Reperfusion of Acute Myocardial Infarction in North Carolina Emergency Departments (RACE)

JAMA 2007; 298 (2):2371-2380
RACE

- Organized a state-wide system of care for STEMI
- Focus: to reduce time to PPCI for patients transferred from non-PCI hospitals to PCI hospitals
- Five regions
  - Rural and urban
  - 2/3 of state’s geography and hospitals
  - Each with a full-time RN regional coordinator
  - Representation at and support by the North Carolina Chapter of the ACC
RACE Regions and Hospitals According to Reperfusion System

RACE

• Hospital-specific reperfusion and/or transfer plan
• Partial financial support from each for their regional coordinator
• Data:
  – Enrollment period: 7/05 – 3/06
  – Post-intervention collection: 1/07 -3/07
  – Non-PCI hospitals: 10 consecutive STEMI pts before and after intervention
  – PCI hospitals: all consecutive patients (NRMI database)
RACE

• Pre-intervention
  – Non-PCI hospitals (518 pts)
    • 39.6% transferred for PPCI
    • 45% received lytics (96.1% subsequently transferred)
    • 15.4% did not receive reperfusion
  – PCI hospitals (579 pts)
    • 39.5% direct
    • 60.5% by transfer
• Post-intervention
  – Non-PCI hospitals (407 pts)
    • 45.9% transferred for PPCI
    • 39.1% received lytics (98.1% subsequently transferred)
    • 15% did not receive reperfusion
  – PCI hospitals (585 pts)
    • 46.7% direct
    • 53.3% by transfer
  – Summary: more PPCI; more transfers; ~ same # not receiving reperfusion
RACE

• Post-intervention
  – D2B times < 90 mins (direct): 56.7% before; 72.0% after
  – D2D2B median time (transfers): 165 mins before; 128 mins after
  – D2D2B median time (transfers from PPCI strategy hospitals): 149 mins before; 106 mins after
  – D in D out median time (transfers from PPCI strategy hospitals): 97 mins before; 45 mins after
  – D2N < 30 mins (lytics): 34.8% before; 51.9% after
RACE

• Biggest process changes
  – Establishment of a leadership team
  – Separate process to expedite getting ECG for CP in ED
  – Using EMS ECG to trigger
  – Hospital-specific reperfusion plan
  – Code STEMI
  – Standardized feedback for ED, EMS
  – Single call to activate
  – ED physicians can activate
  – Patient remains on stretcher in non-PCI hospital
  – Paramedic training in 12-lead ECG
Boston EMS Bypass

STEML Triage Plan & Treatment Registry

**Point of Entry:**
- Twelve lead ECG in field
- ECG categorized as “STEML”, “possible STEML”, or “non-STEML”
- Early notification (“STEML Alert”) & transport to PCI hospital
- Patient bypasses Emergency Department
- Receiving hospital never on diversion
- “Non-STEML” transport to nearest hospital (PCI capable or not)

Boston EMS Bypass

STEML Triage Plan & Treatment Registry

Median Door-to-Balloon Times (2003-2007)

* 2003 based on 6 months, 2007 includes first 3 months of 2008
Boston EMS Bypass

STEMI Triage Plan & Treatment Registry

Door-to Balloon Time \( \leq 90 \) Minutes (2003-2007)

% under 90 minutes

<table>
<thead>
<tr>
<th>Year</th>
<th>% Under 90 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003 (n=28)*</td>
<td>46%</td>
</tr>
<tr>
<td>2004 (n=42)</td>
<td>64%</td>
</tr>
<tr>
<td>2005 (n=54)</td>
<td>72%</td>
</tr>
<tr>
<td>2006 (n=49)</td>
<td>78%</td>
</tr>
<tr>
<td>2007 (n=55*)</td>
<td>89%</td>
</tr>
</tbody>
</table>

* 2003 based on 6 months, 2007 includes first 3 months of 2008
MEMORANDUM

Circular Letter: DHCQ 08-05-486

To: All Ambulance Services
    Acute Care Hospital Chief Executive Officers
    Acute Care Hospital Directors of Emergency Services
    EMCAB Members

From: Paul I. Dreyer, Ph.D., Director
      Bureau of Health Care Safety and Quality

      Jon Burstein, M.D., FACEP, Medical Director
      Office of Emergency Medical Services

      Abdullah Rehayem, Director
      Office of Emergency Medical Services

Re: Implementation of Statewide STEMI Triage (Point-of-Entry) Criteria

Date: May 5, 2008
The MHI Level 1 MI Program Pioneer
“5 Years Later”

Tim Henry, MD
Director of Research
Minneapolis Heart Institute Foundation
“MHI Level 1 MI” Program

- Based on the Trauma system
- Goals
  - Standardize care
  - Improve outcomes
  - Research network of community/rural hospitals
  - Implementation of new data
  - Quality improvement program
- To allow safe transfer of STEMI pts for Primary or Facilitated PCI, with a door (1st medical contact) to balloon time <120 min.

AHJ 2005;150:373
MHI Level 1 MI Program

Minneapolis Heart Institute/Abbott Northwestern Hospital
50 Cardiovascular Specialists

High Volume Cardiac Center
2500 PCI/year
600 STEMI-PCI/yr
10 Interventional Cardiologists

Referral Relationship with 35 Community Hospitals in Minnesota and Wisconsin
Level 1 MI Program

- STEMI diagnosis by emergency physician
- Single phone call to activate system
- 31 hospitals trained
- 1692 consecutive patients over 54 months (775 Zone 1, 557 Zone 2, 360 AN)
- Currently 50+ patients/month
- **Inclusion:** STEMI < 24 hours or New LBBB
- **Exclusion:** None (including out-of-hospital cardiac arrest and cardiogenic shock)

Circulation 2007;116:721
Red– Zone II (90-120 mins)
Blue– Zone I (< 90 mins)
# Level 1 MI Treatment Times

<table>
<thead>
<tr>
<th>Minutes (median)</th>
<th>In door 1 outdoor 1</th>
<th>Transport time</th>
<th>In door 2 - balloon</th>
<th>Total In door to balloon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone I (n=775)</td>
<td>49 (36,66)</td>
<td>22 (16,31)</td>
<td>21 (16,28)</td>
<td>95 (82,116)</td>
</tr>
<tr>
<td>Zone II (n=557)</td>
<td>60 (48,83)</td>
<td>35 (26,49)</td>
<td>19 (15,25)</td>
<td>122 (101,151)</td>
</tr>
<tr>
<td>AN (n=360)</td>
<td>NA</td>
<td>NA</td>
<td>65 (47,83)</td>
<td>65 (47,83)</td>
</tr>
<tr>
<td>DANAMI (n=567)</td>
<td>50 (39-65)</td>
<td>32 (20-45)</td>
<td>26 (20-38)</td>
<td>108</td>
</tr>
</tbody>
</table>
MHI Level 1 MI: Door – Balloon Times

% of patients

ANW | Zone 1 | Zone 2 | NRMI 3/4

< 90 mins | <120 mins

< 90 mins
<120 mins
% of patients
0 10 20 30 40 50 60 70 80 90 100

< 90 mins
<120 mins