Attribution

The following presentation originates from Ms. Lourdes Lorenz, RN, MSN.

There may be some modifications in the original presentation in order to address the WCU EMC curriculum.

Any significant modifications in the original slides will be noted as such.

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RACE Rationale

- Acute MI is the #1 killer in North Carolina.
- Reperfusion therapy (and especially rapid primary PCI) saves lives in ST-elevation MI (STEMI)/New LBBB patients.
- In North Carolina, reperfusion therapy is being given too seldom and too late.
- Improving systems of care for acute MI has become a national priority.
- RACE provides opportunity in NC to work with regional leaders of EMS, emergency medicine, cardiology, and American College of Cardiology.
- RACE is supported by Blue Cross Blue Shield Foundation, to improve care and save lives.

AMI Reperfusion in North Carolina

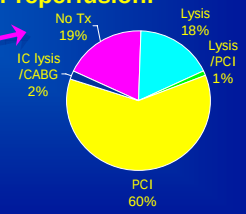
ST elevation eligible for reperfusion:

NRMI 5

19% not treated

NC Medicare

Up to 50% not treated



NRMI 5 December 2004 n=70,468

Importance of Early Reperfusion Therapy in STEMI

Outcomes Dependent Upon:

- Time to treatment: TIME IS MUSCLE !!!
- Early and full restoration in coronary blood flow
- Sustained restoration of flow

Primary Goal In STEMI: Achieve Coronary Patency

Class I

All patients should undergo rapid evaluation for reperfusion therapy & have a reperfusion strategy implemented promptly after contact with the medical system.

3 Major Options:

1) Pharmacological Reperfusion
2) Primary PCI (Percutaneous Coronary Intervention)
3) Acute Surgical Reperfusion

Antman et al. JACC 2004; 44:680.

Selection Criteria for Reperfusion Strategy

- Time from Onset of Symptoms
- High Risk STEMI (eg-cardiogenic shock)
- Risk of Bleeding
- Time Required for Transport to a Skilled PCI Lab

Antman et al. JACC 2004;44:682.

2004 ACC/AHA STEMI Guidelines

Fibrinolysis :

- Early presentation
- Invasive strategy not an option
- Delay to Invasive Strategy

ACC/AHA STEMI Guidelines, 2004

Pharmacological Facilitation of Primary Percutaneous Coronary Intervention for Acute Myocardial Infarction

Is the Slope of the Curve the Shape of the Future?

Bernard J. Gersh, MB, ChB, FRCP
Gregg W. Stone, MD
Harvey D. White, DSc
David R. Holmes, Jr, MD

Current options for reperfusion therapy in patients admitted to a community hospital without cardiac catheterization facilities include administration of fibrinolytic drugs followed by observation, with referral to angiography driven by symptoms and signs of ischemia; transfer to a tertiary care center for primary percutaneous coronary intervention (PCI); or a strategy of facilitated PCI

"Among patients presenting very early (within 60 minutes after symptom onset), outcomes with fibrinolytic therapy alone are excellent, and it will be difficult for any other strategy to result in a significant improvement." [2005]

JAMA 2005;293:979-986

2004 ACC/AHA STEMI Guidelines

Invasive strategy generally preferred if:

- Skilled PCI lab available with surgical backup
- High risk STEMI
- Contraindication to fibrinolytics
- Late presentation
- Diagnosis in doubt

ACC/AHA STEMI Guidelines, 2004

2004 ACC/AHA STEMI Guidelines

"The availability of interventional cardiology facilities is a key determinant of whether PCI can be provided. For facilities that can offer PCI, the literature suggests that this approach is superior to pharmacological reperfusion."

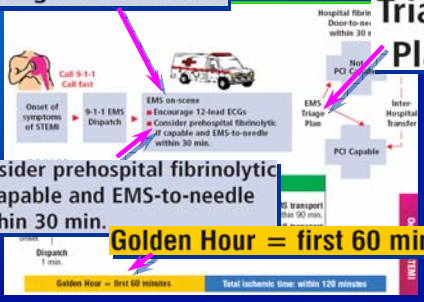
ACC/AHA STEMI Guidelines, 2004

ACC/AHA Guidelines 200

EMS Triage Plan

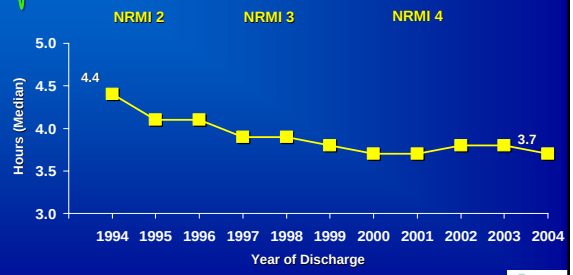
- Encourage 12-lead ECGs
- Consider prehospital fibrinolytic if capable and EMS-to-needle within 30 min.

Golden Hour = first 60 minutes



JACC 2004;44:686.

Median Symptom-Onset to Balloon Times: NRMI 2,3,4



Used by permission, Dr. William French

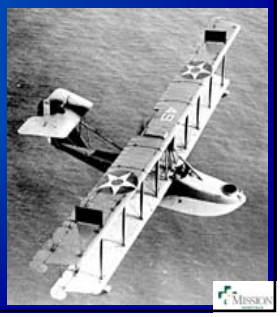
North Carolina EMS Milestones

1910

1st air ambulance built in NC

1917

Earliest air ambulance rescue service (Outer Banks to Norfolk hospitals)



North Carolina EMS Milestones

1968

One of the 1st Paramedic training programs in U.S.

Haywood County, North Carolina

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North Carolina EMS Milestones

1968

Dr. Ralph Feichter, Waynesville Internist

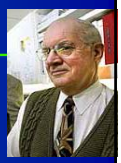
+ Rescue Squad Volunteers

intensive training in cardiac pathophysiology, electrocardiography, arrhythmia recognition, pharmacology (cardio-active drugs) and CPR.

+ 2 Mobile Intensive Care Vehicles

Best EMS AMI System

Seattle Medic One



- System of prehospital emergency cardiac care established in 1970*
  - Michael Copass, MD, Harborview ED
    - Strong medical direction
    - EMT-P
      - QA / accountability
      - Feedback

* *modified*

"Triple 7 rule"

7 minutes to get there, 7 minutes on scene, 7 minutes to the hospital.

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Barrier to Reperfusion: The System

- Reimbursement/Lack of Integrated Healthcare System
- Inter-facility Transfer Issues
- Lack of Standardized Protocols/Care Pathways/ Standing Orders
- Ambiguity of Leadership

RACE

The ***system*** is as important as the regimen!

Patient → Provider → Treatment

Health Services and Outcomes Research

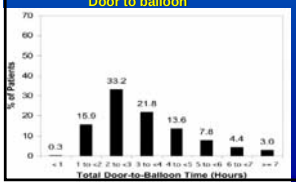
Times to Treatment in Transfer Patients Undergoing Primary Percutaneous Coronary Intervention in the United States

National Registry of Myocardial Infarction (NRMI)-3/4 Analysis

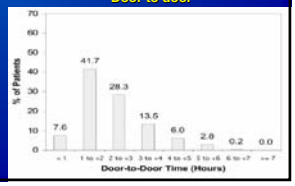
Brahmajee K. Nallamothu, MD, MPH; Eric R. Bates, MD; Jeph Herrin, PhD; Yongfei Wang, MS; Elizabeth H. Bradley, PhD; Harlan M. Krumholz, MD, SM; for the NRMI Investigators

95.8% of patients treated after 90 minutes

Door to balloon



Door to door



NRMI-5: North Carolina

	NC	Nation	Guidelines
N	2,738	79,927	
% eligible treated	81%	80%	
Door-balloon	101 min	100 min	<90 min
11PM to 7AM	107 min		
Weekend	105 min		
Transfer			
1st door – balloon	191 min	165 min	<90 min
1st d-b <90 min	0.8%	5.5%	100%

Achieving Door-to-Balloon Times That Meet Quality Guidelines
How Do Successful Hospitals Do It?

11 best NRMI hospitals (includes Mission Hospital):

Performance + Improvement (2001-2002)

(122 staff interviewed)

Key aspects to success:

1) Prehospital ECG
2) ED independently makes decision to engage cath team
3) Interdisciplinary team

Bradley BH, Krumholz H, et al. Journal of the American College of Cardiology. 2005

RACE Objectives

Improve the public health of North Carolinians:

1. Reduce the STEMI population untreated with reperfusion by 20%.
2. Increase speed of reperfusion toward national benchmarks (90 minutes door to balloon and 30 minutes door to drug).
3. Create regional systems of acute MI care with emergency departments throughout North Carolina.
4. Educate hospital and emergency personnel about national guidelines for AMI reperfusion therapy.

RACE Manual

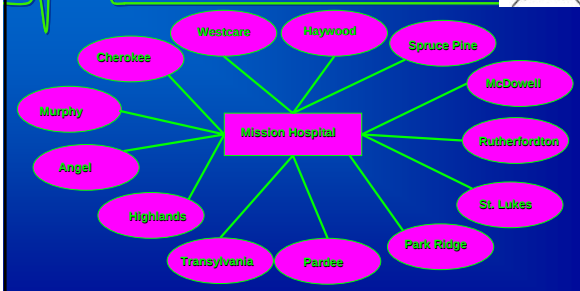
Optimal System Specifications by Point of Care:

- EMS
- ED
- Transport system
- Receiving hospital
- Cath Lab
- Payers, regulators, government

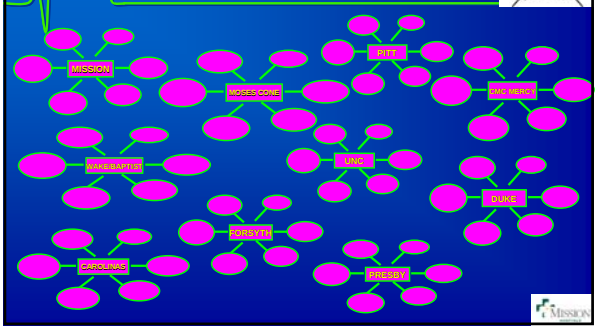
Pilot Interventions — *RACE* Study Interventions

- Initial evaluation of current approach to reperfusion therapy
- EMS and ED-specific intervention (i.e., ***pre-hosp ECG***, ***communication*** from field to ED, ECG machine in ED, education on STEMI presentation, ECG interpretation, current ACC/AHA guidelines)
- RACE posters and standing orders in EDs
- Hot-Line call/ECG fax to ED when STEMI identified; decision for immediate fibrinolytics or transfer; identify best transport; activate catheterization lab
- Monitor times and outcomes

RACE PLAN



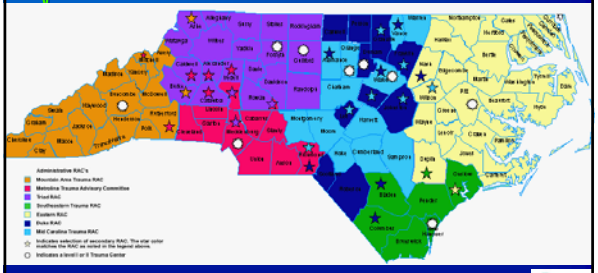
State *RACE*



State *RACE*

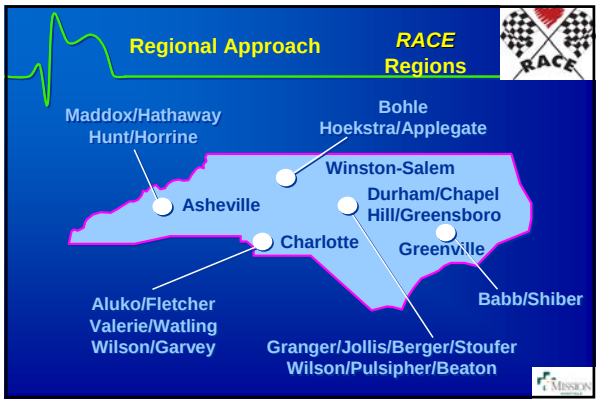
10 Tertiary Centers
x 5-10 Referral Sites/Center
60-110 RACE Teams!!!

North Carolina Trauma Centers Regional Advisory Committee (RAC)



Learn from the established Trauma Response System

Regional Approach — *RACE* Regions



RACE Tertiary Centers

RACE Zones	Tertiary Centers
ASHEVILLE	Mission Hospital
CHARLOTTE	Carolinas Medical Center CMC-Mercy Presbyterian Hospital
DURHAM/CHAPEL HILL GREENSBORO	Duke University Medical Center University of NC Medical Center Moses Cone Hospital
GREENVILLE	Pitt County Hospital
WINSTON-SALEM	Forsyth Medical Center Wake Forest University/Baptist Medical Center

RACE Interventions

Goal:

Develop hospital by hospital customized plan to optimize early and effective reperfusion therapy through:

- Treatment algorithms
- Education
- Transfer Protocols
- Small grants for equipment needs
- Code MI "Hotline"

RACE Interventions

- EMS/Pre-hospital care initiatives
  - Pre-hospital ECG, exclusion criteria assessment, organization of EMS to break down artificial county barriers to coordinated care
- Enhancement of AMI pathways for each emergency department
  - Order sheets, posters, information packages, necessary equipment, drugs, personnel availability
- Guideline-focused conferences
- More efficient infrastructure for the treatment of thrombolytic ineligible patients
- 24/7 interventional site availability and expedient transfer when required (including for all lytic-ineligible patients)

RACE Partners

MISSION HOSPITALS

BlueCross BlueShield of North Carolina

North Carolina Chapter

American Heart Association. Learn and Live.

North Carolina EMS Office of EMS

American College of Cardiology Foundation

NRMI

Duke Clinical Research Institute
DUKE UNIVERSITY MEDICAL CENTER

RACE
EMS Planning and Tracking

- Create EMS, ED, Cardiology, Nursing RACE Team with committed Leadership.
- Use local EMS to transport pts within 50 miles
- Keep patient on local-EMS stretcher.
- Prehospital ECGs for all Chest Pain Patients [Also: cc-based EKG – Graff L *Ann Emerg Med* 2000 36(6): 554-60]
- Paramedic 12 Lead ECG.
- Ability to cross county lines.

RACE EMS Tracking

- RACE-paramedics recognize ST-elevation on 12 lead
- 'Pre-destination Protocol' : establish EMS destination for STEMI patients.
- Trauma model: as in trauma, special designation for STEMI patients (i.e. Code STEMI).
- Record Calls and Playback for QI.
- Provide standardized feedback/ongoing ECG/STEMI training for EMS.

Strategies to Reduce Door-to-balloon Time for Acute MI *N Engl J Med* 2006 (Nov 30)

Mean reduction in door-to-balloon times by strategy

Strategy	Reduction in door-to-balloon time (min)
• Having ***ED physicians*** activate cath lab	8.2
• Use of central page operator who, with a single call, activates cath lab team	13.8
• Use of ***prehospital EKG*** transmission to activate the cath lab while pt still en route	15.4
• Expecting entire cath lab team to arrive within 20 minutes after page	19.3
• Having attending cardiologist always on site	14.6
• Real-time ***feedback*** to staff (ED, cath lab,..)	8.6

not part of RACE presentation

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So What Are We Waiting For?

- Several factors may have accounted for the delay in treatment.
- Hospitals without cardiac catheterization laboratories should recognize their limitations when making treatment decisions for each patient. In particular, ***timeliness in transferring*** patients is of paramount importance.
- Numerous approaches have been suggested to ***reduce door-to-balloon time***, focusing on logistical and organizational issues (Bradley).
- Likely, these improvements will provide a better outcome for transfer patients as well.
- Currently, there is a call to optimize care for patients with acute STEMI in the US by … demolish[ing] barriers so that primary ***angioplasty can become widely available*** and the procedure conducted by experienced operators in accredited institutions within the prescribed quality standards (Jacobs).
- The wait for long-term data for transfer primary angioplasty may be over, but the wait for these patients receiving treatment must now be shortened.
- To deliver prompt, synchronous, coordinated, and premium care to this high-risk group of patients will require strong political will, judicious deployment of resources, and ***seamless integration of emergency medical services with hospitals***. (Koon-Hou Mak *EHJ* 2007)

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RACE Summary

- There is need for improvement in current AMI care in the United States and especially in North Carolina.
- Changes need to occur not only in specific treatment modalities, but also in the **SYSTEM**.
- RACE will address both the lack of treatment for eligible patients and the unnecessary delays caused by inefficient systems.

Notes

- Bradley EH, et al . Strategies for reducing the door-to-balloon time in acute myocardial infarction. *N Engl J Med* 355:2308–2320 (2006)
- Koon-Hou Mak . Benefits of transfer primary angioplasty are durable, so why are we waiting? *EHJ* 2007 28:6 655-656. Editorial responding to:
- Widimsky P, et al. Long-term outcomes of patients with acute myocardial infarction presenting to hospitals without catheterization laboratory and randomized to immediate thrombolysis or interhospital transport for primary percutaneous coronary intervention. Five years' follow-up of the PRAGUE-2 trial *EHJ* 2007 28:6 679-684
- Jacobs AK, et al . Recommendation to develop strategies to increase number of ST-segment-elevation myocardial infarction patients with timely access to primary percutaneous coronary intervention. The American Heart Association's Acute Myocardial Infarction (AMI) Advisory Working Group. *Circulation* (2006) 113:2152–2163
- The "ACC/AHA Guidelines for the Management of Patients with STEMI--'Executive Summary" are posted on the ACC web site (www.acc.org) and have been published in ***Circulation 2004;110(5):588-636. August 3 issue.*** and published in ***JACC 2004;44 (3):671-719. August 4, 2004 issue.*** The full text guidelines are now available on the web http://www.acc.org/clinical/guidelines/stemi/index.pdf.

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