Regionalization of STEMI Systems

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University of Colorado School of Medicine
Co-Chair, Science and Quality, Colorado Mission:Lifeline
Why Regionalize?

MISSION: LIFELINE™ NEW MEXICO
Statewide STEMI System of Care Education Event

July 18, 2014
We already have a system, why regionalize?

• Most effective approach to modifying the system, particularly EMS and hospitals that refer to more than one PCI center.
  
  *If every PCI hospital has the same message, protocols change.*

• Fill in the existing gaps in STEMI care
  
  *Competing hospitals*
  
  *Loose EMS – hospital affiliations*
  
  *Help Low Volume STEMI Referral Centers Establish Stable Protocols*

  *Fibrinolysis and transfer*
  
  *Transfer for Primary PCI*

• Only possible way to overcome the two hour transfer to device times
A "STEMI system" is an integrated group of separate entities focused on reperfusion therapy for STEMI within a region that typically includes:

- emergency medical services (EMS) providers
- at least one community (non-PCI) hospital,
- at least one tertiary (PCI) center.

The system may include one or more of the following components:

- leadership teams of EMS
- emergency medicine
- Cardiology
- Nursing, Hospital Administration, Quality Experts

It utilizes standardized communication (i.e., STEMI alert system), standardized transportation; and data collection and feedback.
Within the ideal state 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 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 primary percutaneous coronary intervention (PCI), the preferred method of treatment for a STEMI attack or fibrinolysis
Challenges We Faced in Colorado
The Challenges You Face In New Mexico

[Map of New Mexico with various hospitals and regions highlighted.

Legend:
- Yellow: Cardiac Resuscitation Coverage Area
- Blue: STEMI Coverage Area
- Green: Receiving (PCI Capable) Hospital
- Orange: Referral (Non-PCI Capable Hospital)
- Mission: Lifeline Recognized Hospital

STEMI Mortality:
- Class 1 (16.2-96.2)
- Class 2 (96.2-127.8)
- Class 3 (127.8-162.5)
- Class 4 (162.5-219.1)
- Class 5 (219.1-725.9)
- Insufficient Data

The Center for Educational Excellence
Promoting excellence in clinical care and patient safety around the world

American Heart Association
MISSION: LIFELINE
STEMI Door-to-Balloon Times Median Times for Transfer In and Non-Transfer In Patients

<table>
<thead>
<tr>
<th></th>
<th>Transfer in DTB Times</th>
<th>Non-Transfer in DTB Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 01, 2013 - December 31, 2013</td>
<td>135</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>108</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>92</td>
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</tr>
</tbody>
</table>
The Impact of Transfer Delays on Outcomes: A Challenge in Rural Centers

Figure 3. Association of DIDO Time With In-Hospital Mortality

<table>
<thead>
<tr>
<th>DIDO Time, min</th>
<th>Mortality, No. of Patients/Total (%)</th>
<th>Adjusted Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤30</td>
<td>43/1600 (2.7)</td>
<td>1.0 (Reference)</td>
</tr>
<tr>
<td>31-60</td>
<td>192/4841 (4.0)</td>
<td>1.34 (0.96-1.86)</td>
</tr>
<tr>
<td>61-90</td>
<td>146/3013 (4.9)</td>
<td>1.41 (0.96-2.06)</td>
</tr>
<tr>
<td>&gt;90</td>
<td>430/5176 (8.3)</td>
<td>1.86 (1.36-2.54)</td>
</tr>
</tbody>
</table>

For each door-in to door-out (DIDO) time group, the unadjusted mortality rate is presented, as well as the adjusted odds ratio and 95% confidence interval (CI; error bars) for each group, with DIDO time greater than 90 minutes as the reference group.
We already have a system, why regionalize?

• Without regional approach to data collection and evaluation, impossible to improve system coordination.

• Provide a platform for regional care of other cardiovascular emergencies... cardiac arrest, stroke, aortic dissection....
We already have a system, why regionalize?

# 1 Reason- Save lives
Time is muscle

Relationship among symptom duration, myocardial salvage, and mortality reduction.

Levels of organization

Individual hospital

Hub and spoke model

Regional system

Every hospital and EMS Agency

Journal of Invasive Cardiology 2011; 23 A:8-12
Regional system

A system that includes all hospitals within a region, establishes common hospital and EMS protocols, and shares common data.
Regional System Advantages

• Patients walk in to every hospital and call every EMS agency... all need a plan.

• Regional leadership involving all major hospitals is more effective at influencing referring hospitals and EMS agencies.
  – If all leading professionals and institutions in a region agree, recommendations more likely to be adopted.

• Single approach enhances rapid treatment.
  – everyone knows their role, no hesitation to find out who is on call....

Journal of Invasive Cardiology 2011; 23 A:8-12
Regional Systems
Barriers / Opportunities

- Competition
  - most commonly cited reason
- Lack of Leadership/Champion
- Conflicting management plans
  - “5 doctors will give you 10 different plans”
- Resources
  - “Feet on the street” system coordinators
- Lack of comparable regional data for ongoing quality improvement and immediate feedback for all members of the team
  - Every hospital is in the top 10% for CV care

Regional Cardiovascular Emergency System

• How are we doing?
  – EMS to device
  – Hospital transfer
• Regionalization
• Building regional systems
• Mission: Lifeline STEMI SYSTEMS ACCELERATOR Intervention
How patients present

- Call 911 EMS (~50%)
- Walk-in (~50%)
- Hospital transfer
  - Walk in or EMS to 1<sup>st</sup> hospital (~60% of PCI hospital)
### How patients present
#### Treatment goals in minutes

<table>
<thead>
<tr>
<th>EMS</th>
<th>Walk-in</th>
<th>Hospital transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td><strong>Potential</strong></td>
<td>&lt;60</td>
<td>&lt;90</td>
</tr>
</tbody>
</table>
Reperfusion Therapy for Patients with STEMI

*Patients with cardiogenic shock or severe heart failure initially seen at a non–PCI-capable hospital should be transferred for cardiac catheterization and revascularization as soon as possible, irrespective of time delay from MI onset (Class I, LOE: B). †Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

2013 ACC/AHA STEMI Guidelines 2013

The Center for Educational Excellence
Promoting excellence in clinical care and patient safety around the world
Primary PCI should be performed in patients with STEMI presenting to a hospital with PCI capability within 90 minutes of first medical contact as a systems goal.

Primary PCI should be performed in patients with STEMI presenting to a hospital without PCI capability within 120 minutes of first medical contact as a systems goal.
Death by guideline goal

60 minute drive time to PCI lab
2001 – 2006 PCI Capable Hospital Expansion

• PCI-capable hospitals
  ↑ 1176 to 1695

• Access to PCI
  79.0% to 79.9%

First medical contact (EMS) to device

Median time 81 Minutes

Q4 2013

S/S Onset-FMC  FMC-ECG  ECG-ED
LOS ED  ED-C-Lab  C-Lab-Device

Mission: Lifeline Receiving Center National Report Q42013
Regional Cardiovascular Emergency System

How are we doing?

• Door to balloon largely solved
• Major targets remain
  1. Hospital transfer patients (roughly half of all STEMI patients)
     First door to device
  2. EMS diagnosed patients (roughly half of patients presenting directly to PCI hospitals)
     First medical contact to device
Regionalization Can Look Very Different Across the Country......Depending on Where you are living
45 STEMI Receiving Centers: Ventura, Los Angeles, & Orange Counties (California)
Colorado Mission: Lifeline
26 PCI capable hospitals
Example of Mission: Lifeline Regional Structure

- American Heart Association
- Communities Foundation of Texas
  - UT Health Science Center Houston
  - UT Southwestern Dallas
  - American College of Cardiology

- AHA Caruth AMI System Initiative
  - Dallas Stakeholder Committee (149)
    - Raymond Fowler
    - Michael Isaac

- AHA Caruth Volunteer Advisory Board (11)
  - James Langabeer

- Education Subcommittee (24)
  - Karen Pickard
  - Chris Weinzapfel
- EMS Resources 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
New Mexico Mission: Lifeline
Elements of an Ideal System
Elements of an Ideal System

• Leadership
• Funding
• Neutral Coordinator
• Data
• Feedback
• Single common plan
Expansion of a Regional ST-Segment Elevation Myocardial Infarction System to an Entire State

Circulation. published online June 4, 2012;
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2012 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

Implementation of a Statewide System for Coronary Reperfusion for ST-Segment Elevation Myocardial Infarction
James G. Jollis; Mayme L. Roettig; Akinyele O. Aluko; et al.
http://jama.ama-assn.org/cgi/content/full/298/20/2371
Regionalization of Emergency Cardiac Care

“Most of the important decisions that impact patient outcomes occur long before the patients reaches the cardiologist”
Regionalization of Emergency Cardiac Care

Move care forward…

• EMS does emergency department job
• Emergency department does cardiology job
• Cardiology lives in the cath lab / intensive care unit
Diagnose quickly

Reperfuse quickly

ST Elevation Myocardial Infarction
- 21 primary PCI labs
- 5,240 paramedics
- 18,000 EMTs
- 540 EMS systems
- 121 emergency departments
Integrated, Systematic AMI Care
Building regional system

Process

1) Develop leadership, funding, data structure

2) Establish REGIONAL PCI CENTERS (primary, lytic ineligible, rescue)

3a) HOSPITAL by hospital establishment of STEMI plan (review, consensus, training)

3b) EMS by EMS establishment of STEMI plan (review, consensus, training)

5) Improve system

Measurement & Feedback
Regional Coordinator(s)

- Directed by regional leadership to implement emergency care plans.
- Lead establishment of STEMI plan in every hospital and EMS agency.
- Day to day oversight and coordination of system.
- Training of EMS, ED, catheterization lab, and QI personnel
- Regular data feedback to hospitals, EMS agencies, and regional meetings.
Establish a STEMI plan

Every Hospital Needs to Have A Written Plan and Protocols in Place for STEMI
Develop a regional plan

- Optimal system specifications by point of care
  - EMS
  - ED
  - Transfer
  - Receiving hospital
  - Cath. Lab
  - Other system issues – payers, regulations

Available at http://www.nccacc.org/news/news1.html
### Lab Activation Protocol

#### Non-PCI Hospital Lab Activation Protocol

- Symptoms of acute coronary syndrome greater than 15 minutes - less than 12 hours.
- ECG diagnosis
  - ST segment elevation in two contiguous leads
  - Machine interpretation of definite STEMI
- **No contraindications to acute catheterization**
  - Active severe bleeding
  - Patient inappropriate for procedure (patient or family refusal, DNR, severe dementia)
- Emergency physician activates Primary PCI hospital as soon as STEMI is identified using term “code STEMI”
- Pre-arranged critical care transport or EMS dispatch notified of “code STEMI” for 911 transfer
- Aspirin 325 mg
- Heparin bolus 60 u/kg, no drip
- Limit continuous infusions
- Fax records while patient in transport

#### EMS Lab Activation Protocol

- Symptoms of acute coronary syndrome greater than 15 minutes - less than 12 hours.
- ECG diagnosis
  - ST segment elevation in two contiguous leads
  - Machine interpretation of definite STEMI
- **No contraindications to acute catheterization**
  - Active severe bleeding
  - Patient inappropriate for procedure (patient or family refusal, DNR, severe dementia)
- Trained paramedic activates Primary PCI hospital

### Develop a Regional Plan
PCI Hospitals

- Single number cath lab activation
- Accept all STEMI patients regardless of bed availability → No DIVERT
- 30 minute lab availability 24/7
- On site surgery optimal
- Ongoing QI and data feedback—AR-G database
- Partial support of a Regional Coordinator
Emergency departments

- Establish a STEMI plan
- Nurse first triage
- 10 minutes to ECG
  - Typical symptoms, over age 30
  - Atypical symptoms, over age 50
- Emergency physician makes reperfusion decision

  Activate lab or initiate fibrinolysis
Care Processes Associated With Quicker Door-In–Door-Out Times

Hospital processes

- Dedicated STEMI reperfusion team with committed leadership
- Hospital-specific reperfusion protocol

ED processes

- System for obtaining ECGs within 10 min of ED arrival
- Single call No. to activate PCI center cardiac catheterization lab

EMS processes

- EMS has equipment to perform pre-hospital ECGs
- Program for paramedics to recognize STEMI on 12-lead ECGs
- Keep patient on local stretcher as part of AMI

Circ Cardiovasc Qual Outcomes. 2011;4:382-388.)
Transfer Patients, 1<sup>st</sup> Door to Device

Ground transport times

Muñoz, et. al., *Circ Interventions*, August 2012
EMS

- Establish a STEMI plan
- ECG for all possible STEMI patients
  - Typical symptoms, over age 30
  - Atypical symptoms, over age 50
- Paramedic interpretation and cath lab activation
  - Paramedic read, machine read, or transmission.
- Diversion plan to PCI hospital
  - Lytic ineligible
  - Hospital within 30 to 40 minutes
Pre-Hospital ECG

- ACTION registry - 2007
- 1,941 of 7,098 EMS transported patients had pre-hospital ECG
- Trend for lower mortality 0.85 (0.63-1.01)

4 ways to activate

1) Paramedic read
2) Machine read
3) ECG transmission
4) Walk in with ECG
EMS ECG → Cath lab activation
Regional Systems of Care Demonstration Project: Mission: Lifeline STEMI Accelerator
National Program Sponsors Through Educational Grants

THE MEDICINES COMPANY
Philips Healthcare
ABIOMED, Inc.
Objectives

• Establish a regional standard of emergency cardiovascular care that includes every hospital and EMS agency.

• Lower cardiovascular mortality by broadly improving the timely treatment of ST elevation myocardial infarction (STEMI) patients.

• Create a sustainable system for treating cardiovascular emergencies including STEMI, cardiac arrest, stroke and aortic dissection.
STEMI ACCELERATOR Sites
STEMI SYSTEMS ACCELERATOR

Intervention Sites

- Great Rivers
  - Columbus, OH
  - Central, PA
  - Philadelphia, PA
  - Louisville, KY

- Midwest
  - Detroit
  - St. Louis
  - E. Wisconsin
  - Central Indiana

- Founders
  - New York City
  - N. New Jersey

- Greater Southeast
  - East Tennessee
  - Tampa

- Western States
  - Kern County, CA
  - Hawaii

- South West
  - Colorado (East Range)
  - Houston
  - San Antonio
  - Oklahoma City

American Heart Association | MISSION: LIFELINE
STEMI SYSTEMS ACCELERATOR Intervention

- Using national level system faculty and local AHA staff to broker competitive entities to regionalize STEMI care for a community.
- Success based on regional local leadership owning the program.
- Unbiased staff to recruit all hospitals to join centralized database.
- Regional Intervention Day
  - CME/CNE event
- Data- Baseline, Quarterly for 1 year, Post Intervention
- Quarterly meetings to share best practices, data review across the region and identify strategies to improve process
Voluntary.

Intervention does not change referral lines.

Augments existing systems / leaves regional leadership entirely in charge of system.
STEML SYSTEMS ACCELERATOR Intervention Data

- All primary PCI hospitals in the Accelerator Region
  > enroll in AR-G (minimal requirement- STEMI only for duration of the project timeline)
  > Agree to “systems release”
    - Hospitals ID’s are blinded
    - Data may be aggregated (combined) for regional report (M:L Systems Report) and with 19 additional regions in the program.
- System data consent release form (DCRF) must be signed and returned to AHA for assignment of a system ID #
- Timelines:
  > July 2012 – enroll and complete release forms
  > Baseline regional Data July 1, 2012 discharges through September 31st, 2012
  > Quarterly Data through December 31, 2013
Colorado Mission: Lifeline Accelerator Project

- Participation from Entire State
- EMS Involvement A Must
- Gain Acceptance for Each Hospital to Commit to a Plan
  - Find Champion Referral Partners to Help
- Get All To Participate in Data Collection
  - ARG Participation
- Review Data Often
Critical First Step—Engagement of EMS Systems

EMS STEMI Pathway
Colorado Mission: Lifeline

STEMI Alert Criteria
ST segment elevation of ≥1 mm in 2 contiguous leads
signs & symptoms of ACS >15 minutes <12 hours

Goal: On scene time <15 minutes

Administer ASA 324mg po (chewed)
Administer Oxygen to maintain O2 sat between 94-99%

Where do I take the patient?

If estimated time from first medical contact
EMS at patient’s side) to balloon < 120
minutes, transport to PCI Catheterization Hospital.

For transport to PCI:
Activate Cath Lab
Possible contraindications to acute echocardiography:
active severe bleeding or patient
inappropriate for procedure (patient or
family refusal, DNR, severe dementia).

Communicate/transmit 12 Lead ECG findings

Establish IV Access

Establish 2nd IV, if possible

Administer NTG per protocol

Administer Narcan for pain control per protocol

Provide copy of EMS run sheet - Ensure time of symptom onset and time of patients side
are documented.

Provide copy of 12 Lead ECG

Agency:

Patient ID:

DOB:

REPERFUSION CHECKLIST for Evaluation of the Patient with STEMI

STEP 1

Has patient experienced chest discomfort for greater than 30
minutes and less than 12 hours?

YES

NO

STEP 2

Are there contraindications to fibrinolyis?

If ANY of the below are checked “Yes,”
Fibrinolysis is contraindicated.
Consider direct transport to PCI,
capable facility where feasible.

YES NO |
| ABSOLUTE CONTRAINDICATIONS |
| YES NO |
| ABSOLUTE CONTRAINDICATIONS |

Any prior intracranial hemorrhage

Active bleeding or bleeding diathesis

(excluding minor)

Known structural cerebral vascular lesion (eg, aneurysmal malformation)

Significant closed-head or facial trauma within 3 months

Known malignant intracranial neoplasm

Interventional or neurosurgical surgery

( primary or metastatic)

within 2 months

Ischemic Stroke within 3 months

Severe uncontrolled hypertension

EXCEPT acute ischemic stroke

Suspected aortic dissection

Severe uncontrolled hypertension

5.5 hours

For streptokinase, prior treatment

within the previous 6 months
Get Non-PCI Capable Hospitals To Agree To A Protocol—Lysis as Default

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

Table 6. Contraindications and Cautions for Fibrogenicolytic therapy in STEMI*

<table>
<thead>
<tr>
<th>Absolute contraindications</th>
<th>Relative contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any prior ICH</td>
<td>History of chronic, severe, poorly controlled hypertension</td>
</tr>
<tr>
<td>Known structural cerebral vascular lesion (e.g., arteriovenous malformation)</td>
<td>Significant hypertension on presentation (SBP ≥180 mm Hg or DBP ≥120 mm Hg)</td>
</tr>
<tr>
<td>Ischememic stroke within 3 mo</td>
<td>History of prior ischememic stroke ≥3 mo</td>
</tr>
<tr>
<td>Suspected aortic dissection</td>
<td>Dementia</td>
</tr>
<tr>
<td>Active bleeding or bleeding diathesis (excluding metases)</td>
<td>Known intracranial pathology not covered in absolute contraindications</td>
</tr>
<tr>
<td>Significant closed-head or facial trauma within 3 mo</td>
<td>Traumatic or prolonged (≥10 min) CPR</td>
</tr>
<tr>
<td>Intracranial or intraspinal surgery within 2 mo</td>
<td>Major surgery (≤3 wk)</td>
</tr>
<tr>
<td>Severe uncontrollable hypertension (unresponsive to emergency therapy)</td>
<td>Recent (within 2 to 4 wk) internal bleeding</td>
</tr>
<tr>
<td>For streptokinase, prior treatment within the previous 6 mo</td>
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</tbody>
</table>

*Viewed as advisory for clinical decision making and may not be all-inclusive or definitive.

CPR indicates cardiopulmonary resuscitation; DBP, diastolic blood pressure; ICH, intracranial hemorrhage; SBP, systolic blood pressure; and STEMI, ST-elevation myocardial infarction.
Transfer for PPCI as Default

Patient Label

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Colorado Mission: Lifeline STEMI Guideline
for Hospitals without Percutaneous Coronary Interventional (PCI) Capability
Estimated time from first hospital door to PCI < 120 minutes
v3, 2013

Signs/Symptoms of Acute Coronary Syndrome (ACS)?
Yes - Follow algorithm below. No - Refer to hospital’s non ACS guideline.

Acquire 12 lead EKG
Physician reads 12 lead within 10 minutes

STEMI criteria: 1. Signs/Symptoms of Acute Coronary Syndrome AND 2. ST segment elevation of ≥3 mm in two contiguous leads
Notify PPCI receiving hospital of impending transfer and record information below.
If ST elevation inconclusive or isolated to V1-V2, or LBBB,
- recommend consultation with physician at PPCI Hospital prior to activation.

Goal: Patient in the door and out the door < 30 minutes

1st Medical Contact/EMS Time:
Pt. ED Arrival Time:
Pt. ED Discharge Time:

Today’s Date:
Patient Name:
Date of Birth:
Allergies:

Patient Weight (stated):

Obtain Vital Signs and Pain Scale

<table>
<thead>
<tr>
<th>Pain</th>
<th>Time</th>
<th>RN Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>BP</td>
<td>O2 Sat</td>
</tr>
</tbody>
</table>

Aspirin 324 mg STAT (four chewable baby aspirin) or Aspirin 300mg PR if unable to take PO (if not already given)
Establish Saline Lock #1 or IV fluid TKO large bore needle
Establish Saline Lock #2 or IV fluid TKO large bore needle, if time allows.
Try to avoid medications requiring infusion pumps

Page 1 of 3

Nurse signature: Date: Time:
Physician signature: Date: Time:

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STAT Labs: Complete Metabolic Panel, CBC, Troponin, PT, PTT, PT INR if patient previously on Warfarin (Coumadin®), and pregnancy serum if childbearing age.

Heparin IV loading dose 70 units/kg. No max dose
Apply cardiac monitor and have hands free defibrillator pads at bedside.

Nitroglycerin 0.4 mg sublingual every five minutes x 3 PRN or Nitroglycerin 0.4 mcg/ml infusion for chest pain
Hold for SBP <100
Continue antiplatelet therapy. Patient took Viagra, Levitra, or Revatio within 24 hours or Cialis within 48 hours.

Morphine 2.4 mg IV every 5-15 minutes PRN for chest pain unrelieved by NTG.

Oxygen at 2L/min, titrate to maintain C2 Sat above 94%

Antithrombotic Options
- Ticagrelor (Brilinta) 180 mg PO OR Clopidogrel (Plavix) 600 mg PO OR Prasugrel (Effient) 60 mg PO. Prasugrel with Prasugrel: Do not use in patients with active bleeding, history of TIA or stroke, age > 75 years, body weight less than 50 kg or > 132 lbs.

Coronary Angioplasty (Angioplasty) 5 mg IV every 5 minutes x 5 doses if patient hyperreactive (>15,000)
Hold if HR <60, SBP <90 mmHg, evidence of heart failure, cardiogenic shock, heart block.

Fax EKG

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ADDITIONAL IMPORTANT INFORMATION

Documentation | Data | RN | Initials
---|---|---|---

Onset of Symptoms | Date | Time |
Mode of Arrival to First Hospital | Self | EMS |
EMR, Time of First Contact | |
(Time of Arrival at First Hospital) | |
First EKG obtained | Pre-hospital (EMS) | After 1st hospital arrival |
Symptoms of Heart Failure | Yes | No |
Symptoms of Cardiogenic Shock | Yes | No |
Cocaine Use: self-reported within the last 72 hours/OS positive urine test | Yes | No |
Cardiac Arrest | Yes | No |
If yes, Time: Location: | Community | Pre-hospital (EMS) | After 1st hospital arrival |
Established Criteria for STEMI Receiving Hospitals

Criteria

1. Protocols for triage, diagnosis and Cardiac Catheterization Laboratory activation should be established within the primary PCI hospital/STEMI-Receiving Center. A single activation phone call should alert the STEMI team. Criteria for EMS activation of the Cardiac Catheterization Laboratory should be established in conjunction with EMS offices.

2. The STEMI-Receiving Center should be available 24 hours/7 days a week to perform primary PCI.

3. The Cardiac Catheterization Laboratory staff including interventional cardiologist should arrive within 30 minutes of activation call.

4. There should be universal acceptance of STEMI patients (no diversion).

5. There should be a plan for triage and treatment for simultaneous presentation of STEMI patients.

6. If cath lab and staff are available, the patient should be transported directly to the cath lab with minimal stay in the ED (Cath Lab Direct).

7. Interventional cardiologists should meet ACC/AHA criteria for competence (>75 total PCI per year).

8. The STEMI-Receiving Center should meet ACC/AHA criteria for volume (>86 primary PCI and >200 total PCI annually).

9. The STEMI-Receiving Center must participate in the Mission: Lifeline-approved data collection tool, ACTION Registry-GWTG (Premier Form).

10. A program should be in place to track and improve treatment (acutely and at discharge) with ACC/AHA guideline based Class I therapies.

11. There should be a recognized STEMI-Receiving Center liaison/system coordinator to the system, a dedicated data coordinator and a recognized physician champion.

12. There should be monthly multidisciplinary team meetings to evaluate outcomes and quality improvement data. Operational issues should be reviewed, problems identified, and solutions implemented. The following measurements should be evaluated on an ongoing basis:

   a. Door-to-balloon (D2B) time, non-transfer < 90 (optimally <60) minutes

   b. STEMI Referral Hospital ED door-to-balloon (transfer D2B) time < 90 minutes

   c. First Medical contact to balloon inflation (E2B) non-transfer < 90 minutes

   d. First Medical contact to balloon inflation (transfer E2B) <120 minutes

   e. Proportion of eligible patients receiving reperfusion therapy

   f. Proportion of eligible patients administered guideline-based Class I therapies

   g. Proportion of patients with field diagnosis of STEMI and activation of the Cardiac Catheterization Laboratory for intended primary PCI that

      i. do not undergo acute catheterization because of misdiagnosis

      ii. undergo acute catheterization and found to have no elevation in cardiac biomarkers and no revascularization in the first 24 hours

   h. In-hospital mortality
Critical Success Factors for Regionalization

• Place patient first, not competition or $$
• Have a “neutral” party coordinate competitive regions (Key-> funding the neutral body)
• Cardiology, ED Medicine, Nursing, EMS leadership, CV Administration & QI
• Empower ED Medicine and EMS to be decision makers & activate the reperfusion plan
• Keep Reperfusion plan simple, parallel processing
• Data drives change-> both immediate and QI quarterly monitoring important
• Nurse or paramedic coordinators / Mission: Lifeline Directors essential to success
Break Time
The Power of Data

- Ongoing measurement and feedback to entire team/region is goal
- Focus on benchmarks most amenable to improvement
NCDR: Dedicated to Cardiovascular Quality

2400 hospitals
> 1000 cardiologists
> 20 million clinical records
Data
Participation in Regional Reports / System Requirements

1. Regional PCI hospitals enroll in NCDR ACTION-GWTG Registry
2. PCI hospitals sign up with Mission: Lifeline
3. PCI hospitals complete
   • ML System DCRF
   • Accelerator Project DCRF
ARG Participation in 2014

Current Site Distribution

Active Sites = 948

Alaska: 1  Hawaii: 7  Puerto Rico: 3  International Participants: 5
ARG-GWTG

- Collects detailed information about patients admitted to participating hospitals with
  - STEMI
  - NSTEMI
- Allows for evaluation of patterns of care, use of reperfusion therapies, concomitant medical therapies and evaluates in-hospital outcomes
## Baseline Characteristics - STEMI

<table>
<thead>
<tr>
<th>Variable</th>
<th>STEMI (n = 67,093)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (yrs)</td>
<td>62</td>
</tr>
<tr>
<td>Female sex</td>
<td>29%</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>26%</td>
</tr>
<tr>
<td>Prior MI</td>
<td>19%</td>
</tr>
<tr>
<td>Prior HF</td>
<td>5%</td>
</tr>
<tr>
<td>Prior PCI</td>
<td>20%</td>
</tr>
<tr>
<td>Prior CABG</td>
<td>6%</td>
</tr>
<tr>
<td>Prior stroke</td>
<td>5%</td>
</tr>
</tbody>
</table>

January 01, 2013 - December 31, 2013
### Hospital Presentation Characteristics - STEMI

#### Qualifying Criteria
- Persistent ST Elevation: 97%
- New LBBB: 2%

#### Presenting Characteristics
- Tachycardia: 17%
- Hypotension: 7%
- Signs of HF: 7%
- Cardiogenic shock: 8%
- Pre-Hospital Cardiac Arrest: 8%

*January 01, 2013 - December 31, 2013*
# In-Hospital Outcomes - STEMI

<table>
<thead>
<tr>
<th>Variable</th>
<th>STEMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median hospital LOS</td>
<td>3</td>
</tr>
<tr>
<td>Death*</td>
<td>6.4%</td>
</tr>
<tr>
<td>Re-infarction</td>
<td>0.7%</td>
</tr>
<tr>
<td>HF</td>
<td>4.6%</td>
</tr>
<tr>
<td>Cardiogenic Shock</td>
<td>4.4%</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.5%</td>
</tr>
<tr>
<td>RBC Transfusion**</td>
<td>3.0%</td>
</tr>
<tr>
<td>Suspected Bleeding Event**</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

January 01, 2013 - December 31, 2013
STEMI–Door to Balloon and Door to Needle Times Cumulative 12 Month Data

- DTB ≤ 90 min - Non-Transfer in: 96%
- DTB ≤ 90 min - Transfer in: 32%
- DTN ≤ 30 min - All: 44%
STEMI Primary PCI Results
DTB Benchmarks for Transfer-In Patients

- Door to Balloon ≤ 90 Minutes
  - 2013Q2: 33%
  - 2013Q3: 34%
  - 2013Q4: 31%
  - 2013Q1: 31%

- Door to Balloon ≤ 120 Minutes
  - 2013Q2: 67%
  - 2013Q3: 67%
  - 2013Q4: 65%
  - 2013Q1: 64%

1st Door to Balloon ≤ 90 Minutes
Participation Needed from All Parts of the STEMI System For Data Collection

**ACTION Registry-GWTG**

**A. DEMOGRAPHICS**
- Last Name
- First Name
- Middle Name
- Birth Date

**B. ADMISSION**
- Patient Zip Code
- Means of Transport to First Facility
  - Self/Family
  - Ambulance
  - Mobile ICU
  - Air
  - Time Estimated
- Transferred from Outside Facility
  - Yes
  - No
  - Means of Transfer
  - Time Estimated
- Admission Date
- Location of First Evaluation
- Admission Date
- Time of First Evaluation

**C. CARDIAC STATUS ON FIRST MEDICAL CONTACT**
- Symptom Onset Date/Time
- First ECG Obtained
- STEMI or STEMI Equivalent
  - Yes
  - No
  - ECG Findings
  - ST elevation LBBB
  - Isolated posterior MI
  - Time Estimated
- STEMI or STEMI Equivalent First Note
- Subsequent ECG
- Cardiogenic Shock
- Cocaine Use
- Heart Rate
- Systolic BP
Are There Other Benefits?
Registry Data for Completion of Maintenance of Certification

Search the Measures Library

Choose a measure from the set for which you will provide data. In this step in the PIMs, you would select the individual measures for which you will provide performance data. For this demonstration, you need select only one measure; however, you would be required to select at least three in the Self-Directed PIM. The completed Project PIM requires only one measure, but you may select more.

AMI: Acute Myocardial Infarction

- [ ] 30-Day Mortality Rate - Acute Myocardial Infarction
- [ ] 30-Day Readmission Rate - Acute Myocardial Infarction
- [ ] ACEI or ARB for LVSD
- [ ] AMI Inpatient Mortality
- [ ] AMI Perfect Care Bundle
- [ ] AMI Smoking Cessation

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Conclusions

• Participation in Mission:Lifeline has the potential to save lives!
• Regionalization of STEMI Care and Establishment of Protocols for STEMI-referring and STEMI receiving hospitals is key
  – Standardize care across the region
• Involvement of key stakeholders will increase the chance of success
• Data collection, review and directed QI projects are the real power of this project
Questions/Comments

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American Heart Association
MISSION: LIFELINE