STEMI and Stroke Systems of Care: The Mississippi Experience

DR. HARPER STONE
PRESIDENT, MHCA
Disclosures

Nothing to disclose
In The Beginning….

- August 2009: founded with 5 hospitals
- March 2017: our membership includes 20 PCI Centers and 65 Stroke Hospitals
Mission: Improve the health status of Mississippians

Vision: Unite stakeholders to bring about an alignment of efforts that reduce morbidity, mortality, and cost associated with problematic disease process that plague our community.
Primary Goals We Set and Are Meeting

1. Creation of collaborative quality improvement efforts involving Mississippi Hospitals, EMS Services, & medical professionals

2. Development of state and regional network of hospitals and EMS services based on best care protocols

3. Institutional level heart attack and stroke teams used to collect, analyze and react to quality outcomes
Areas of Focus

**Phase I:** Primary PCI Hospital Implementation

**Phase II:** Non PCI Hospital Implementation

**Phase III:** EMS

**Phase IV:** Public Education Campaign

“Dial Don’t Drive”
Phase I: Primary PCI Hospital Implementation

- Basic requirements/capabilities
- Standardized drug protocols
- Involvement of all Mississippi PCI hospitals;
  Policy of Inclusion
- Regional Coordinators/Regional Leadership
1. Institution specific written STEMI care plan/protocols to achieve rapid primary PCI (D2B < 90 minutes >90%)
2. ED ECG < 10 minutes
3. 24/7 primary PCI capability within 30 minutes
4. ED physician activates the STEMI team
5. Single call activation of the STEMI team (immediate)
6. Universal acceptance of STEMI transfers (regardless of bed availability/no diversions for STEMI patient)

7. Ongoing data monitoring/quality improvement (ACTION GWTG)

8. Multidisciplinary STEMI Committee: Cardiology Champion, ER Physician, Quality, Administration, CL Nurse, ER Nurse

9. Ongoing STEMI education: EMS, Emergency Department, CCL

10. Feedback to Non PCI hospitals

11. Commitment to improve STEMI care for all hospitals regardless of affiliation
Phase II: Non PCI Hospital Implementation

- MHCA Introduction Letter/Invitation to join (70 Non PCI hospitals)
- Survey of current practices in Non PCI Hospitals
- Basic Requirements
- Education/Training: Regional and Statewide Symposiums
  - Standardized Protocols
  - Transportation Protocols
  - EMS
  - Data Collection/ACTION GWTG Registry
  - Standardized PPT Presentations
Non PCI Hospital Requirements

- Written institute specific plan for early identification and management of STEMI patients: parallel processes
- Standard orders and drug protocols
- Standardized reperfusion STEMI care protocol that designates primary PCI as preferred strategy if D2B <120 minutes from FMC
- Standardized reperfusion STEMI care plan that designates fibrinolysis when D2B<120 minutes from FMC not obtainable
- Streamlined standardized protocol for rapid transfer and transport of STEMI patient to primary PCI hospital regardless of POE: direct transfer to CCL
The Ideal Non PCI Hospital

- Early STEMI identification: ECG < 10 minutes
- Parallel Processes:
  - Goal: Door in – Door out < 30 minutes for transfer patients
  - Goal: Door to Needle of < 30 minutes for fibrinolytic patients
  - Data Transfer: Fax Face sheet, Lab, ECG directly to CCL
## 20 PCI Hospitals

### NORTH (7)
- Baptist Desoto
- Baptist Golden Triangle
- Baptist Oxford
- Delta Regional
- North MS Med Ctr
- Magnolia Regional
- Methodist Olive Branch

### CENTRAL (7)
- Anderson Regional
- MS Baptist Med Ctr
- Merit Health Central
- Merit Health River Region
- Rush Foundation
- St. Dominic
- UMMC

### SOUTH (6)
- Forrest General
- Memorial @ Gulfport
- Merit Health Wesley
- Singing River Health System (Ocean Springs; Pascagoula)
- Southwest Regional
STEMI PROTOCOLS

**STEMI – Primary PCI Protocol**
MHCA Approved for Non PCI Hospitals

- Activate referral PCI hospital and EMS
- Monitor, Oxygen, IV with saline
- Nitroglycerin 0.4 mg SL (repeat as needed or IV)
- Aspirin 325 mg po chew and swallow
- Second Anti-platelet Agent (PICK ONLY ONE)
  - Ticagrelor (Brilinta) 180 mg po (PREFERRED)
  - Clopidogrel (Plavix) 600 mg po
- Heparin 60 units/kg IV bolus (max 4000 units)
- Morphine sulfate IV as needed for pain
- Attach hands-free defibrillator pads
- Transfer to PCI hospital
- Door-in to door-out goal is less than 30 minutes

**STEMI - Lytic Protocol**
Recommend lytic therapy when First Medical Contact to PCI is anticipated to be > 120 minutes
MHCA Approved for Non PCI Hospitals

- Activate referral PCI hospital and EMS
- Monitor, Oxygen, IV with saline
- Nitroglycerin 0.4 mg SL (repeat as needed or IV)
- Aspirin 325 mg po chew & swallow
- Clopidogrel (Plavix)
  - Age ≤ 75 yrs: 300 mg
  - Age > 75 yrs: 75 mg
- TNKase (tenecteplase):
  - <60 kg: 30 mg
  - 60-69 kg: 35 mg
  - 70-79 kg: 40 mg
  - 80-89 kg: 45 mg
  - >90 kg: 50 mg
- Heparin 60 units/kg IV (max 4000 units) BOLUS, THEN 12 units/kg/hr INFUSION (max 1000 units/hr)
- Morphine sulfate IV as needed for pain
- Attach hands-free defibrillator pads
- Transfer to PCI hospital
It is imperative for EMS to be able to cross county lines when necessary for reperfusion.

EMS services should cross-cover for adjacent EMS in another county.

STEMI should take priority over many non-life threatening medical conditions.
EMS Requirements

- Ambulance services should obtain EKG within 15 minutes (typical ACS 30 and older, atypical 50 and older)

- Initiate EMS early notification to PCI hospital

- + EKG patients directly to PCI hospital if 90 minutes window obtainable from first med contact to PCI or if shock or thrombolytic contraindicated

- If patient stops at non-PCI hospital then patient must be treated on stretcher for EKG/results + transferred to PCI hospital with SAME ambulance
Mississippi Healthcare Alliance
THEN and NOW.....
Median Delay Time From Symptom Onset to First Medical Contact

- MS POV: 128 (2010Q1), 52 (2016Q4)
- Nation POV: 116 (2010Q1), 111 (2016Q4)
- MS EMS: 57 (2010Q1), 53.5 (2016Q4)
- Nation EMS: 52 (2010Q1), 50 (2016Q4)
First EKG Obtained Prehospital: STEMI

Percent

<table>
<thead>
<tr>
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<th>2010Q1</th>
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<td>MS</td>
<td>40</td>
<td>90</td>
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<tr>
<td>Nation</td>
<td>53</td>
<td>86</td>
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Mississippi Healthcare Alliance
Median Length of Stay at Referral Hospital: STEMI Patients

- **2010**
  - MS Median: 89.5 minutes
  - Nation Median: 66.5 minutes

- **2016**
  - MS Median: 58 minutes
  - Nation Median: 58 minutes
Arrival to PCI <=90Minutes (Door to Balloon)

Percent of Admissions

- **2010Q1**
  - Direct Presentation: 65%
  - Walk-In: 91%

- **2016Q4**
  - Direct Presentation: 93%
  - Walk-In: 91%

- **2016Q4**
  - Direct Presentation: 98%
  - EMS: 98%

MS vs Nation
EMS First Medical Contact to PCI ≤90 Minutes

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<tr>
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<th>2010Q1</th>
<th>2016Q4</th>
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<tr>
<td>Nation</td>
<td>48</td>
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Median Time from FMC to PCI

- **MS Median**
  - 2010: 103 minutes
  - 2016: 79 minutes

- **Nation Median**
  - 2010: 91 minutes
  - 2016: 79 minutes
In-hospital Mortality: STEMI

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<tr>
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<th>Nation</th>
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<tbody>
<tr>
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<td>6.8</td>
<td>5.8</td>
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<td>2016</td>
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MSDH Collaboration with MHCA STEMI Committees

- Elected members meet quarterly at MSDH in Jackson

STE MI PI Committees Objectives
  - Confidentially review unblinded data from ACTION Registry GWTG for STEMI
  - Provide feedback as needed for systems improvement at local level

STE MI Advisory Committees Objectives
  - Provide guidance and technical advice in the implementation and execution of the state STEMI plans
Prior to the STEMI System of Care adoption by MSDH in 2011, MS STEMI mortality was ABOVE that of the national average.

- MS has seen a 19.5% decrease in heart disease deaths from 2004-2015:
  - Female death: down 21.7%
  - Black females: down 23.5%
  - White females: down 21.6%
  - Male death: down 18.0%
  - White males: down 18.8%
  - Black males: down 18.4%
Stroke System of Care

- Adopted by MSDH 2013
- 3 Regional Rollouts to State 2014
- Self Designation of Level 1, 2, 3 began 2015
- GWTG-Stroke Registry for PI
- 2016 now composed of:
  - 2 Level 1 hospitals
  - 8 Level 2 hospitals
  - 55 Level 3 hospitals
Level 1—Comprehensive Stroke Center

Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical, surgical, and interventional vascular care. The team consists of a **neurologist, neurosurgeon, and endovascular specialists**.

Fully equipped Emergency Department (ED) for rapid diagnosis and treatment using standard **CT imaging within 25 minutes** and ability to have results reported within 45 minutes of test completion. Lab services available 24/7 with appropriate result reporting.

**Neurology, Neurosurgery, and Endovascular specialists available 24/7.**

**Intensive Care** capability available with critical care specialist available 24/7.

**Complete rehabilitation services** (physical therapy, occupational therapy, and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.

Readily available for transfer of patient from field or lower care facility.

Maintenance of adequate **helicopter landing site** on campus.

**Operating room** and appropriate support staff available **24/7** for emergency surgery when necessary. Radiologic and **diagnostic imaging** with expedited reporting available **24/7**, this should include angiography with endovascular capabilities.

**Must participate in the American Heart Association (AHA) “Get With The Guidelines” (GWTG) Stroke Registry.** A multi-disciplinary quality improvement team, should meet at least quarterly to review data and lead quality improvement initiatives.

Stroke team members must document at least eight hours of Continuing Medical Education (CME) annually.

Community and professional educational projects should be ongoing.
Level 2 -- Primary Stroke Center *(must have all of the requirements of Level 1 EXCLUDING endovascular capabilities)*

- Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical and surgical care. The team consists of a diagnostic radiologist, neurologist, and neurosurgeon. Fully equipped ED for rapid diagnosis and treatment using standard CT imaging within 25 minutes and ability to have results reported within 45 minutes of test completion.

- Lab services available 24/7 with appropriate result reporting.

- Radiology, Neurology, and Neurosurgery specialists available 24/7.

- Intensive Care capability available with critical care specialist available 24/7.

- Complete rehab services (physical therapy, occupational therapy and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.

- Readily available for transfer of patient from field or lower care facility.
• Maintenance of adequate helicopter landing site on campus.
• Operating room and appropriate support staff available 24/7 for emergency surgery when necessary.
• Radiologic and diagnostic imaging with expedited reporting available 24/7.
• Must participate in the AHA GWTG Stroke Registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.
• Stroke team members must document at least eight hours of CME annually.
• Community and professional educational projects should be ongoing.
Level 3—Stroke Capable Hospital
(must have the ability to diagnose and stabilize patient for transfer to Level 1 or 2 Referring Center)

- ED physician, other qualified physician, or physician extender available 24/7 to diagnose and initiate appropriate treatment.
- Rapid diagnosis and treatment using standard CT imaging within 25 minutes and ability to have results reported within 45 minutes of test completion.
- Lab services available 24/7 with appropriate result reporting.
- Acute stroke-trained providers should be available 24/7 to direct IV Alteplase (t-PA) administration.
- Transition plans must be established for rapid transfer of patient to Level 1 or 2 Stroke Center. Factors that may necessitate transfer include:
  - Consider utilizing “Drip and Ship” after initiation of Alteplase if neurosurgery coverage is not available.
  - Patients with rapid clinical decline.
  - Patients without response to IV Alteplase or outside IV Alteplase window who may benefit from neuro intervention.
  - Other factors as clinically necessary.
- Must participate in the AHA GWTG Stroke Registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.
- Community and professional educational projects should be ongoing.
Level 4—Non Stroke Hospital

- Facility is able to assess and evaluate for possible stroke, but lacks essential components to treat patient with IV thrombolytics.
- Transition plans must be established to facilitate rapid transfer of patient to Level 1 or 2 Stroke Center.
- May be bypassed in accordance with this plan or an EMS Medical Control Plan.
Stroke Alert Protocol for MS Hospitals

Stroke Alert Protocol for Mississippi Stroke System of Care Hospitals

Patient presents to ED with signs/symptoms of stroke AND Time Last Known Well is determined to be within 6 hours

10 min
- Activate Stroke Alert
- MD Assessment
- NIHSS Score
- Review Attestation Inclusion/Exclusion Criteria
- Obtain Weight

25 min
- Non-Contrast CT

45 min
- Treatment Decision is Made
- Not a candidate for alteplase or interventional care
- Alteplase Candidate: NIHSS >= 6, NIHSS <= 10, score drop of 5 or greater score drop in NIHSS score if >10
- Transferred to Level 1 facility with interventional capability
- Transferred to Level 1 facility with interventional capability
- Transferred to closest Level 1 facility

90 min
- Patient for medical management; consider transfer to higher level of care within system if medically necessary
- Transfer to closest Level 1 facility
- Transfer to closest Level 1 facility

*Transfers should be made to hospitals participating in the Mississippi System of Stroke Care. Consider ground vs. air transport based on time and acuity of patient.
Pre-hospital Stroke Protocol
1) Initial assessment, transport ASAP:
   ABCs
   Obtain time of symptom onset (Last time known well) __________; Source of information ________________________________; Contact information:____________
2) Administer high concentration oxygen, as needed, to maintain O2 Sat >94 percent.
3) Position patient with head/shoulders elevated to 15-30 degrees (unless contraindicated).
4) Maintain NPO.
5) Blood glucose < 60, treat per protocol.
6) Do not treat high blood pressure without physician approval.
7) Perform Stroke Scale – Cincinnati Stroke Scale.
8) Transport patient to the appropriate facility:
   a. Transport patient to the closest hospital capable of treating the patient with IV Alteplase (Stroke Capable or Primary/Comprehensive Stroke Center). Hospitals not able to diagnose and treat stroke patients (Level 4 hospitals) may be bypassed. EMS may use discretion based on transport time or other unforeseen factors.
   b. Consider transport of the stroke patient with severe symptoms (hemiplegia, aphasia, neglect, stably intubated) to a Comprehensive Stroke Center if symptom onset to hospital arrival time is greater than 3 hours and less than 6 hours.
   c. Transport patient to the closest appropriate facility if unstable (e.g., cardiac arrest, unstable airway).
9) IV NS KVO once en route.
10) EKG once en route.
11) Notify receiving facility of estimated arrival time of acute stroke patient, Stroke Scale finding, and time of onset.
Mode of Arrival EMS: STROKE

Percent

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Door to Needle Time <=60 Minutes: Stroke

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<td>73</td>
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<tr>
<td>2016</td>
<td>63</td>
<td>78</td>
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Thrombolytic Therapies: Stroke

Comparison of MS and Nation Percentages:
- 2Q2014: MS 12.6%, Nation 13.4%
- 4Q2016: MS 17.3%, Nation 16.7%
In-hospital Mortality: Ischemic Stroke

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<th>4Q2016</th>
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MS | Nation
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- **Confidentially review unblinded data from GWTG-Stroke registry for Stroke**
- **Provide feedback as needed for systems improvement at local level**

Stroke Advisory Committees Objectives
- **Provide guidance and technical advice in the implementation and execution of the state Stroke plans**
ACUTE STROKE LIFE SUPPORT (ASLS) TRAINING

- MHCA supported in all 3 regions of the state
- University of Miami Gordon Center approved ASLS Training Centers in Tupelo, Jackson, and Pascagoula
- Course offerings posted on MHCA website [www.mshealthcarealliance.org](http://www.mshealthcarealliance.org)
- FREE to participants
CPR IN SCHOOLS

- Grant to AHA for “Hands Only” CPR Training in public schools
- “Training-the-Trainer” across MS January 2017
- Training report expected May 2017
- Reusable kits
Future Project Plans for MS

- Out of Hospital Cardiac Arrest (OHCA) and
- Targeted Temperature Management (TTM)
  - 75% of PCI centers currently have capability of TTM; goal 100% of our hospitals performing TTM
  - Hospital Protocols for transfer patients that have OHCA to transfer to PCI hospital will be developed
  - Continue with CPR in Schools to train 30,000 students yearly
Thank you!

To EMS, Hospitals, and Healthcare Providers for all your outstanding teamwork to improve healthcare

www.mshealthcarealliance.org