVF

**Posterior View**

- Septal wall ischemia, injury, or infarct – V₅ through V₆
- Anterior wall ischemia, injury, or infarct – V₃ and V₄

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**Left anterior descending artery (LAD)**

- RCA (Right coronary artery)
- Cx (Circumflex artery)

**E.C.G.**

- Normal limits:
  - PR: 0.12 - 0.20 ms
  - QRS: 0.06 - 0.11 ms
  - QTc: Male 0.397 ms  Female 0.415 ms

*There may be an overlap in blood supply by the RCA and Cx artery depending on which artery is dominant.*
Treatment of STEMI

Oxygen

IV

Medications
IMPROVEMENTS IN CARE

TIME IS MUSCLE

DALLAS FIRE RESCUE
IMPROVEMENTS

- Fentanyl – Pain Management
- Lifenet – ECG Transmission Software
- American Heart Association W.W. Caruth Initiative
  - Education
  - Protocol
  - Procedures
FENTANYL

Pain Management

November 1, 2010
Medical City Hospital partners with Dallas Fire Rescue to outfit Rescues with Lifenet software subscription.
ER receives notification that a 12 Lead has been transmitted.

ER views 12 Lead and forwards to all necessary personnel.
<table>
<thead>
<tr>
<th>Transmissions</th>
<th>Transmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioTel</td>
<td>694</td>
</tr>
<tr>
<td>Presbyterian Dallas</td>
<td>223</td>
</tr>
<tr>
<td>Baylor University Medical City</td>
<td>210</td>
</tr>
<tr>
<td>Medical City</td>
<td>158</td>
</tr>
<tr>
<td>Doctors</td>
<td>132</td>
</tr>
<tr>
<td>Methodist Medical Center</td>
<td>120</td>
</tr>
<tr>
<td>Presbyterian Plano</td>
<td>78</td>
</tr>
<tr>
<td>Charlton Methodist</td>
<td>32</td>
</tr>
<tr>
<td>Parkland Memorial Hospital</td>
<td>31</td>
</tr>
<tr>
<td>Baylor Plano</td>
<td>29</td>
</tr>
<tr>
<td>St. Paul / UTSW</td>
<td>29</td>
</tr>
<tr>
<td>Dallas Regional Medical Center</td>
<td>24</td>
</tr>
<tr>
<td>Baylor Garland</td>
<td>12</td>
</tr>
<tr>
<td>Medical Center Plano</td>
<td>9</td>
</tr>
<tr>
<td>Dallas Medical Center</td>
<td>7</td>
</tr>
<tr>
<td>Veterans</td>
<td>7</td>
</tr>
<tr>
<td>Texas Regional MC Sunnyvale</td>
<td>6</td>
</tr>
<tr>
<td>Children's Dallas</td>
<td>3</td>
</tr>
<tr>
<td>Baylor Carrollton</td>
<td>2</td>
</tr>
<tr>
<td>Methodist Richardson</td>
<td>2</td>
</tr>
</tbody>
</table>
Feedback from hospitals

ER board with D2B times

Illustration of direct impact by transmission of 12 Lead
Thank you for allowing us to join with you in providing care for STEMI survivors. As you know, “Time is muscle.” Improving outcomes for STEMI survivors is truly a team effort. This care begins with the EMS team. Please let me know if there is anything I can do to improve our process or provide information that may help your job in the field. We appreciate all you do!

**STEMI WORKUP**

Chief Complaint:  Chest Pain

EKG Transmitted:  X  Yes  No

Cath Lab activated from the field:  X  Yes  No

D2B:  22 minutes  E2B:  53 minutes

EMS Observation:  X  Yes  No

Occlusion:  100% RCA

Outcome:  Home on the Feb 4th with scheduled rehab

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Paula Spencer, RN, CEN  
Chest Pain Coordinator/  
Director, EMS Regional Outreach  
Texas Health Presbyterian Hospital Dallas  
214-345-7159

C. Sean Black, MD  
Asst. Medical Director,  
Texas Health Presbyterian Hospital Dallas  
Emergency Department  
Chest Pain Center, Medical Director

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**Texas Health Presbyterian Hospital Dallas**  
Together Everyone Achieves More
IMPROVEMENTS IN CARE

AMERICAN HEART ASSOCIATION
DALLAS CARUTH INITIATIVE
AHA Dallas Caruth Initiative

• $3.5 Million Grant over 2.5 years
  – Communities Foundation of Texas – W.W. Caruth Jr.

• AHA led with 250 volunteers

• 24 EMS agencies have signed a Memorandum of Understanding (MOU)

• 15 hospitals signed an MOU

• Dallas County population is 2.4 million

• Research Metric: “Symptom Onset to Arterial Reperfusion”
Challenges

• Minimal coordination of STEMI care between EMS and receiving hospitals

• Lack of STEMI protocol sets between EMS and receiving hospitals

• Minimal or no QA/QI, or STEMI feedback loops; complete lack of data accurately reflecting STEMI care in Dallas County

• Overall lack of process understanding transcended EMS, ED and cath lab staff
Dallas County Challenges

• What is the overall impact of STEMI challenges in Dallas County?

<table>
<thead>
<tr>
<th>% D2B ≤90 min</th>
<th>State</th>
<th>86%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nation</td>
<td>88%</td>
</tr>
</tbody>
</table>

Q1 2011

- 70% <90 min
- 15% >90 min
- 15% >120 min
First Year Accomplishments

American Heart Association
Dallas Caruth Staff

AHA Caruth Volunteer
Advisory Board (11)

Dallas Stakeholder Committee (149)
Raymond Fowler
Michael Isaac

UT Health Science Center Houston
UT Southwestern Dallas
American College of Cardiology

Education Subcommittee (24)
Karen Pickard
Chris Weinzaepfel

EMS Advisory Subcommittee (30)
Kevin Cunningham
Craig White

Protocols Subcommittee (42)
Chris Chiara
Mark Till

Quality Improvement Subcommittee (19)
Bob Hillert
Tom Tierney

Conference Planning Subcommittee (13)
Tami Kayea
Jennifer Ledbetter
ACS Signs & Symptoms
- Chest pain or discomfort, usually behind the breastbone
- Unpredictable chest pressure, discomfort, or tightness
- Complaints of "heart racing" or palpitations
- Brady-cardiac: Bradycardia
- Syncope: Weakness in patients > 65 years old
- New or worsened stroke symptoms
- Difficulty breathing (without obvious cause i.e. asthma or CHF)

**If C/P is thought to be stimulant induced:**
- Diazepam 2.5-5mg slow IVP max 10mg
  - OR
- Midazolam 2.5-5mg slow IVP max 5mg or IN max 10mg

**Minimize patient exertion**
- Apply Oxygen to maintain SPO2 > 94%

**B 324 mg Aspirin PO Chewed, not swallowed**

**P**
- If STEMI Criteria met, activate CATH LAB, transmit ECG & immediately initiate transport to appropriate PCI capable hospital.
- Establish IV access at TKO rate or saline lock
- SBP > 110 mmHg
  - 0.4 mg nitroglycerin SL tablet or SL spray q 5 minutes until pain is gone or max 3 doses. Maintain SBP > 110 mmHg
- Pain unrelieved by Nitro:
  - Morphine 2-4mg slow IVP max 20mg
  - OR
  - Fentanyl 1mcg/kg q 15 minutes max 200 mcg

**SBP < 110 mmHg**
- Shock position

**P**
- If SBP falls < 110 mmHg in response to treatment:
  - Discontinue standing nitroglycerin & analgesic treatments

**FEMALES**: Females, diabetics and geriatric patients often have atypical signs/symptoms, or only generalized complaints
- Remember Erectile Dysfunction drugs are now being used to treat pulmonary hypertension
- Do not administer Nitroglycerin to any patient who has used Viagra (sildenafil) or Levitra (vardenafil) in the past 24 hours or Cialis (tadalafil) in the past 36 hours due to potential severe hypotension
- If possible, establish a second IV on STEMI patients DURING TRANSPORT ONLY

ACS Signs & Symptoms
- Chest pain or discomfort, usually behind the breastbone
- Unpredictable chest pressure, discomfort, or tightness
- Complaints of "heart racing" or palpitations
- Brady-cardiac: Bradycardia
- Syncope: Weakness in patients > 65 years old
- New or worsened stroke symptoms
- Difficulty breathing (without obvious cause i.e. asthma or CHF)

EMS Chest Pain / ACS Guidelines

**STEMI Criteria**
- ST segment elevation of ≥ 1 mm in 2 contiguous leads with or without signs & symptoms of ACS

**12 Lead EMS ECG Criteria**
- Patients > 20 years old experiencing any ACS signs & symptoms
- OR
- Any age patient with ACS signs & symptoms AND a history of:
  - HTN
  - Cardiac disease
  - Smoking
  - Diabetes mellitus
  - Severe Obesity
  - High Cholesterol
  - Recent recreational drug use

When in Doubt, Obtain an ECG

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**Legend**
- **F** First Responder
- **B** EMT-Basic
- **I** EMT-Intermediate
- **P** Paramedic
- **M** Medical Control

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Chris Chiara, Co-Chair
Education Plan

4,273 Workbooks Completed For EMS And Hospital Personnel

Over 800 Workbooks Completed By Dallas Fire Rescue Personnel
Dallas County – STEMI System of Care

Performance Metrics

UTHealth
The University of Texas Health Science Center at Houston

Jami DelliFraine, PhD
Jim Langabeer, PhD, EMT-b
Jamie Emert, BS
Safa Fathiamini, MD

The University of Texas Health Science Center
School of Public Health
## STEMI Key Outcome Metrics

<table>
<thead>
<tr>
<th></th>
<th>Q4 2010</th>
<th>Q1 2011</th>
<th>Q2 2011</th>
<th>Q3 2011</th>
<th>Q4 2011</th>
<th>Trend (+ is good)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOAR</td>
<td>195</td>
<td>181</td>
<td>173</td>
<td>190</td>
<td>190</td>
<td>3%</td>
</tr>
<tr>
<td>D2B**</td>
<td>74</td>
<td>77</td>
<td>65</td>
<td>70</td>
<td>68</td>
<td>8%</td>
</tr>
<tr>
<td>FMC2B**</td>
<td>133</td>
<td>105</td>
<td>83</td>
<td>88</td>
<td>93</td>
<td>29%</td>
</tr>
<tr>
<td>E2B</td>
<td>72</td>
<td>76</td>
<td>69</td>
<td>74</td>
<td>73</td>
<td>-1%</td>
</tr>
<tr>
<td>Cath Lab</td>
<td>21</td>
<td>19</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>0%</td>
</tr>
<tr>
<td>Total EMS Time</td>
<td>-</td>
<td>29.5</td>
<td>30.5</td>
<td>30</td>
<td>29</td>
<td>2%</td>
</tr>
<tr>
<td>D2B Minutes saved with EMS Cath Lab Activation</td>
<td>5  9  10  13  23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>156%</td>
</tr>
</tbody>
</table>

**non-transfer, STEMI, primary PCI only**
81% of Cases < 90 Minute D2B
Improved 11% from Q1 2011
STEMI Mortality
2.4%
Down from 6.1%
IMPROVEMENTS IN CARE

DFR PERFORMANCE
Outstanding Regional System Performer
AHA Dallas Caruth STEMI Initiative
2nd Quarter - 2011

Award Presentation - November 28, 2011
9-10 am
Medical City Hospital
City Hall E Tower
7777 Forest Lane Dallas, Texas 75230

Introduction:
Wendy Segrest
Vice President of Quality and Systems Improvement
American Heart Association - SouthWest Affiliate

Award Presentation:
Thomas Tierney
Operations Manager - Biotel Parkland Health and Hospital System
Co-Chair - QI Subcommittee - Dallas Caruth Initiative

Award Recipients:

Dallas Fire-Rescue
Tami Kayea - Section Chief - EMS

Medical City Dallas Hospital
Jennifer Ledbetter - Director of Cardiovascular Services

Best Door-To-Balloon Time
D2B: 24
FMC2B: 55

4 of the Best 15 D2B Times
Outstanding Regional System Performer
AHA Dallas Caruth STEMI Initiative
3rd Quarter - 2011

Award Presentation - March 28, 2012
Texas Health Presbyterian Dallas Hospital
Haggar Hall
8200 Walnut Hill Lane Dallas, Texas 75231

Introduction:
Leilani Stuart and Russell Griffin
Directors - Dallas Caruth Grant
American Heart Association - SouthWest Affiliate

Award Presentation:
Bob Hillert, M.D.
Cardiology - Doctors Hospital, Dallas, TX
Co-Chair - QI Subcommittee - Dallas Caruth Initiative

Award Recipients:

Dallas Fire-Rescue
Tami Kayea - Section Chief - EMS

Texas Health Presbyterian Dallas Hospital
Paula Spencer - Chest Pain Coordinator
Dr. Bob Brockie - Interventional Cardiologist
Dallas becomes a model system.
Dallas asked to present STEMI system at AHA and Duke University School of Medicine Conference.

**Agenda**

**Friday, May 11, 2012**

12-1:30 pm  Registration

1:30   Welcome and Opening Remarks

1:40   Testimonial for STEMI Care: A System that Works: Dallas, Texas

2:00   National STEMI and Cardiac Arrest Systems of Care / Mission: Lifeline / Heart Rescue: What is Hot with Cold?

2:20   National STEMI Systems of Care: Targets for Regional Intervention

2:40   Great Debates and Expert Panel with Q&A: How Far is too Far for Primary PCI?

3:10   Break / Poster Sessions

3:30   **Workshops – Session 1**

A) Funding and Resourcing Regional Systems
B) Implementing Systems of Care 101
C) Implementing Data / ACTION-GW/TFG Registry
D) D1) Practicum: Pre-hospital Cardiac Arrest System / Resuscitation / Hypothermia

4:45   **Workshops – Session 2**

A) Funding Regional Systems Funding and Resourcing Regional Systems
B) Implementing systems of care 101
C) Implementing Data / ACTION-GW Registry
Future Presentation

CARDIAC ARREST PERFORMANCE (ROC)
Percent of patients who had out-of-hospital cardiac arrest and CPR in Dallas that survived to return home.

2012  9.4%  2009  6.0%  2006  3.9%
QUESTIONS?