Optimizing STEMI Systems of Care

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Disclosure

I have no disclosures
Time and Mortality in STEMI Patients

Shorter time from door-to-balloon (PCI) leads to lower risk of mortality

Longer D2B – higher mortality

Mortality, %

0 to 60 min | 15.4%
61 to 120 min | 23.3%
121 to 180 min | 28.1%
181 to 360 min | 30.8%

Terkelsen CJ JAMA 2010;304:763-771
Time from Symptom Onset to Treatment Predicts 1-year Mortality after Primary PCI

The relative risk of 1-year mortality increases by 7.5% for each 30-minute delay

Do whatever it takes to reduce time from symptom onset to ER arrival and time from ER arrival to PCI!

↑ Public awareness of MI Sx
CAD centers of excellence with lower DBTs and excellent outcomes
Regional coordination
Ambulance ECG telemetry
Ambulance/ER CCL activation
ICs sleep in hospital
Continual QI
Barriers to Timely Reperfusion

• The patient
  • Failure to promptly recognize symptoms
  • Hesitation to seek medical attention

• Time to transport
  • Mandated delivery to the closest hospital, regardless of PCI capabilities
  • Long transport in rural areas

• Decision process on arrival
  • Clot-busting drugs vs. PCI
  • Off hours
  • Transfer to PCI facility

• Time to implement treatment
  – Procedural factors
  • Team assembly
The Reality of Today’s Patients

• Not all STEMI patients call 9-1-1
  • 50% of STEMI patients present to their local emergency department (ED)
• “Walk-in” patients
• Rapid ECG
  – CODE 10 Established – ECG in under 10 minutes from time of arrival (DOOR TIME)
  – Operational Considerations
    • CODE 10 called overhead in ED
    • multiple available ECG machines
    • process in place to mobilize ECG machine and tech
    • training/competency of Emergency Care Techs to perform ECG
    • high priority of ED MD to read ECG
The Ideal Patient & System

• **Patients and the public:**
  • Recognize the symptoms of STEMI
  • Realize the importance of:
    • Activating emergency medical services (EMS) via 9-1-1 promptly
    • Getting treatment quickly

• **The ideal system:**
  • Promotes education efforts for the Emergency Medical System, the Emergency department personnel, cath lab staff, physicians and the patients.
  • Provides coordinated and patient-centered care
Transport: Patient to ED by Ambulance

- Coordination with Emergency Medical System
- 12 Lead ECG performed in field
  - Appropriate ECG machines on ambulance capable of transmitting clean tracing
  - Training/ competency of EMT to perform ECG
- EMS transmits to Base Hospital, BH contacts Cardiovascular Receiving Center (CVRC)
  - Our institution is both a BH and CVRC
- Radio call to ED
  - Notifies ED MD, ED RN, Activates CATH LAB – simultaneously
  - ED MD contacts ED CALL PANEL On Call Interventional Cardiologist
The Ideal Emergency Medical System (EMS)

• In an ideal system:
  • Ambulances are equipped with 12-lead ECG machines
  • EMS providers are trained to:
    • Use and transmit 12-lead ECGs
    • Care for STEMI patients
    • Provide feedback on performance and compliance with guidelines
  • Standardized point-of-entry (POE) protocols define patient transport rules
  • When there is STEMI, the cath lab is activated promptly
  • Patients transported to a STEMI-referral hospital remain on the stretcher with EMS present pending a transport decision
  • When “walk-in” patients present to a STEMI-referral hospital and require primary PCI, activation of EMS occurs
  • Hospitals close the communication gap with EMS
PROCESS: STEMI Presentation: EMS v. Walk-In

**EMS**

- STEMI Recognition by EMS Pre-Hospital Prior to “DOOR”
  - Education & Collaboration with EMS for timely and accurate 12 Lead ECG
- Pre-hospital activation of ED, CCU & CCL Team CODE STEMI
  - 30 minute arrival time
- ED MD interprets ECG upon pt. arrival, repeats if necessary.

**Walk-In**

- STEMI Recognition upon arrival of Walk–In CODE 10:
  - ECG within 10 min
- ED MD primary interpretation of ECG with *simultaneous* activation of IC and CCL TEAM
STEMI Treatment

GOAL: Achieve D2B < 90 minutes <60 minutes

• Key Criteria
  – Early activation
  – Door to Data/ECG < 10 min
  – Door to Decision < 15 min
  – Door to Cardiac Cath Lab (CCL) < 30 minutes
  – CCL door to Ready for Stick < 10 min
  – CCL door to BLN < 45 min
Early Data

AMI Door-To-Balloon % Compliance within 90 Mins

100% Top Decile Achievement
91.9% VBP Performance level

- 100%
- 93.1%
- 91.7%
- 91.0%
- 88.5%
- 87.5%
- 84.6%
- 82.6%
- 70%

HHI opens
D2B Outlier Root Cause Analysis Forwarded to MDs
CCL Team Called at same time of Interventionalist
"Handheld 90 min Countdown Timers"
Medic Recognition letters
ED STEMI Care Awards presented by HIM
STEMI Team Recognized posted daily
ED 12 Lead
Interventionalists 1st Responder

FY 2009 Q1 FY 2009 Q2 FY 2009 Q3 FY 2010 Q1 FY 2010 Q2 FY 2010 Q3 FY 2010 Q4 FY 2011 Q1 FY 2011 Q2 FY 2011 Q3 FY 2011 Q4
Dedicated Mobile Phones in ED For STEMI Notification

STEMI

- Programmed with IC Cell Numbers
- ED MD speaks directly with IC
- Program IC’s cell phones with ED Cell identifier as “STEMI”
Next Steps

Tracking Progress

Create evaluation mechanism to track progress and outcomes and give feedback.
# Primary PCI Data Collection Form

**This is NOT a Permanent Part of the Patient's Record**

## Data Element

<table>
<thead>
<tr>
<th>Date AND Time ED notified of patient arrival:</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrived by: EMS BLS Walk in</td>
<td></td>
</tr>
<tr>
<td>OCS-EMS Identification (run) #:</td>
<td></td>
</tr>
<tr>
<td>Medical Record #:</td>
<td></td>
</tr>
<tr>
<td>Patient Age: Male Female</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date &amp; time patient first arrives to Hoag:</th>
<th>&quot;Door to Data&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED Physician:</td>
<td>Hoag Goal &lt; 10 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initial ECG obtained: EMS Hoag</th>
<th>&quot;Door to Data&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1st ECG obtained</td>
<td>National Goal = 10 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEMI? Yes No</th>
<th>Hoag Goal &lt; 10 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>If EMS ECG, was the field interpretation confirmed? Yes No</td>
<td>Hoag Goal &lt; 10 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ED calls Perfect Serve to activate Call Team</th>
<th>Hoag Goal &lt; 15 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ED calls Interventional Cardiologist:</th>
<th>Hoag Goal &lt; 15 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Call Team arrival time to hospital:</th>
<th>Hoag Goal = &lt; 30 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cardiologist arrival time to hospital:</th>
<th>Hoag Goal = &lt; 30 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Patient ready for transport to CCL:</th>
<th>ED arrival to CVL arrival Hoag Goal = &lt; 40 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Patient arrives in CCL from ED (Please document if room not available.)</th>
<th>&quot;ED to lab&quot; Hoag Goal &lt; 5 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Patient ready - prepped &amp; draped</th>
<th>&quot;CCL door to ready&quot; Hoag Goal &lt; 10 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Local</th>
<th>Hoag Goal = 0 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Artery Open (time of 1st balloon inflation)</th>
<th>Hoag Goal = &lt; 45 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Culprit artery:</th>
<th>Hoag Goal = &lt; 45 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Immediate post-procedure pt disposition &amp;/or location:</th>
<th>Goal D2B = &lt; 90 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total ED door to balloon (D2B) time =</th>
<th>Goal E2B = &lt; 90 minutes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total EMS to balloon (E2B) time =</th>
<th>Goal E2B = &lt; 90 minutes</th>
</tr>
</thead>
</table>

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**Primary PCI Data Collection Form**

- Initiated Dec 2010
- Completed by designated CCL RN’s
- Reviewed and reported by AMI Team Leaders
- Immediate, real-time feedback for all
Door 2 Balloon Time (in Minutes)

Door 2 Balloon Time (in minutes)

60.0
53.5
55.0
57.5
51.0
57.0
56.0

2010
2011
2012
2013
2014
2015
2016
Partners for Success

• Patients and care givers
• EMS providers
• Physicians, nurses and other providers
• STEM-referral (non-PCI) hospitals
• STEMI-receiving (PCI-capable) hospitals
• Health systems
• Departments of health
• EMS regulatory authority / office of EMS
• Quality improvement organizations
• State and local policymakers
Summary- STEMI Management
