





## **RACE COORDINATOR MEETING**

**North Carolina Mission: Lifeline and RACE CARS**

**Moving STEMI and Cardiac Arrest Care into the  
Future**

<https://cee.dcri.duke.edu/>



# Mission Lifeline and RACE CARS

- Discuss the concept of regionalization
- Review the role of the RACE Coordinator
- Apply concepts, learned in this meeting, to your regional process improvement efforts for STEMI and Cardiac Arrest



# Introductions:

- Race Coordinators
  - West
    - Julie Nelson
  - East
    - Nick Jarman
- Community Coordinator
  - Kathy Montero

# Regionalization:





# Definition of Regionalization:

- is a systematic method of bringing patients
  - from a defined geographic region
  - in need of specialized, specific emergent medical or surgical care
  - to designated facilities with the capabilities and resources immediately available to provide such treatment.

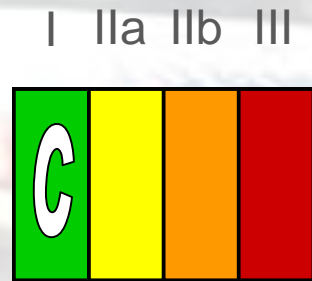
# Systems of Care

Each community should develop a STEMI system of care following the standards developed for Mission Lifeline (AHA) including:

- Ongoing multidisciplinary team meetings with EMS, non-PCI, and PCI centers
- A process for pre-hospital identification and activation
- Destination protocols for PCI centers
- Transfer protocols for non-PCI centers for appropriate patients



**NEW**  
Recommendation



*ACC/AHA 2009 Joint STEMI/PCI Guidelines  
Focused Update JACC 2009*

# AHA/ASA Recommendations for EMS Systems of Care for Stroke

## Exec Summary

1. Rapid dispatch.
2. Use algorithms/protocols.
3. Involve ER physicians, EMS and acute stroke team.
4. Transport to acute-stroke capable hospital.
5. Establish assessments for thrombolysis eligibility.



# What would TRAUMA do?

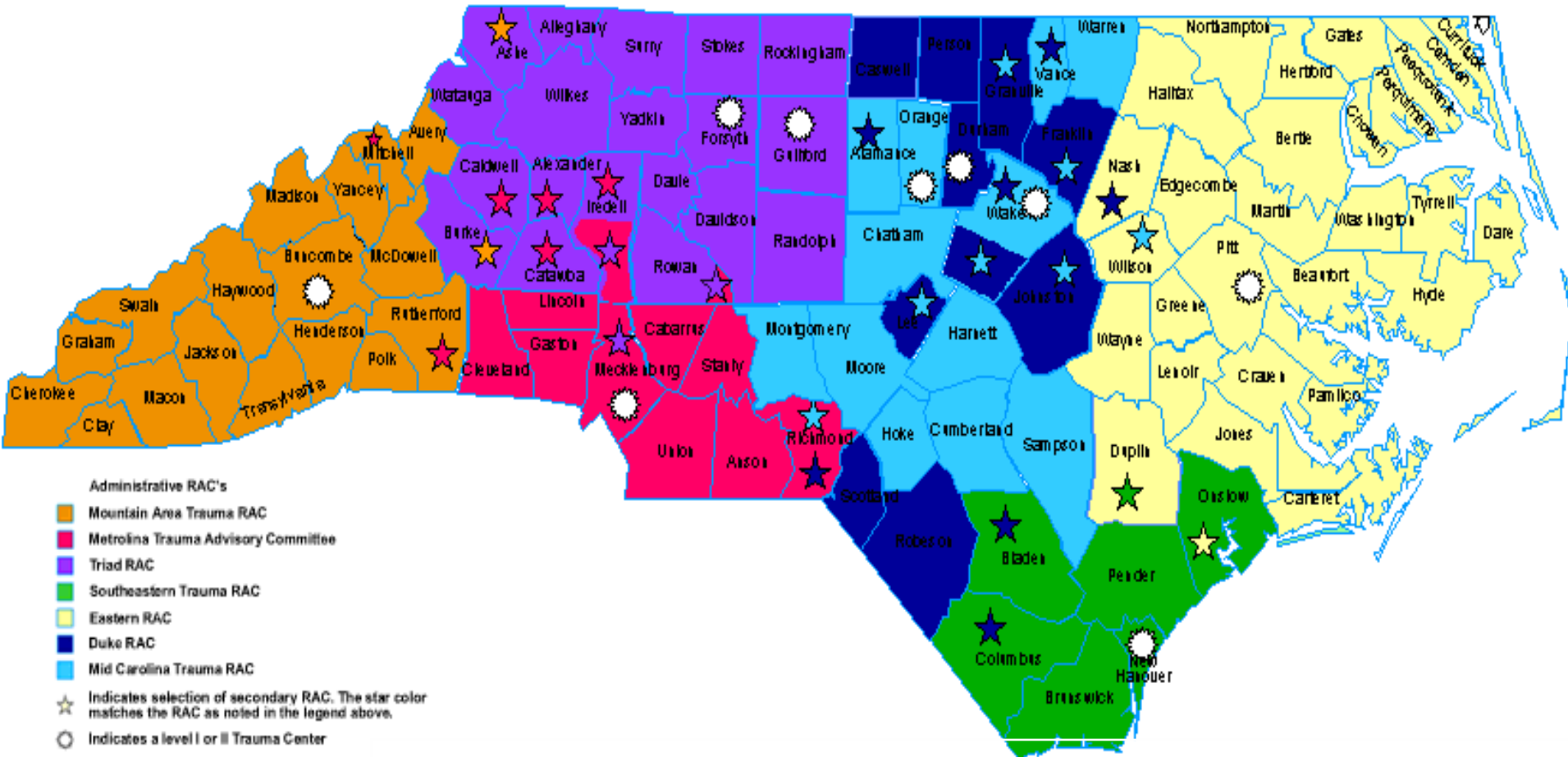
## The Trauma Call:

- Patient/bystander calls 911
- Dispatch
- EMS response
- **Recognition of a RED TAG trauma by Paramedics**
- Pre-hospital emergency care/treatment
- Notification of the Trauma Team prior to ED arrival
- Transport to the most appropriate facility (Level I Trauma Center)
- Early definitive care



# North Carolina Trauma Centers

## RACs- Regional Advisory Committee



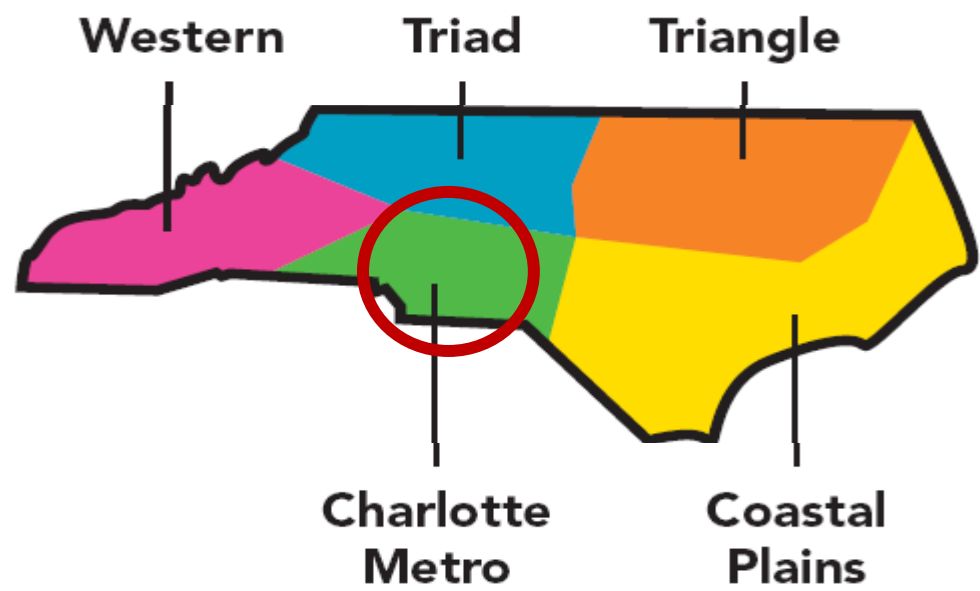
The mission is to participate in development of standardized regional trauma care, as well as the establishment and maintenance of a coordinated trauma system to promote optimal trauma care for all citizens within the Trauma RAC's area.

Charlotte Metro pop. >1,050,000 (2008)  
 18<sup>th</sup> largest city in the U.S.

~~98 Non PCI Hospitals~~

19 PCI Hospitals

500+ EMS Systems



RACE PCI Hospitals by Region (24 / 7 availability with on-site surgical backup)

Western	Triad	Charlotte Metro	Triangle	Coastal Plains
Frye Mission	Forsyth Highpoint Moses Cone WFUBMC	CMC CMC-Mercy CMC-Northeast Gaston Presbyterian	Duke Durham Regional UNC Rex Wake	Cape Fear Valley CarolinaEast First Health New Hanover Pitt

Hub and Spoke concept



# Benefits of Regionalization:

- Right patient, right hospital, right time
- Streamlined process
- Eliminate duplication
  - Resultant cost reduction?
- Networking of un-networked hospitals

# System Barriers to Implementing a Regional System:

- Lack of integrated healthcare system
- Lack of standardized protocols
- Hospital overcrowding
- Reimbursement
- EMTALA
- Ambiguity of leadership
- Resources
- EMS level of provider
- Geographical challenges

# Steps for Creating a Regional System for Stroke and STEMI Care:

- Create common goals based on evidence-national guidelines and specialty recommendations
- Design care tools that emphasize goals
- Create methods to measure performance (registries)
- Create a method to feedback results (real time & registries)
- Reformulate the aims
- Sustain the Gain



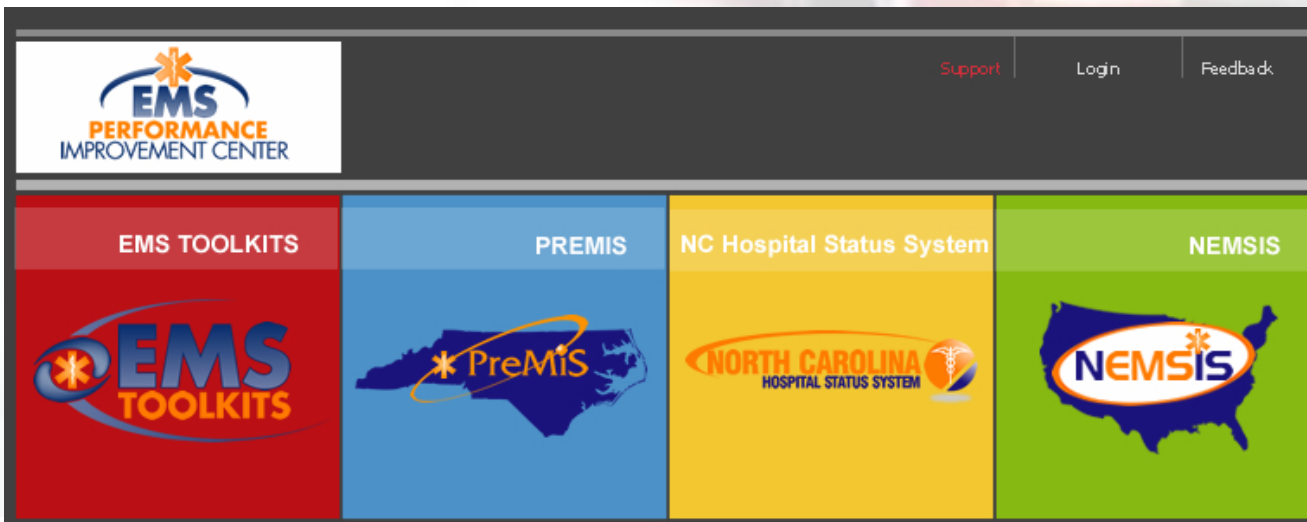
# EMS






## Acute Cardiac Toolkit:



Established STEMI system quality standards:

- 1) In the field ECG
- 2) Under 15 minute scene time
- 3) Hospital pre-notification
- 4) Standing STEMI plan / destination protocols

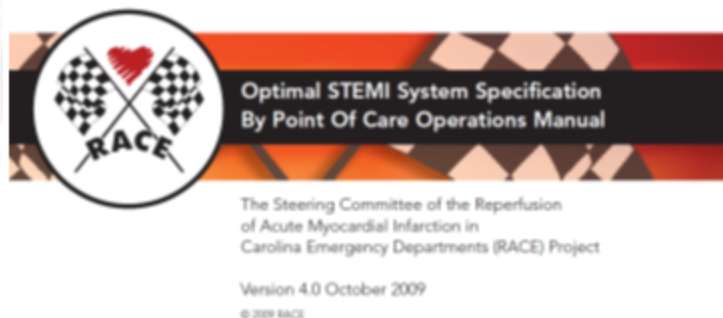
A screenshot of the EMS Performance Improvement Center website. The header includes the logo for the EMS Performance Improvement Center, with links for Support, Login, and Feedback. Below the header are four main navigation buttons: EMS TOOLKITS (red), PREMIS (blue), NC Hospital Status System (yellow), and NEMSIS (green). Each button features a corresponding logo: EMS TOOLKITS with a caduceus and "EMS TOOLKITS" text; PREMIS with a map of North Carolina and "PreMIS" text; NC Hospital Status System with "NORTH CAROLINA HOSPITAL STATUS SYSTEM" text and a caduceus; and NEMSIS with a map of the United States and "NEMSIS" text.

	<a href="#">Support</a>	<a href="#">Login</a>	<a href="#">Feedback</a>
<a href="#">EMS TOOLKITS</a> 	<a href="#">PREMIS</a> 	<a href="#">NC Hospital Status System</a> 	<a href="#">NEMSIS</a> 

# RACE Operations Manual:

## Optimal system specifications by point of care

- EMS, STEMI
- Non-PCI and PCI EDs
- Transfer protocols
- Catheterization lab
- Other system issues – payers, regulations
- Choice of PCI or lytic reperfusion regimens





# Single best plan per hospital: RACE OPERATIONS MANUAL:

## Regimen A – Primary PCI

Preferred if able to meet time goals

(To be used with institution specific standing orders/protocols for ST-elevation myocardial infarction patients)

### ELIGIBLE PATIENTS

- Within 12 hours of symptom onset.
- ST-segment elevation in 2 or more contiguous leads >1mm or left bundle branch block.
- Primary angioplasty is also the best option for:
  - Cardiogenic Shock; Killip class III or >.
  - Possible ST-elevation MI but uncertain of diagnosis.
  - Contraindication to fibrinolysis.
  - Physician or patient preference.

Goal is to open artery with angioplasty balloon within 90 minutes of arrival to first hospital or first medical contact.

- Emergency department physician makes the decision about need for primary angioplasty, if possible. Consultation should be limited to situations of uncertainty.
- Notify PCI hospital of an ST-elevation MI in need of primary angioplasty.
- Complete EMTALA form as a priority.
- Fax patient records including ECG to receiving hospital WHILE PATIENT IN TRANSFER.
- Continuous IV infusions should only be used if required for stability during transfer.

### OTHER MEDICATIONS

1. Heparin: Bolus at 70 IU/kg IV bolus. No maintenance infusion during transfer.
2. Aspirin: 325 mg chewed.

### PRN Medications:

1. Nitroglycerin paste 1 to 2 inches topically PRN chest pain.
2. Morphine Sulfate 2-10mg IV for chest pain unrelieved by Nitroglycerin PRN.

## Reperfusion Regimen B – Fibrinolysis

(To be used with institution specific standing orders/protocols for ST-elevation myocardial infarction patients)

### ELIGIBLE PATIENTS

- Within 12 hours of symptom onset.
- ST-segment elevation in 2 or more contiguous leads >1mm or left bundle branch block.
- Absence of contraindications (see below).

### FIBRINOLYTIC [tenecteplase (TNK) or reteplase (rPA)]

#### Tenecteplase (TNK) regimen

Single IV bolus over 5 seconds

Use TNK dose chart at right to determine dose. ➔

Patient weight \_\_\_\_\_ kg  
Patient-specific dose \_\_\_\_\_ mg  
(NOT TO EXCEED 50mg)

Patient Weight (kg)	TNK (mg)	Volume TNK to be administered (ml)
< 60	30	6
≥ 60 to < 70	35	7
≥ 70 to < 80	40	8
≥ 80 to < 90	45	9
≥ 90	50	10

### OR

#### Reteplase (rPA) regimen

10 units IV over 2 minutes given twice at 30-minute intervals.

In nurses' notes and MAR, please note EXACT TIME

of fibrinolytic administration, and obtain ECG 30 minutes after fibrinolytic administered.

### OTHER MEDICATIONS:

1. Heparin:
  - a. Bolus at initiation of TNK or rPA - 60 IU/kg IV bolus (maximum 4,000 IU).
  - b. Maintenance 12 IU/kg/h (maximum 1,000 IU) to achieve activated partial thromboplastin time (APTT) 1.5 to 2 times control, maintained for 48 hrs.
2. Aspirin 325 mg chewed.

### Absolute contraindications

- Any prior intracranial hemorrhage
- Known structural cerebral vascular lesion (for example arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 months EXCEPT acute ischemic stroke within 3 hours
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head or facial trauma within 3 months

### Relative contraindications

- History of chronic severe, poorly controlled hypertension
- Severe hypertension on presentation (systolic blood pressure greater than 180 mm Hg or diastolic blood pressure greater than 110 mm Hg)
- History of prior ischemic stroke greater than 3 months, dementia, or known intracranial pathology not covered in contraindications
- Traumatic or prolonged (greater than 10 minutes) CPR or major surgery (less than 3 weeks)
- Recent (within 2 to 4 weeks) internal bleeding
- Noncompressible vascular punctures
- Pregnancy



# Top 5 for Regional Systems of Care:

1. Don't change referral lines if they are aligned with good patient care
  - **Patient, EMS, and ED Medicine choose**
2. Patients walk into all hospitals
  - **Every hospital, every EMS agency responding to 9-1-1 calls must be included in a system plan & have a “reperfusion plan”**
3. Neutral Convening Entity
4. Common data base, continuous QI monitoring, mechanism for feedback
5. ***Focus on the PATIENT***



# Successes:

- State resources already addressing regionalization of STEMI and Stroke care
  - Legislative initiatives
  - OEMS
  - Grants
- Regions exist for STEMI and Networks exist for Stroke
- Data platforms already exist
- Best treatment options are being built into plans

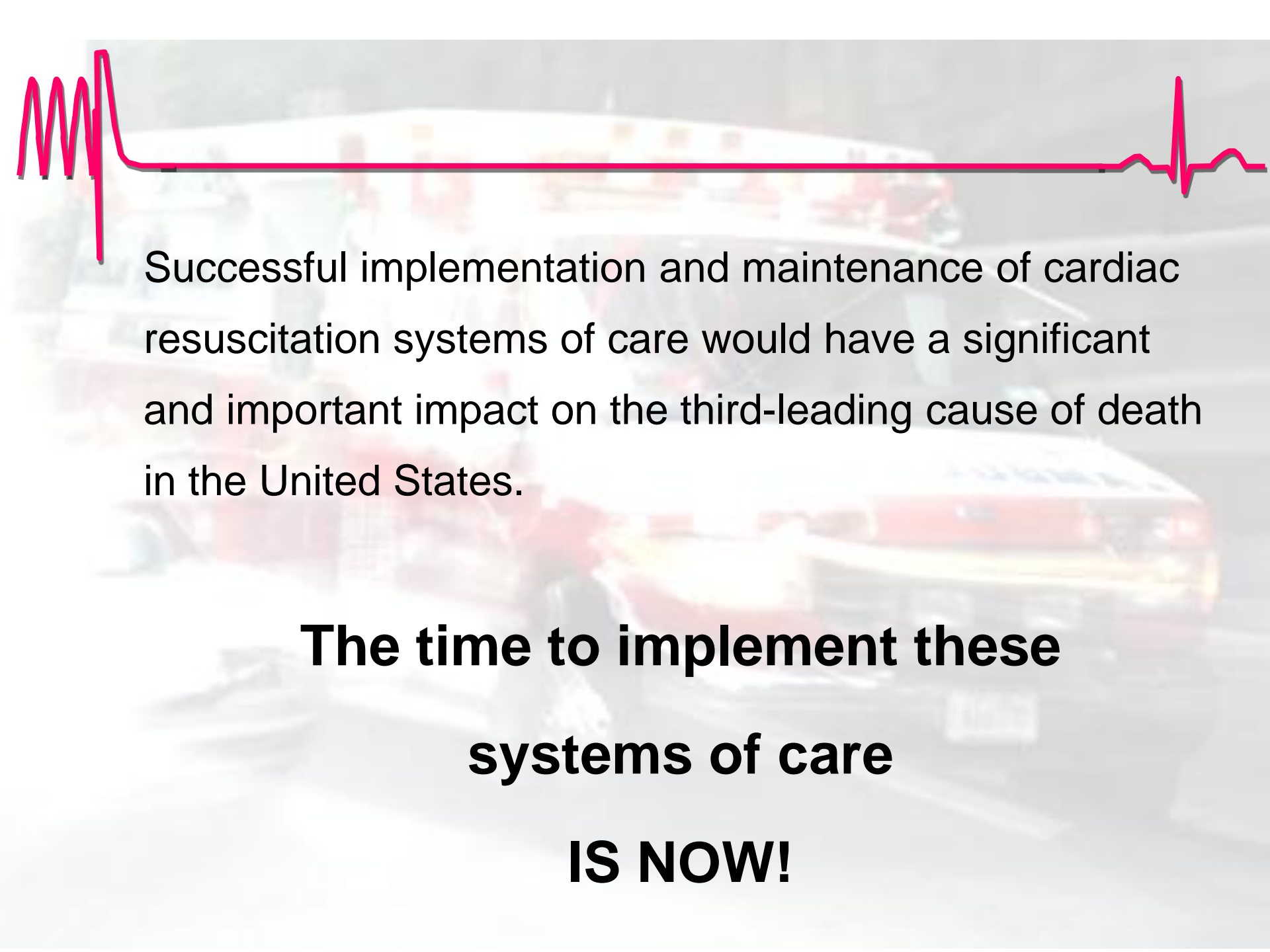


## Regional Systems of Care for Out-of-Hospital Cardiac Arrest : A Policy Statement From the American Heart Association



we believe **that the time has come** for a call to **develop and implement** standards for **regional systems of care** for those with restoration of circulation after **OOHCA**; concentrate **specialized** post resuscitation skills in selected **hospitals**; transfer unconscious post– cardiac arrest patients to these hospitals as appropriate; **monitor, report,** and try to **improve** cardiac resuscitation **structure, process,** and **outcome**; and reimburse these activities.

*Circulation.* 2010;121:709-729;

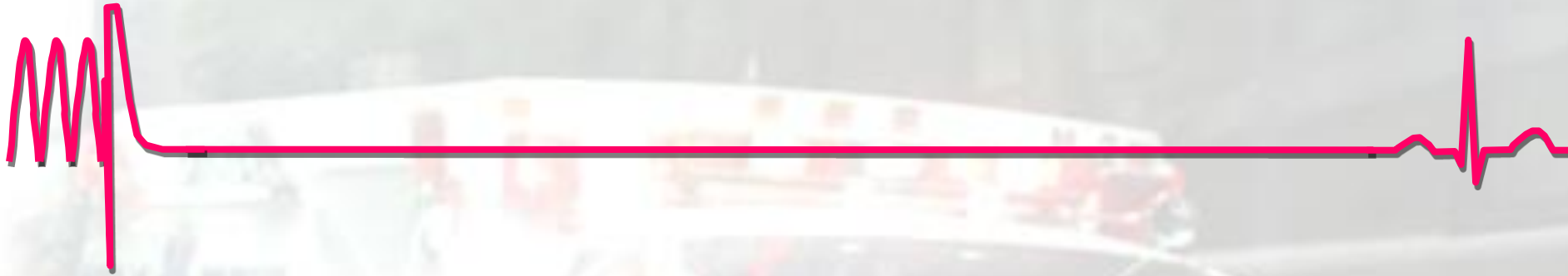


Successful implementation and maintenance of cardiac resuscitation systems of care would have a significant and important impact on the third-leading cause of death in the United States.

**The time to implement these  
systems of care  
IS NOW!**

# STEMI CARE:





*“Where you live should  
not determine  
whether you live”*



# RACE *Cardiac Arrest Resuscitation System*

2) Establish REGIONAL *CARDIAC ARREST* CENTERS

1) Develop leadership,  
funding, data structure

4) Improve system

*Measurement  
& Feedback*

3c) Community by community  
*cardiac arrest* training/AED  
placement

3a) HOSPITAL by hospital  
establishment of *cardiac arrest* plan  
(review, consensus, training)

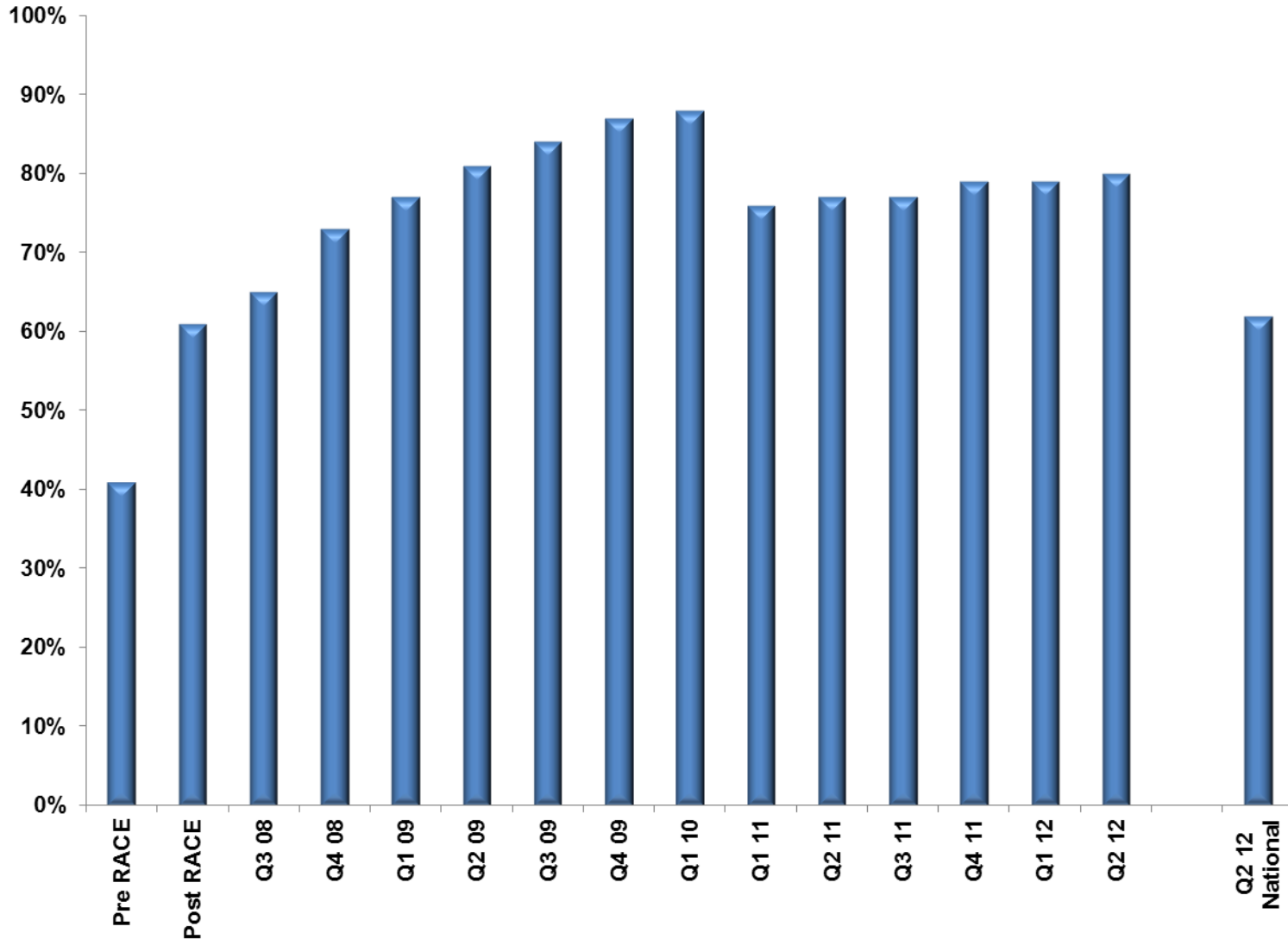
3b) EMS by EMS  
establishment of *cardiac arrest* plan  
(review, consensus, training)



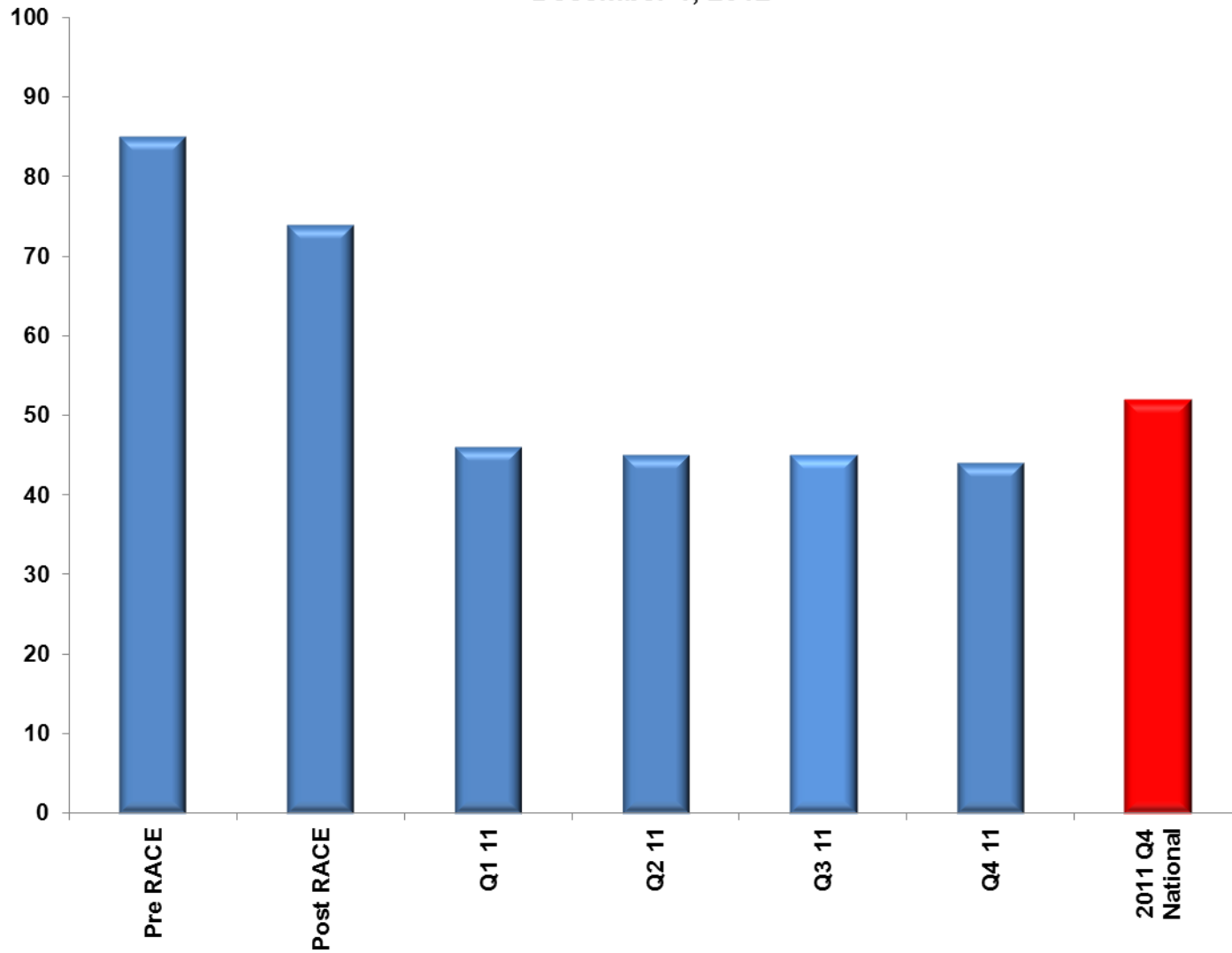
# Pre-Hospital ECG

## RACE and Mission Lifeline Data

Dec 1, 2012



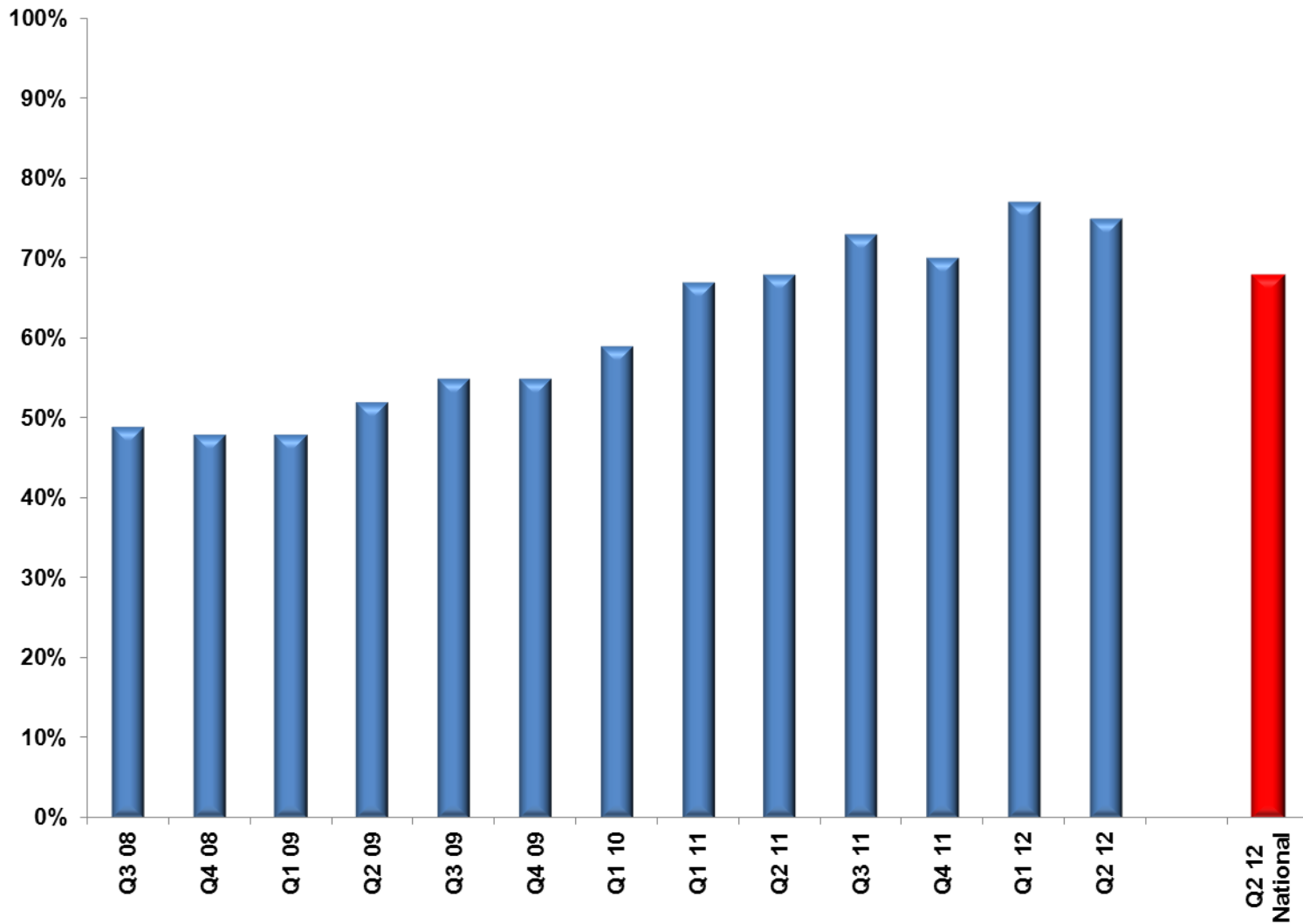
**POV + EMS Door to Device  
Median Time in Minutes  
RACE and Mission Lifeline Data  
December 1, 2012**



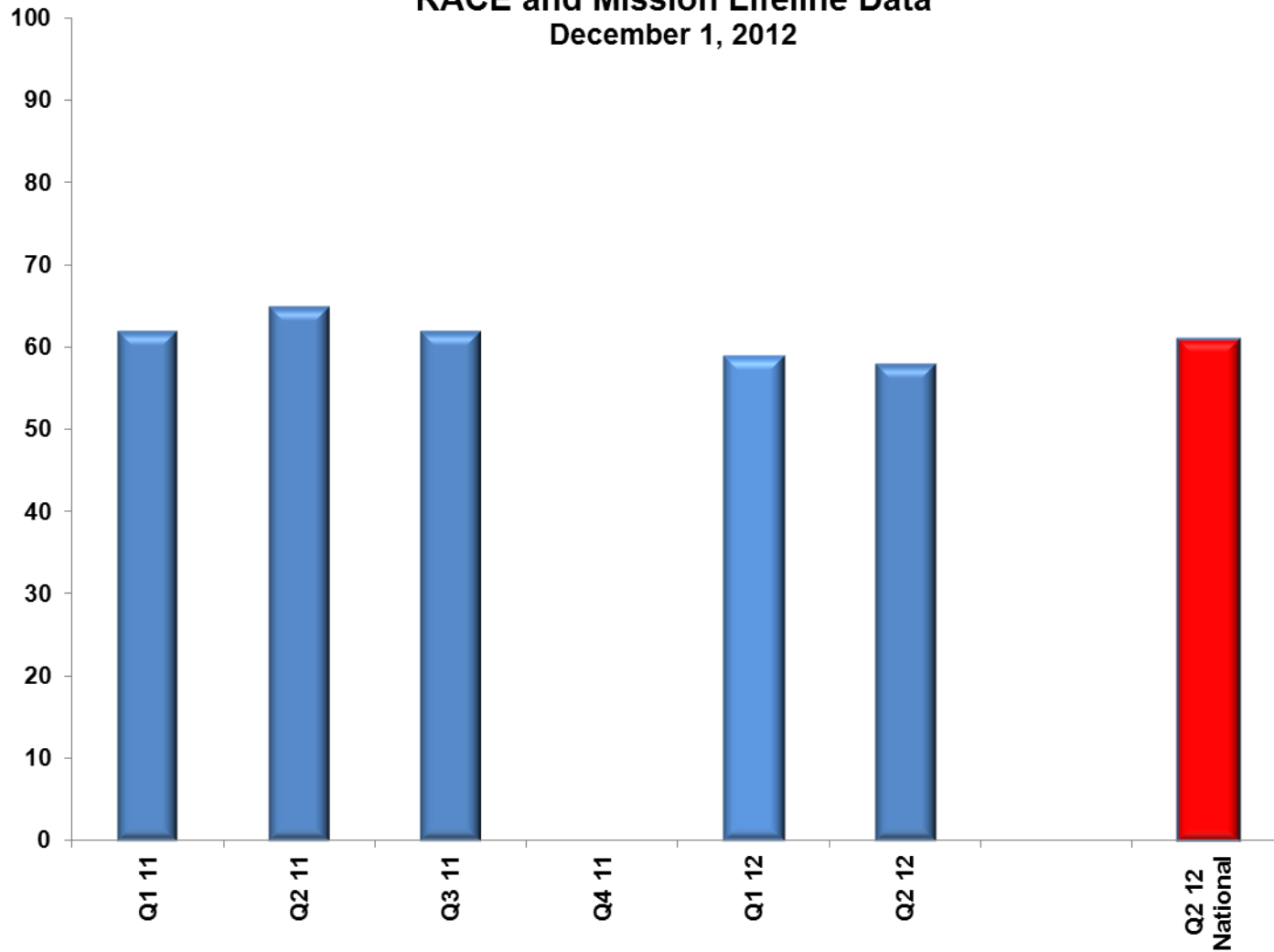
# First Medical Contact to Device < 90 minutes

## RACE and Mission Lifeline Data

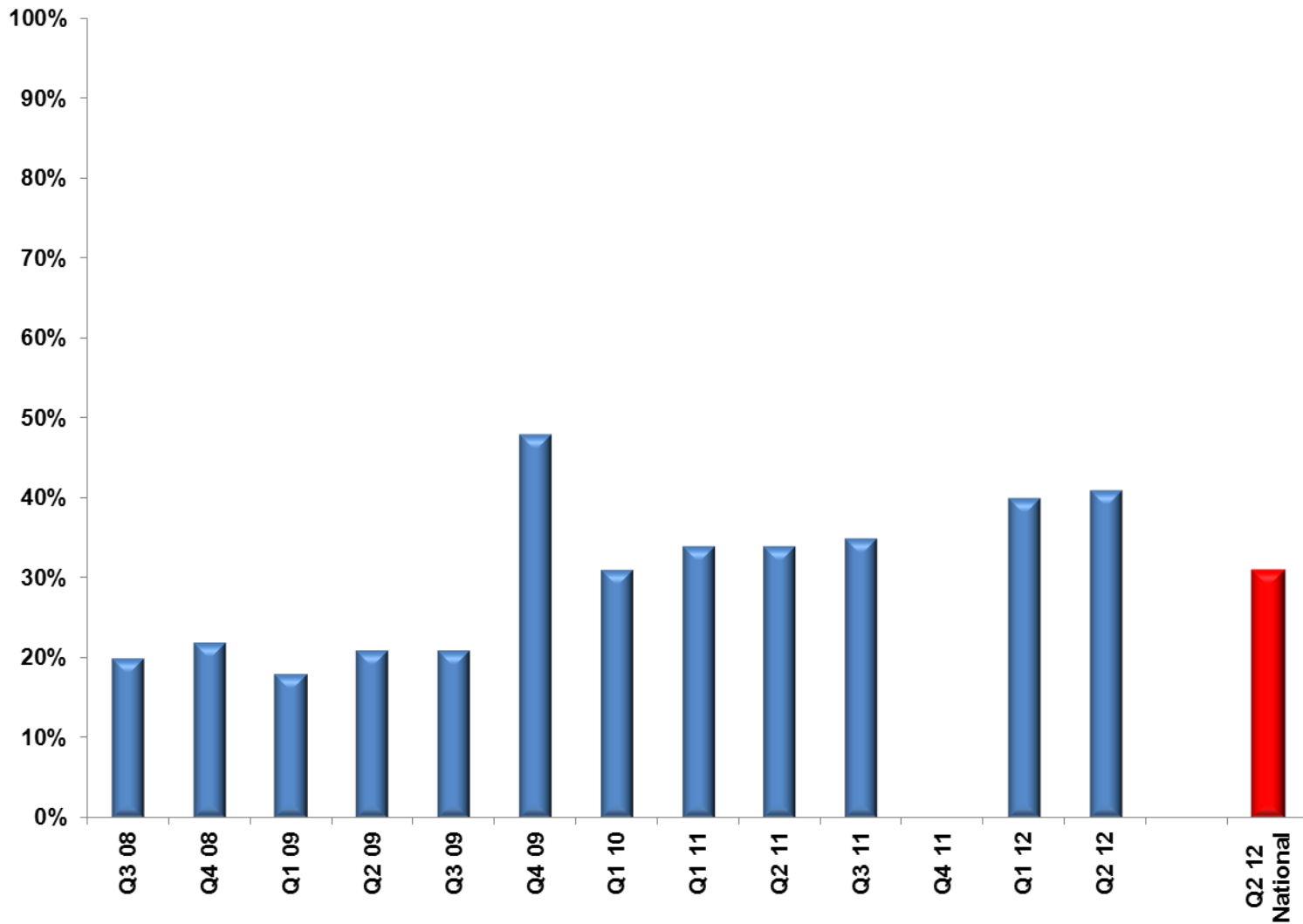
Dec 1, 2012



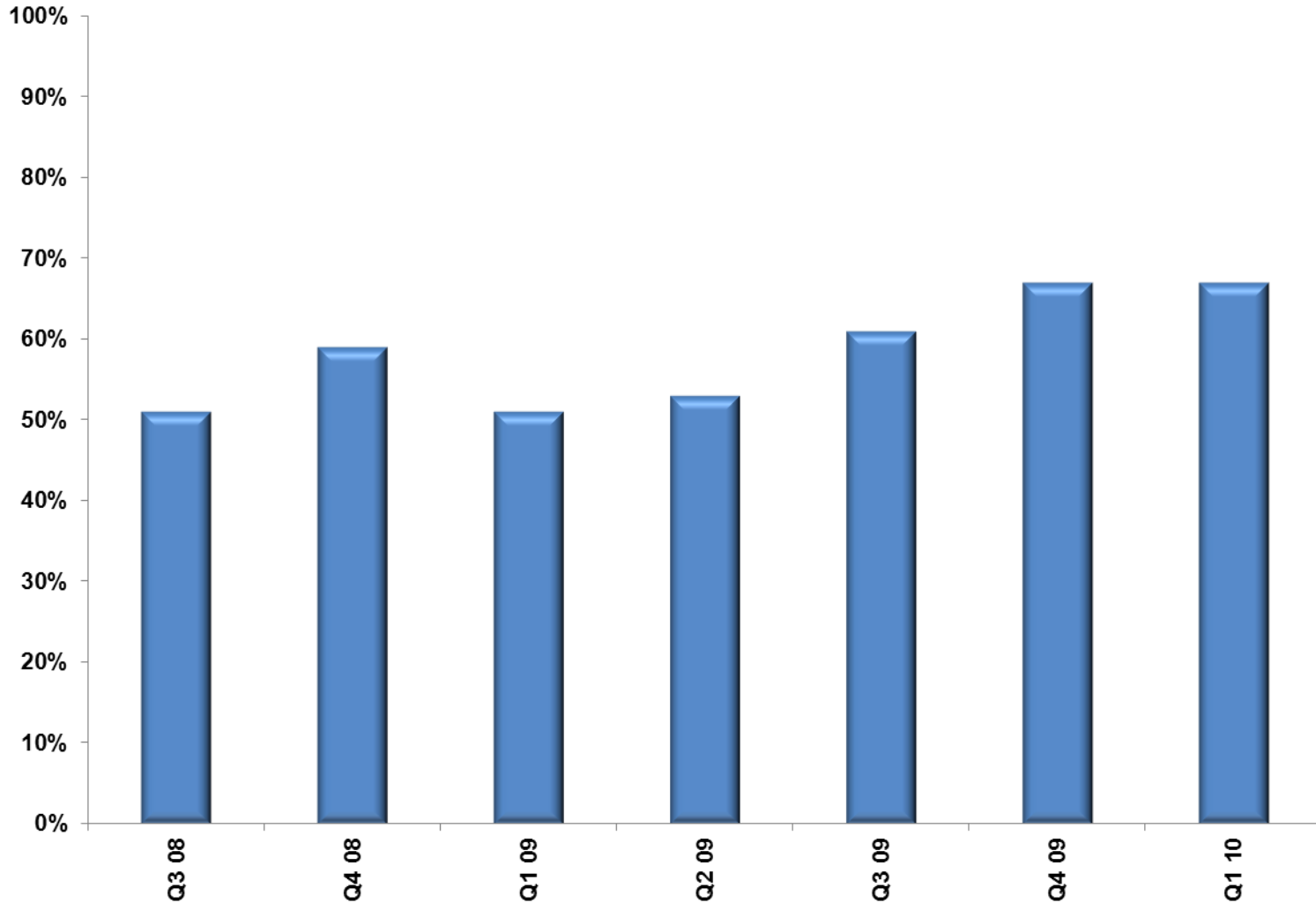
**Door in Door Out  
Non-PCI Center  
Median Time in Minutes  
RACE and Mission Lifeline Data  
December 1, 2012**



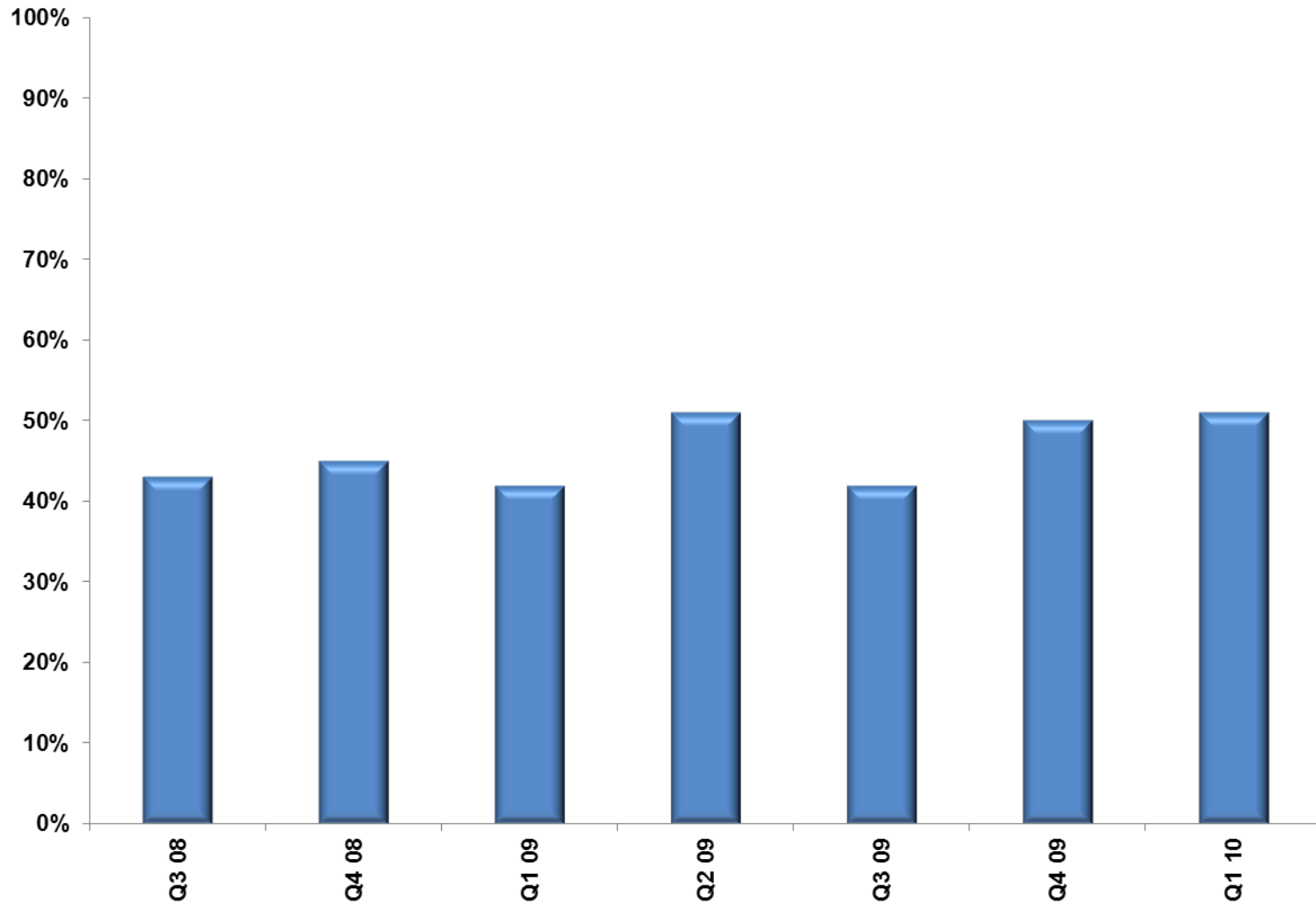
**First Door to Device < 90 minutes  
Non-PCI Center  
RACE and Mission Lifeline Data  
Dec 1, 2012**



**First Door to Device < 120 minutes  
Non-PCI Center  
RACE and Mission Lifeline Data  
Dec 1, 2012**



**Door to Lytic in < 30 minutes  
Non-PCI Center  
RACE and Mission Lifeline Data  
Dec 1, 2012**



# Mission: Lifeline Recognition Awards

## GOLD

- Carolinas Medical Center
- CMC- Northeast
- \*Frye Regional Medical Center
- High Point Regional Health System
- Presbyterian Hospital
- University of North Carolina Hospital
- WakeMed Health and Hospitals





# Mission: Lifeline Recognition Awards

## SILVER

- Durham Regional Hospital
- New Hanover Regional Medical Center
- Presbyterian Hospital – Huntersville
- Presbyterian Hospital - Matthews



# Mission: Lifeline Recognition Awards

## Bronze

- Cape Fear Valley Medical Center
- Carolina East Medical Center
- CMC- Mercy
- Carmont Health/ Gaston Memorial
- Cone Health
- Duke University Hospital
- Vidant Medical Center
- Wake Forest Baptist Medical Center
  
- Central Carolina Hospital





# Regional Cardiovascular Emergency System How are we doing?

## Door to balloon largely solved

### Major targets remain

1. Hospital transfer patients (roughly half or 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*



# Mission Lifeline System Reports:

23 of 26 centers

2 pretty sure are signed up

1 who is checking

***Data Drives Change!***



# Surveys:

- See completion list
- Claire comments



American  
Heart  
Association®

MISSION  
LIFELINE

# REGIONAL SYSTEMS OF CARE DEMONSTRATION PROJECT MISSION: LIFELINE™ STEMI SYSTEMS ACCELERATOR

**James G. Jollis, MD, FACC**

Professor of Medicine & Radiology

Duke University Medical Center

**Mayme Lou Roettig, RN, MSN**

Director, Systems Education

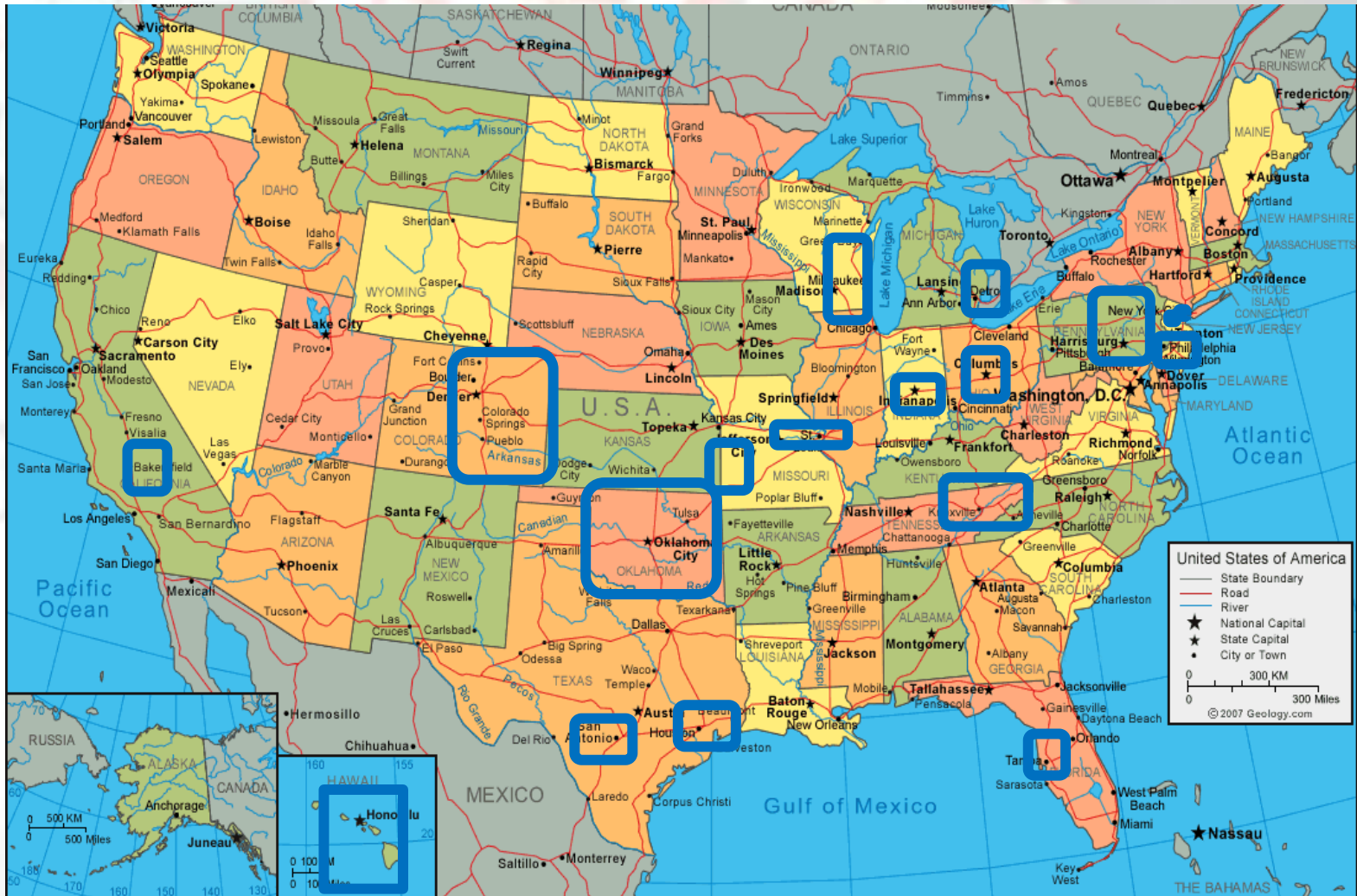
Assistant Director, Center For Educational Excellence

Duke Clinical Research Institute/Duke University Medical Center

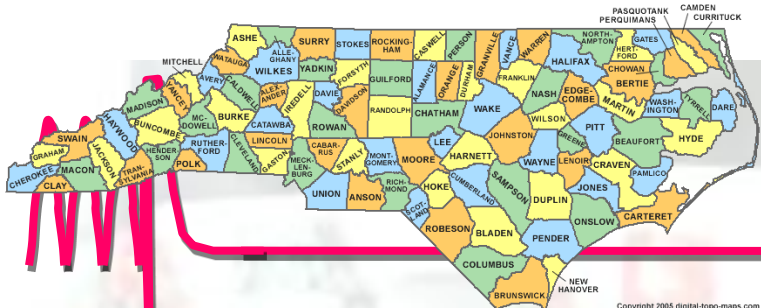
# STEMI Accelerator



MISSION:  
LIFELINE



 STEM Accelerator Sites



Copyright 2005 digital-topo-maps.com

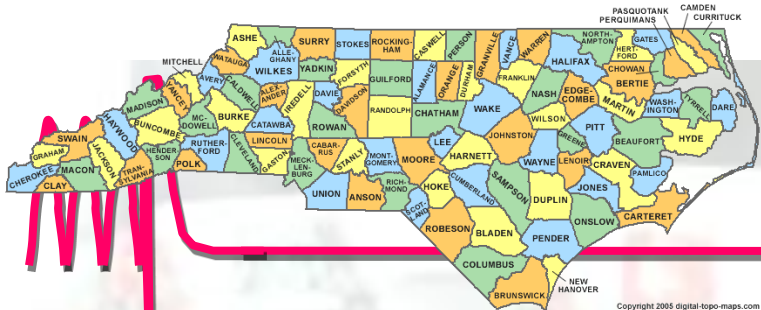
**21 primary PCI centers**

**540 EMS systems**

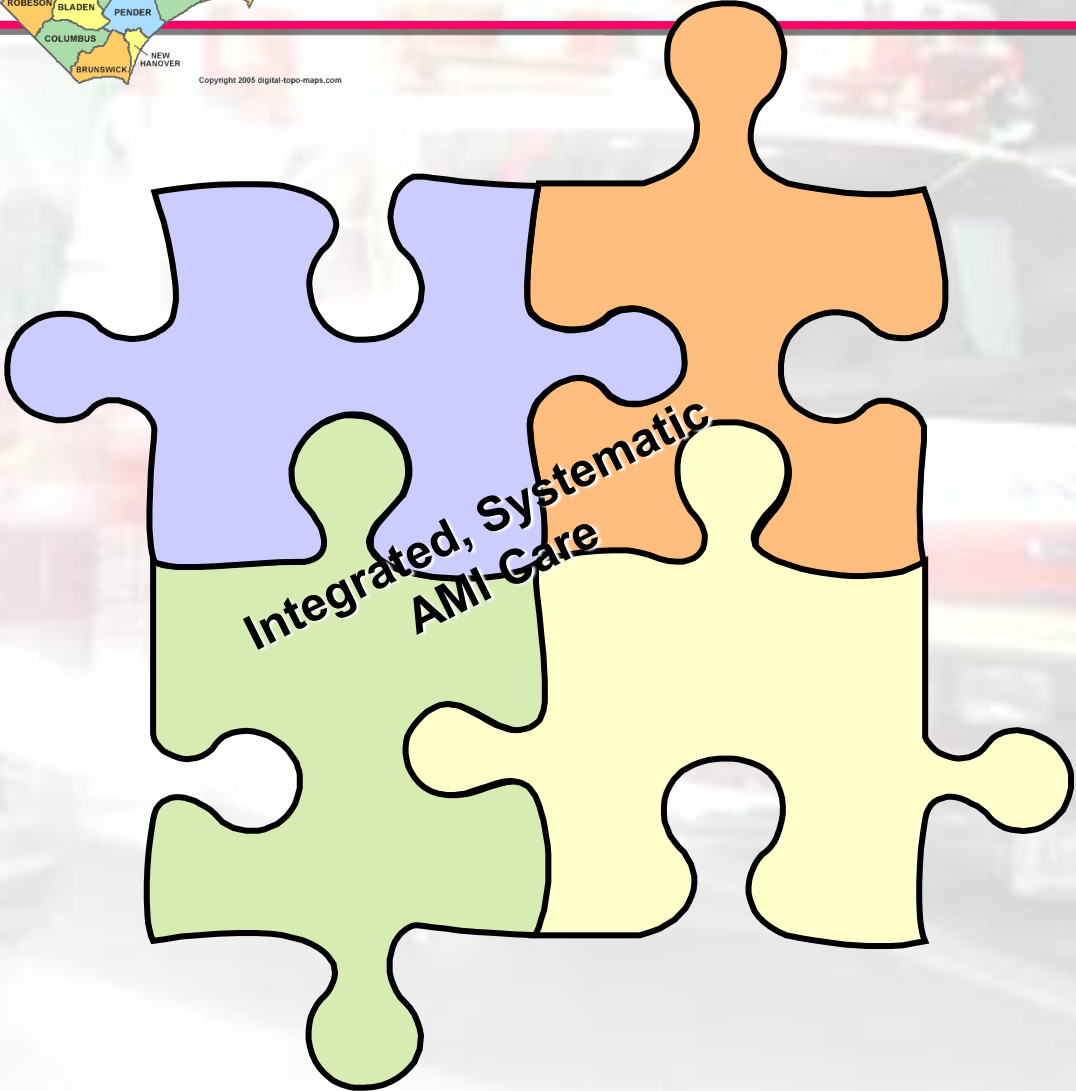
**5,240 paramedics**  
**18,000 EMTs**

**118 emergency departments**



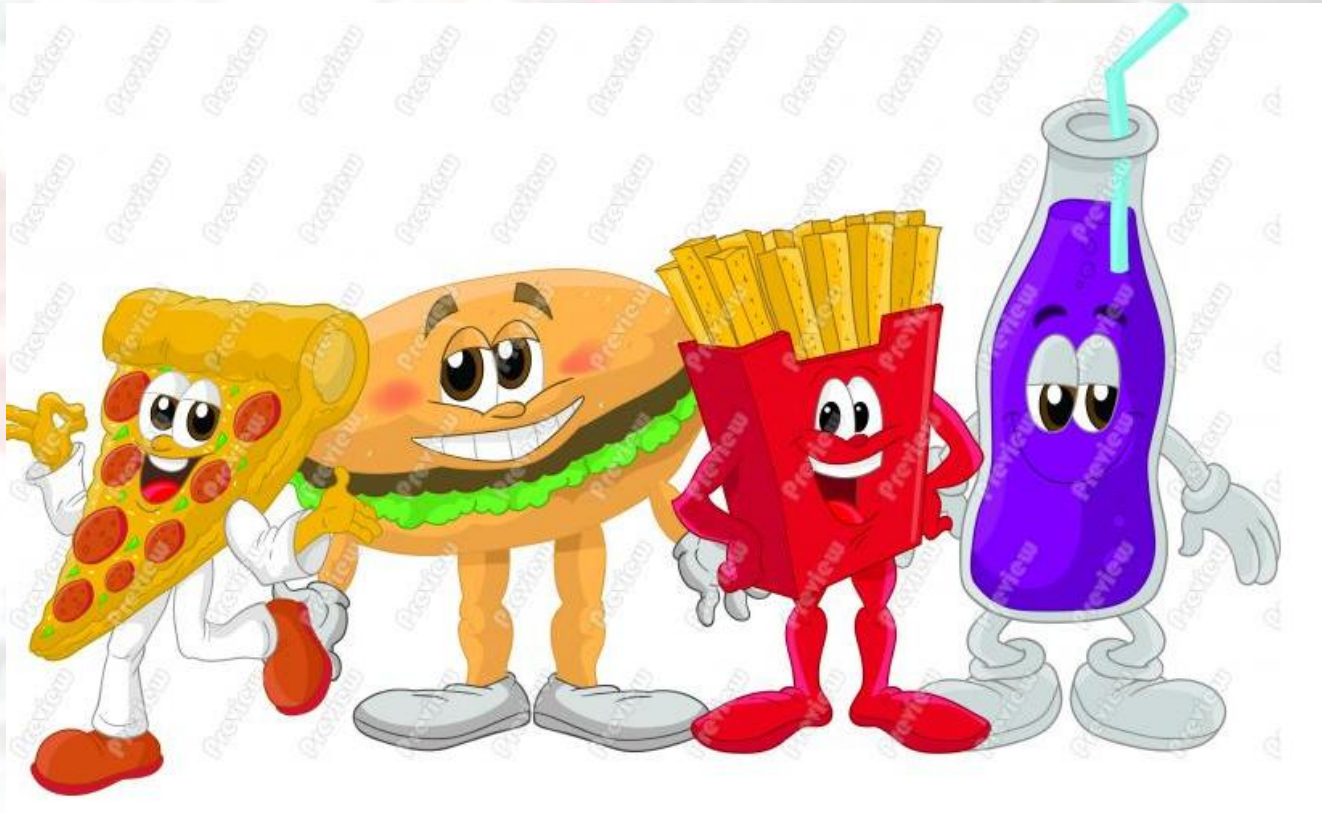


Copyright 2005 digital-topo-maps.com



**Integrated, Systematic  
AMI Care**

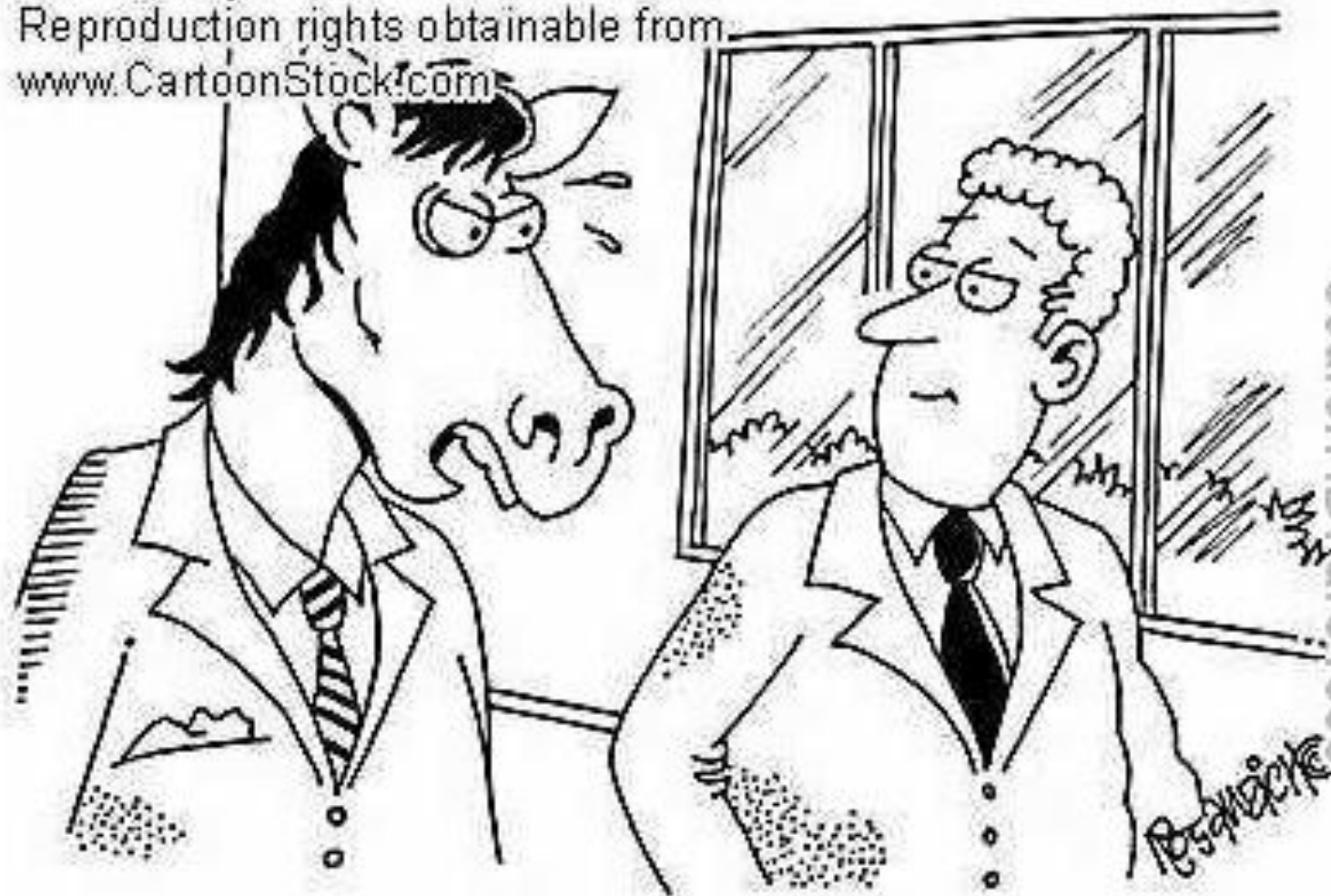
# BREAKTIME



# RACE Coordinator Role:



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Reproduction rights obtainable from  
[www.CartoonStock.com](http://www.CartoonStock.com)



search ID: dro1055

"WOULD YOU STOP SAYING I'M THE GLUE THAT HOLDS THIS OFFICE TOGETHER!"

# History STEMI Systems in NC:

“RACE moved beyond the cath lab and PCI hospitals to focus on EDs, EMS, hospital networks, and associated communication and transport systems.” Heart.org

“AHA’s Mission: Lifeline – A Call to Arms for Emergency Medicine” ACEP News Jan 2009

**RACE Pilot  
1st STEMI  
System**

**RACE  
65 hospitals/  
Multiple EMS Agencies**

**RACE - ER  
Entire State**

**RACE CARS Goal:  
Improve OOHCA  
survival by 50% by 2015**

**Mission Lifeline  
RACECARS**

2003

2005

2006

2007

2008

2009

2010

2011 - 2015

“Racing Against the Clock: A North Carolina-based project becomes a model for discovery-to-balloon”

Richard R. Rogoski 2008

“RACE: A Herculean attempt to improve STEMI care”  
Nov 12, 2007 Lisa Nainggolan



“North Carolina’s RACE program cuts door-in door-out times for STEMI patients”  
Jun 28, 2011 Reed Miller



# Regional Coordinator:

- Organizes cardiac arrest system
- Serves as a resource for education
- Assists EMS:
  - establishing plans to engage dispatch and first responders
  - Develop data sharing plans



# RACE *Cardiac Arrest Resuscitation System*

2) Establish REGIONAL *CARDIAC ARREST* CENTERS

1) Develop leadership,  
funding, data structure

4) Improve system

*Measurement  
& Feedback*

3c) Community by community  
*cardiac arrest* training/AED  
placement

3a) HOSPITAL by hospital  
establishment of *cardiac arrest* plan  
(review, consensus, training)

3b) EMS by EMS  
establishment of *cardiac arrest* plan  
(review, consensus, training)



## 3 Buckets:

- Your PCI Facility
- Your Transfer Facility
- Your EMS Agencies
  - Local
  - Transport – inter facility-rural EMS





# First Step:

- Your PCI Center
  - Identify your team
  - Develop list with contact information
  - Existing team, tweak members
  - Physician Champion
  - Administrative Support

Many of you have other roles,  
who are your resources



# External Resource List:

- List your non PCI centers and Contact info
  - Primary Contact
  - Physician Lead
- Identify EMS agencies for each facility and contact info

\*if you don't have established relationships,  
you will need to make appointments



# Administrative Meetings:

- Meet with hospital and EMS administrators to share project information
- Slide set developed
- Market this work, name recognition



# Hospital Participation:

- Agree to participate-informal no contract
- Complete survey to understand current practice
- Participate in regional meetings
- Create/update order sets, protocols, etc., based on
  - AHA guideline recommendations, NC Operations Manual, Regional Plan
- Agree to train all hospital employees on some level of CPR
- Agree to train all heart patients and families on discharge on recognition of cardiac arrest compression only CPR
- Agree to enter CARES registry data on pts who make it to the hospital
- Implement improvement efforts as identified by your data



# EMS Participation:

- Agree to participate
- Complete survey to understand current practice
- Participate in regional meetings
- Create/update order sets, protocols, etc., based on
  - AHA guideline recommendations, NC Operations Manual, Regional Plan, NCOEMS Protocols
- Agree to enter CARES registry data on cardiac arrest patients
- Engage First Responders and Dispatch in this project
- Implement improvement efforts as identified by your data



# Survey:

- EMS Agencies and All hospitals
- RACE Coordinator will send to your contact to complete
- Understand current processes around cardiac arrest
- Use for regional, hospital, and agency specific plans
- Completion:
  - 76% PCI centers 16/21
  - 37% EMS 37/100
  - 31% Smaller facilities 31/100
- Complete Before and at the End of the Project to evaluate process changes



# Regional Meeting:

- Understand resources
- Understand what EMS Agencies and Hospitals plans are for OOHCA
- Create regional plan based on input from all
- Consider Bypass and STEMI plans
  - If non PCI hospitals do not want to care for these cardiac arrest patients, EMS would implement their bypass plan if appropriate
  - Non PCI center still need a transfer process for STEMI patients – EMS could also bypass if appropriate
- Community Plans



# Regional Plans:

- Sets expectations for best care of the cardiac arrest patient
- From Dispatch to Hospital Discharge
- Monitoring to make sure we have the best plan in place
- Adjust plans based on data and change in resources
- Decide on data, feedback, and review





# Feedback:

- Who drives this process?
- What data to include?
- Individual Case Data
- Data over time



# Data Review:

- What to review?
- How often to review?
- What format to review?
  - Meeting, call, written
- Case review



# EMS Resource:

- Develop Relationships with First Responders and Dispatch
- Develop a data plan
- Develop a feedback mech
- Engage them for community education
- Part of team

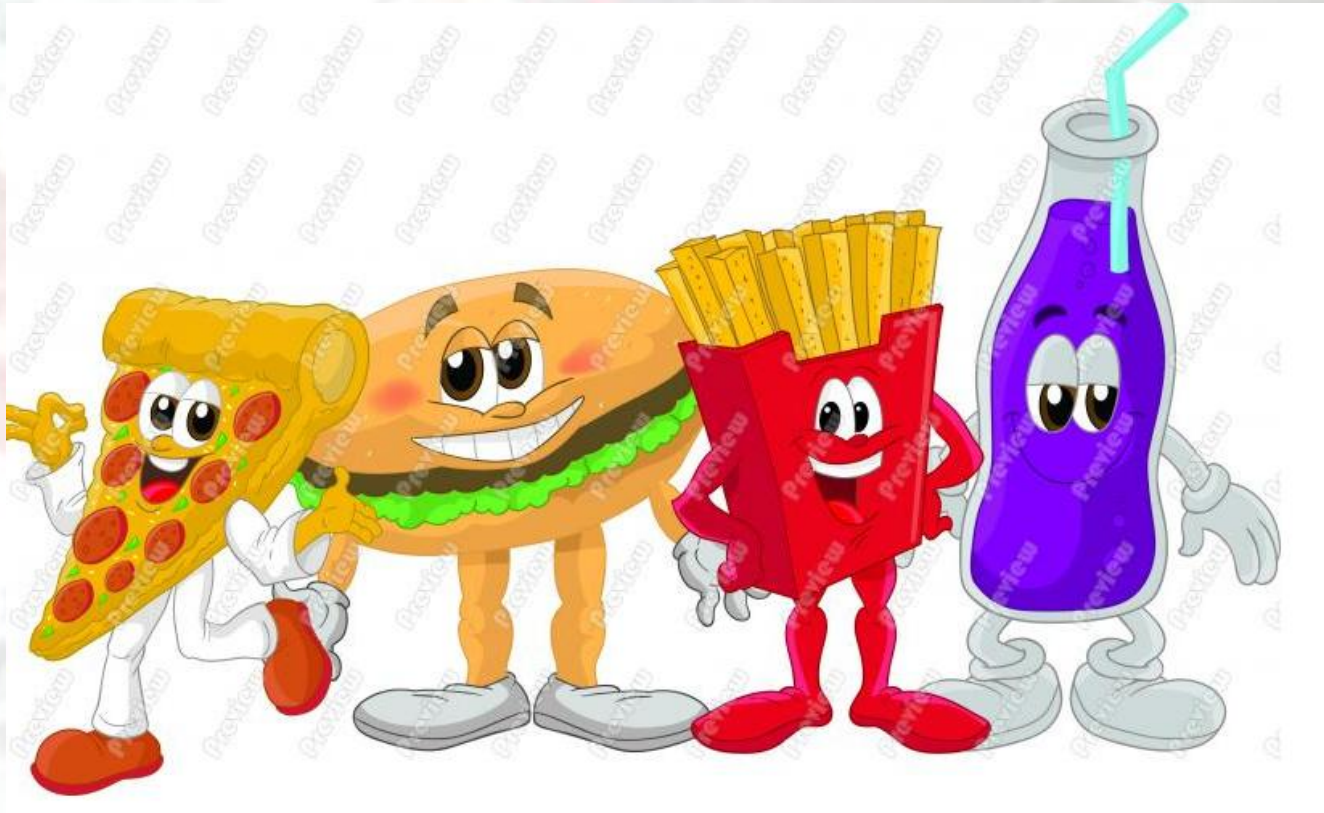


# Summary:

- Coordinator:
  - somebody bringing together different elements: somebody responsible for organizing diverse parts of an enterprise or groups into a coherent or efficient whole
- System:
  - A set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem.

**You are the glue who holds your regional together!**

# Lunch





# Improvement Efforts

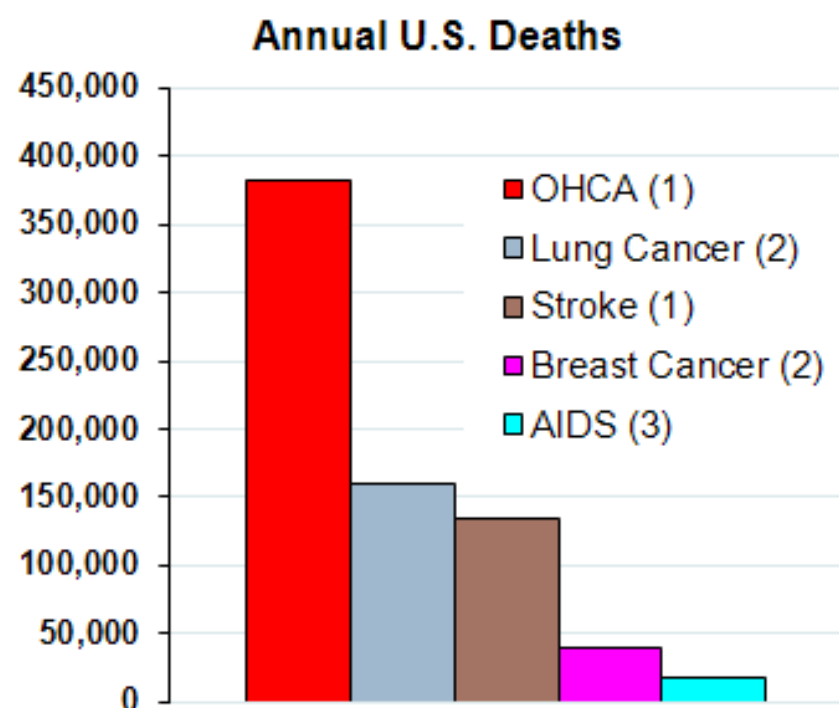
If we can't  
save them,

**DONATE  
LIFE**

**DONAR  
VIDA**

RACE CARS

## Out-of-Hospital Cardiac Arrest: Overlooked Cause of Death



- ▶ Wide variance in local, regional, economic and ethnic survival rates
- ▶ Current data collection sporadic, minimizing motives for systemic improvement

(1) American Heart Association Heart Disease and Stroke Statistics – 2012 Update.

(2) Cancer.org - 2012.

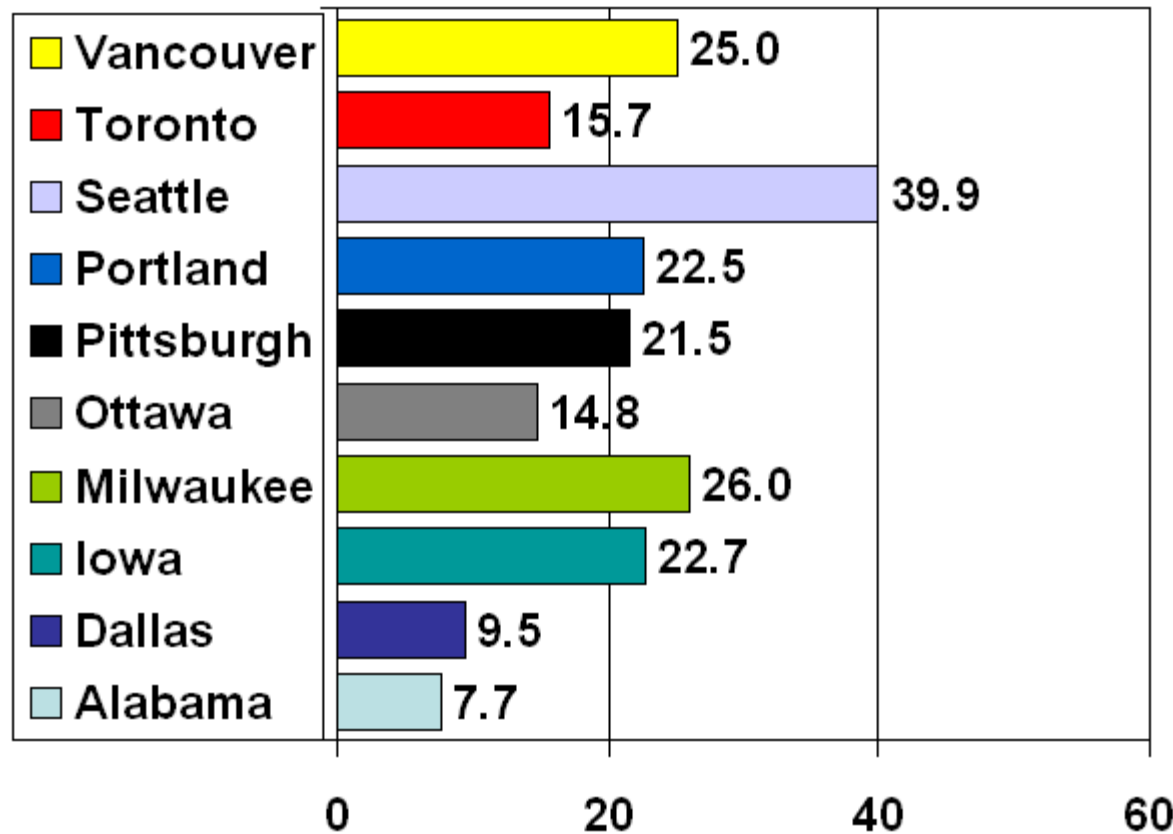
(3) U.S. HIV & AIDS Statistic Summary. Avert.org.



# Variation in survival VF arrest

## Resuscitations Outcomes Consortium

### Survival to discharge



# HeartRescue Partners



### HeartRescue Partners



**Program Goals:**

**Goal 1:** Improve Survival of Cardiac Arrest by 50% over 5 years in geographies we fund.

**Goal 2:** Increase and improve measurement of Sudden Cardiac Arrest.

**Goal 3:** Expand and improve national and global impact of the HeartRescue Project.

- Program Results FY12- Q1FY13:**
1. Partner programs now covering 50% or more of state populations, and reported on baseline and 2011 survival outcomes. **900 survivors reported in 2011.**
  2. New partners in FY12 (AMR), and FY13 (University of Illinois)
  3. All partners hosted 25 Resuscitation Academies and eLearning webinars reaching 1,000+ EMS/Hospital leaders with best practice education
  4. Partners presented to 1,200 EMS leaders at 8 events to date.
  5. 3 million people saved a life virtually with Save-a-Life Simulator on HeartRescueNow.com



# HeartRescue Flagship Premier Partner Program:

## **1st Chain: Community Response**

- i. Early SCA Recognition
- ii. Early 911
- iii. Early and effective bystander CPR or CCC
- iv. Early Public Access to AED

## **2nd Chain: Pre-Hospital Response**

- i. Enhanced dispatch
- ii. Enhanced/high performance CPR or CCC
- iii. Defibrillation care (e.g. one shock therapy for VF patients)
- iv. Pre-hospital hypothermia
- v. Drug delivery (e.g. Intra-osseous drug delivery)

## **3rd Chain: Hospital Response**

- i. Patient triage to Resuscitation Center of Excellence
- ii. Hypothermia as indicated by local protocol
- iii. 24/7 Cath Lab
- iv. Patient indicated therapies provided (e.g. ICD, PTCA, stent, CABG)
- v. Post survival patient and family education and support

# myCARES.NET



Welcome To:

## Cardiac Arrest Registry to Enhance Survival (CARES)

Sponsored by:



Log In to myCares™

Username:

Password:

[Did you forget your password?](#)



[CARES Introduction](#)

[More information on Cares](#)

[Press on Cares](#)

[Maps](#)

[IRB/HIPAA](#)

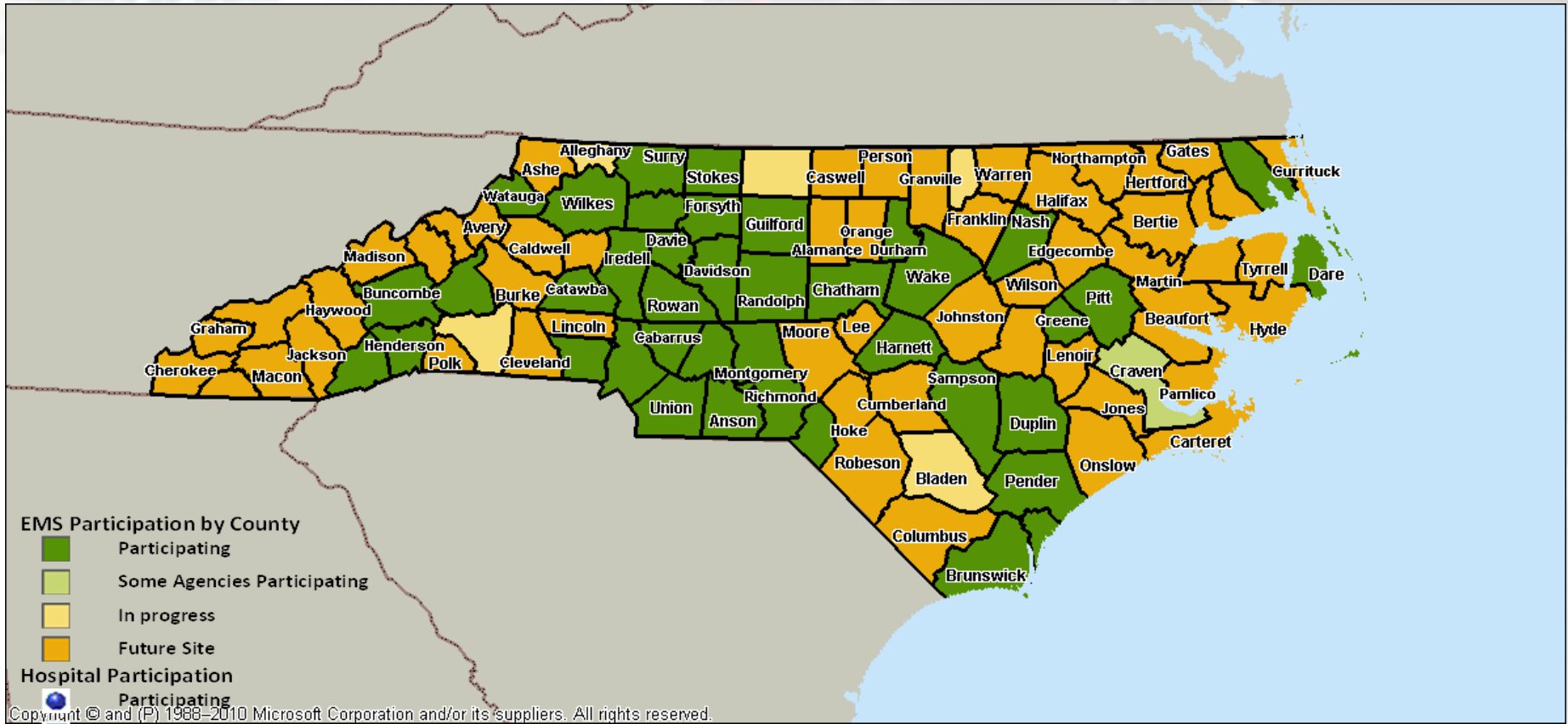
### CARES

The Cardiac Arrest Registry to Enhance Survival (CARES) was initiated in October 2004 as a cooperative agreement between the Center for Disease Control and Prevention (CDC) and the Department of Emergency Medicine at Emory University School of Medicine to identify incidents of prehospital cardiac arrest. The CARES Program is designed to consolidate all essential data elements of a prehospital cardiac arrest event in an efficient manner. With this standardized collection system, participants can track ongoing system performance in several, tailored reports. If you have any questions about this program, please send an email to

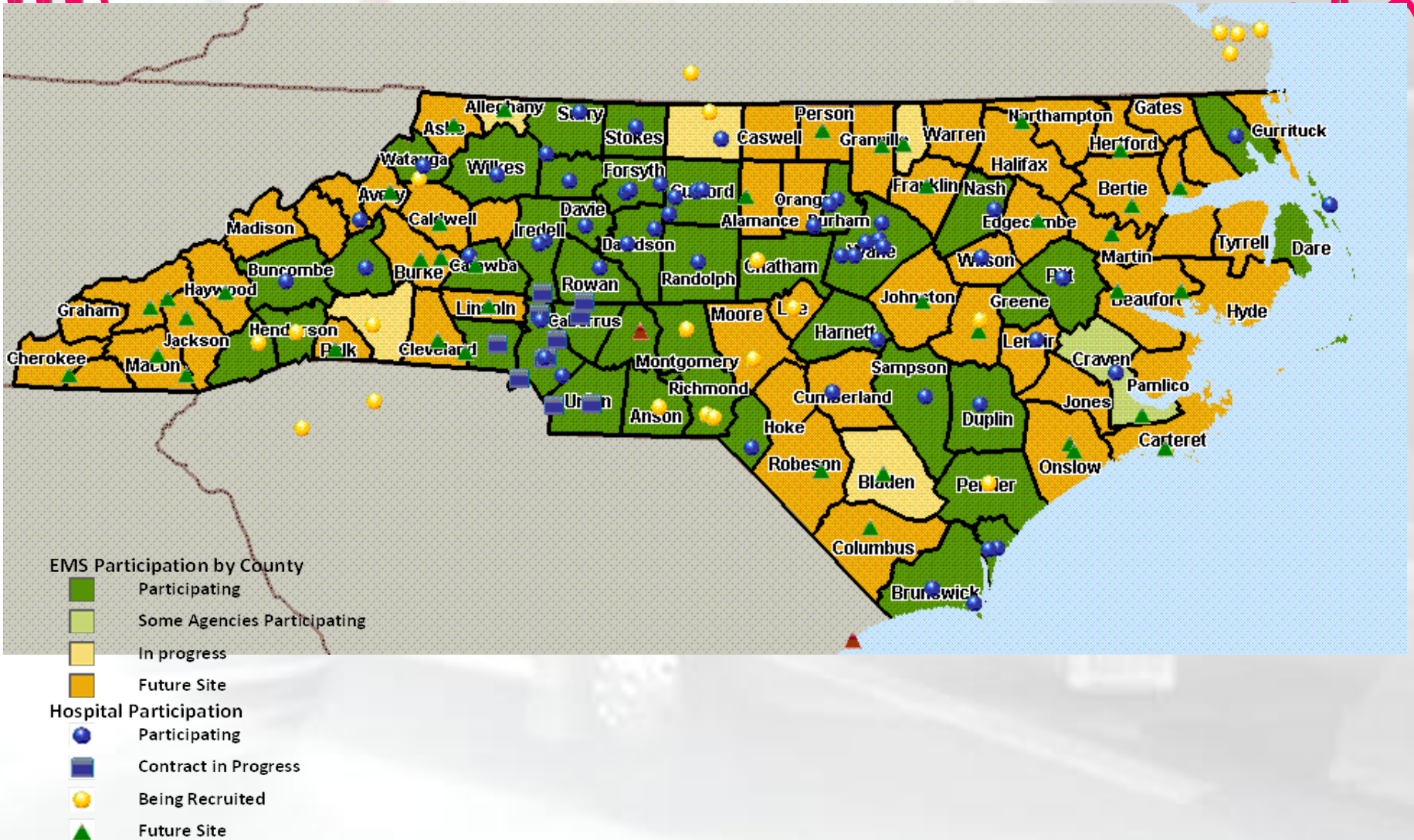
# CARES Participation:

	Number	% Population	Cumulative Population
EMS Systems in NC	100	100%	
EMS Systems reporting into CARES	39	65.97%	65.97%
EMS Systems in Progress	5	2.65%	68.62%
Future EMS Systems	55	31.38%	100
Cases in the CARES (Audited)			
Total 2010	1643		
Total 2011	1911		
Total 2012	2090		
Grand Total to date	5644		
Hospitals in CARES			
Total Hospitals Needed for CARES NC data	139		
Hospitals identified by EMS as destination	90		
Hospitals Trained	59		
Hospitals with data in system	43		

# EMS Participation:



# Hospital Participation:





**18 months out at least!**

# PreMIS:

- Lacks sufficient data points for CARES
- Working to make version 3 capable of electronic export to CARES
- Train employees:
  - PreMIS / NEMESIS / CARES compliant data dictionary
- Individual medic complete PCR using data dictionary definitions



# Cardiac arrest in North Carolina:

~ 5000-8000 per year (ED vs. EMS records)

## NC Office of EMS Preliminary data

- Statewide Cardiac Arrests: 5,213
- EMS Return of Spontaneous Circulation: 1,845 (35%)
- Arrived at Emergency Department Alive: 1,034 (20%)
- Admitted to Hospital Alive: 589 (11%)
- Discharge from Hospital Alive :not available... likely under 5%



# Cardiac arrest in North Carolina From the CARES Registry:

Bystander CPR	23%
AED Use	1.3%
Public CPR training	3% / year

**32% Survival Rate**

(Utstein criteria)

Original CARES data from Wake, Durham and  
Mecklenburg Counties



# Current Data:

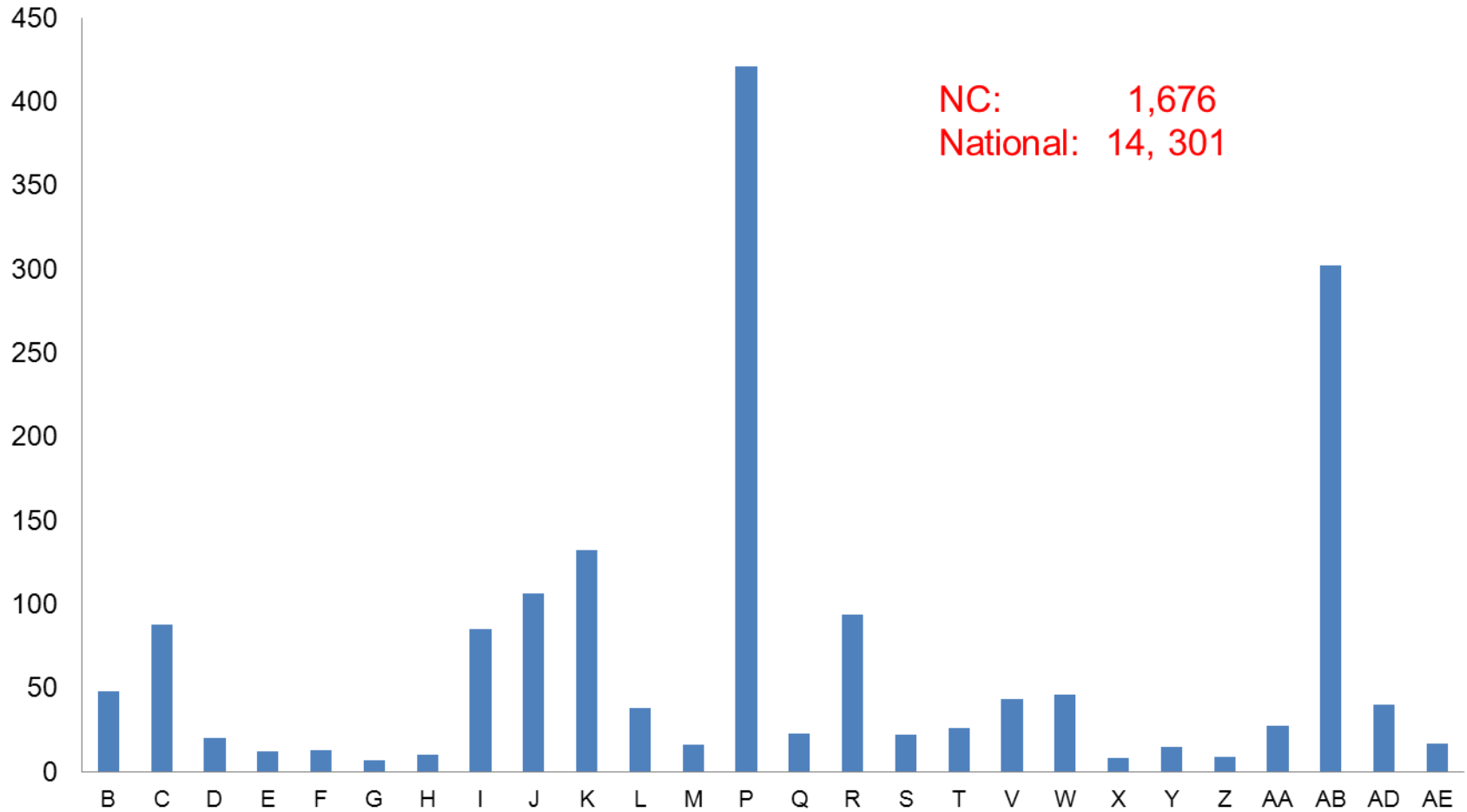
Site	Inclusive Dates Reported	Overall Survival to Hospital Discharge	Source for Overall Survival Data	Number of Cases included in Overall Survival Statistics	Bystander Witnessed VF Survival to Hospital Discharge	Source for VF Survival Data	Number of Cases included in VF Survival Statistics	% Bystander CPR Provided
North Carolina (Original 4 Agencies)	Jan 1, 2010 to Dec 31 2010	11.7%	CARES Utstein Report	1098	31.7%	CARES	164	33.9%
North Carolina (Revised 6/25/12)	Jan 1, 2010 to Dec 31 2010	10.4%	CARES Utstein Report	1310	28.0%	CARES 2010 report	193	34.0%
North Carolina (7/27/11)	Jan 1, 2011 to Dec 31 2011	12.0%	CARES Utstein Report	1463	29.4%	CARES Utstein Report	235	38.2%



# North Carolina CARES Case Volumes Year to Date: 2012 September 26, 2012



NC: 1,676  
National: 14,301

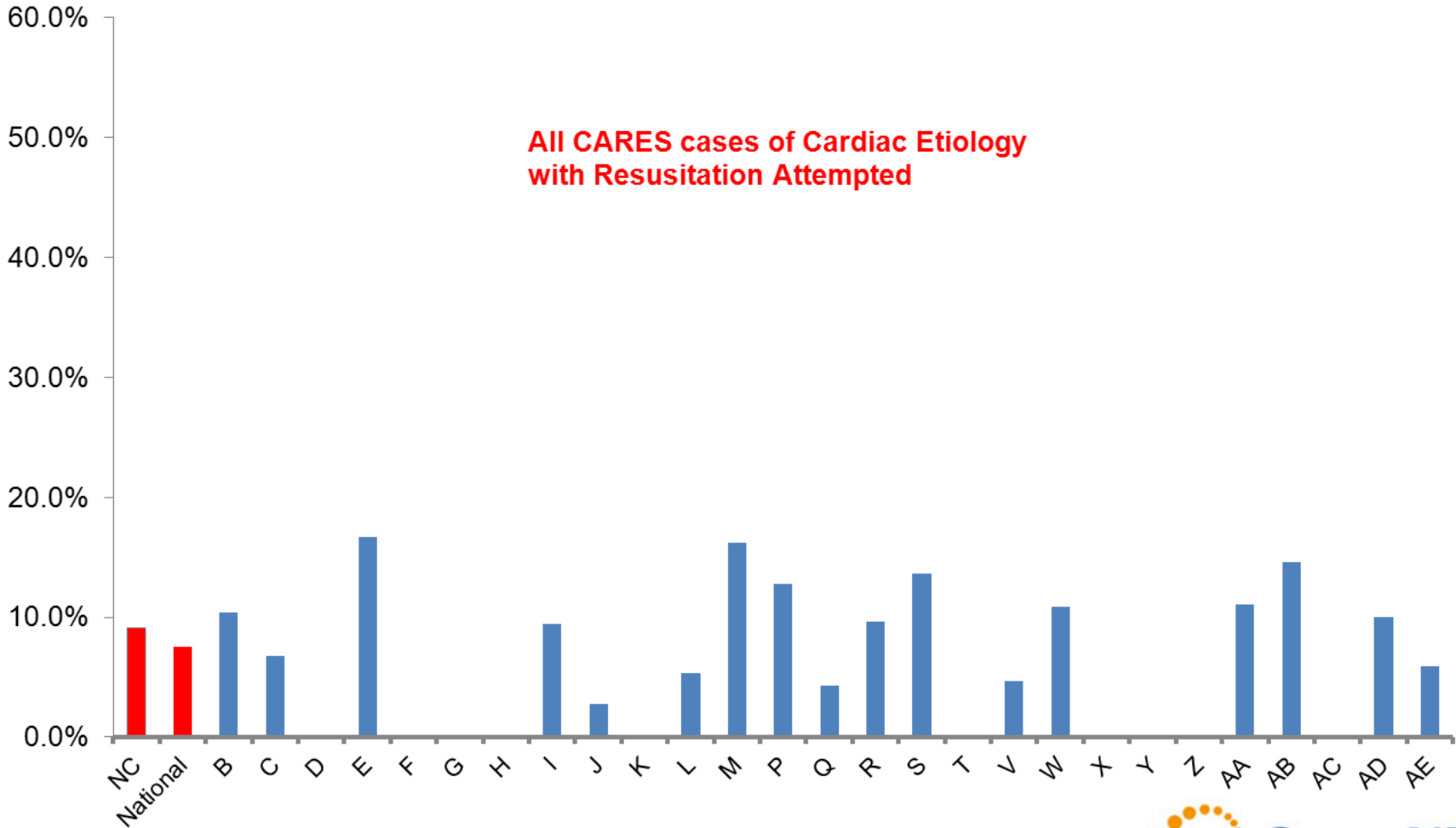




# North Carolina CARES

## Overall Survival

Year to Date 2012  
September 26, 2012



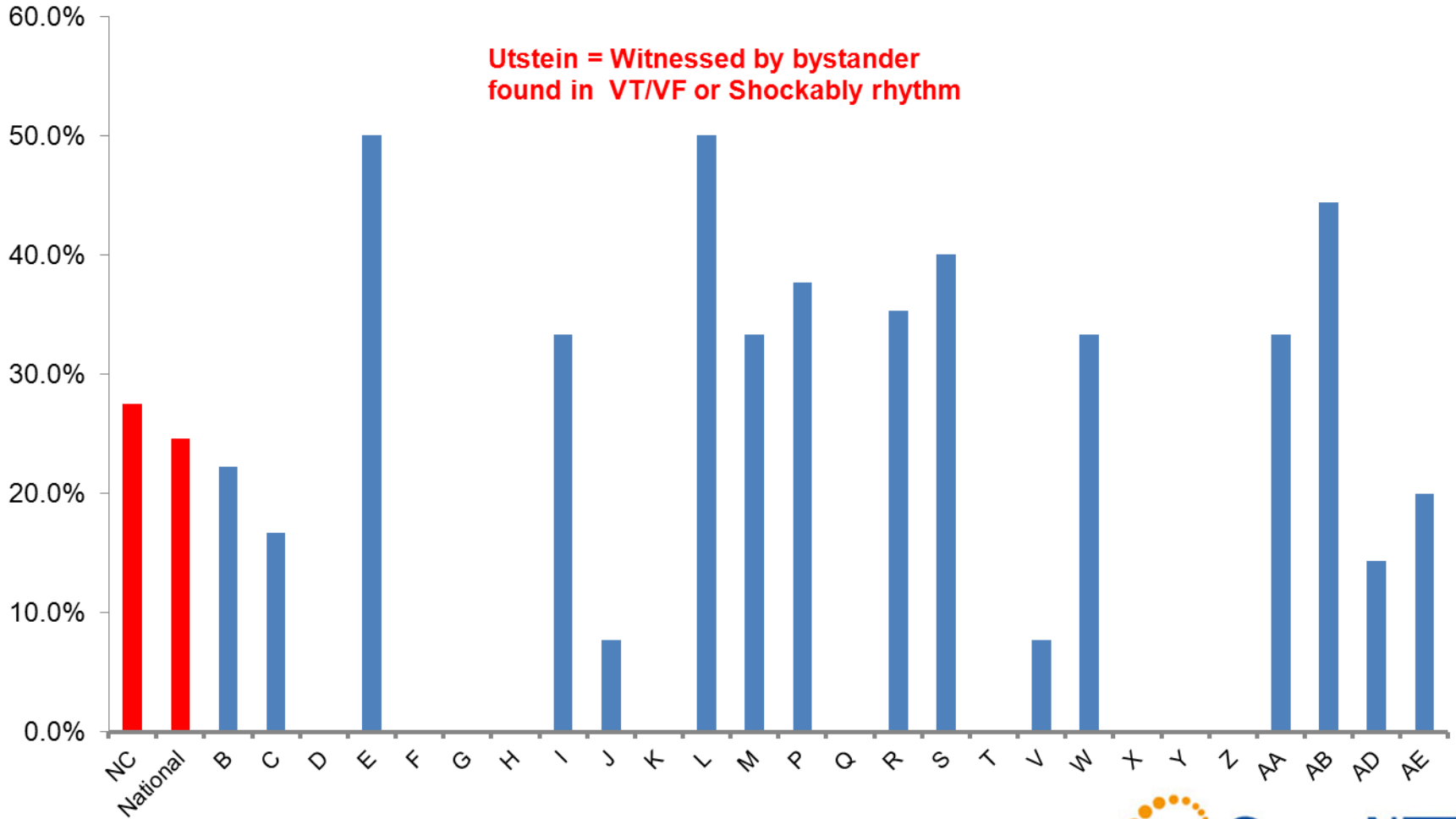


Cardiac Arrest Resuscitation System

# North Carolina CARES Utstein Survival Year to Date 2012 September 26, 2012



**Utstein = Witnessed by bystander  
found in VT/VF or Shockably rhythm**





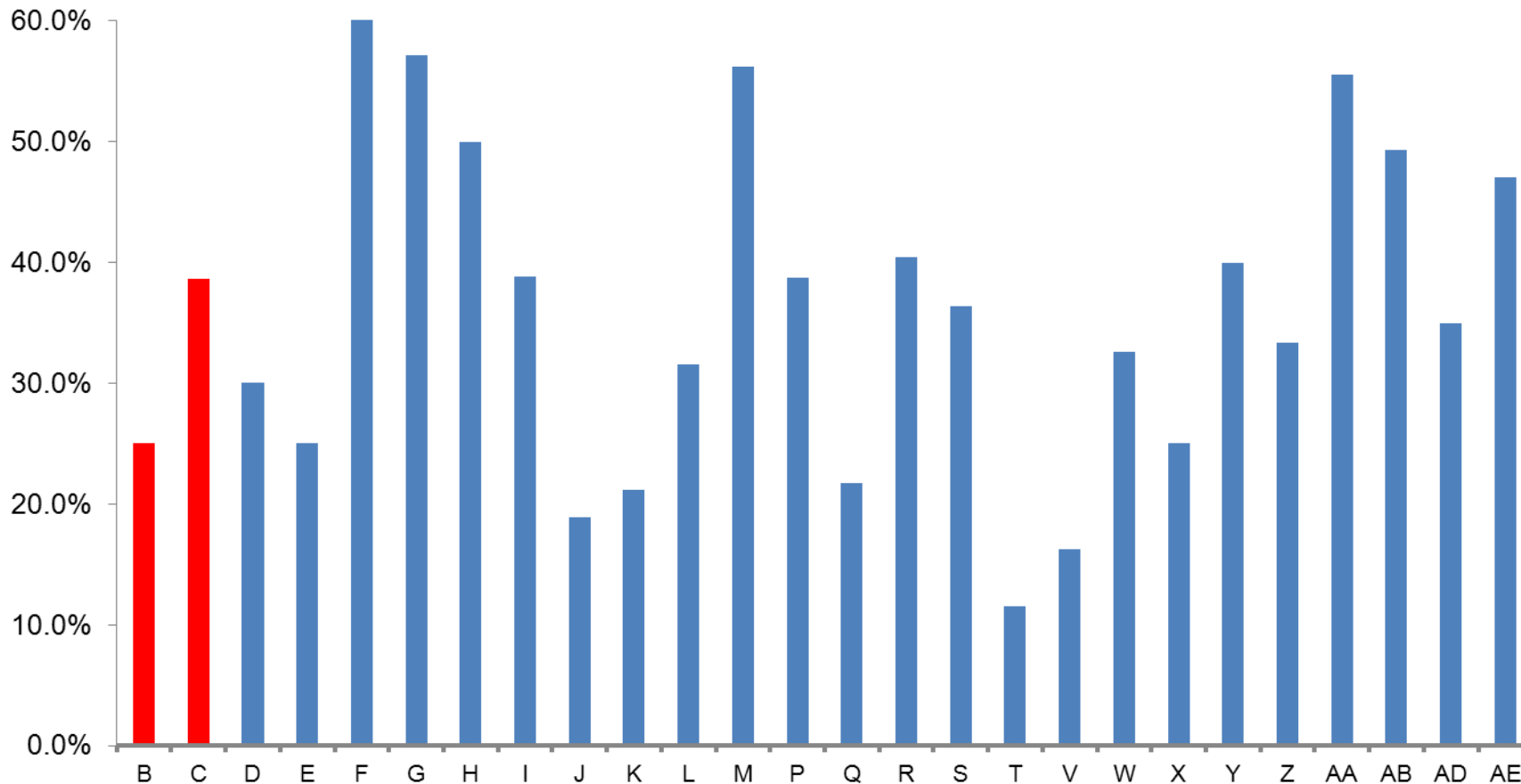
Cardiac Arrest Resuscitation System

# North Carolina CARES Sustained ROSC in Field Year to Date 2012 September 26, 2012



## HeartRescue PROJECT

Every second counts. Every action matters.

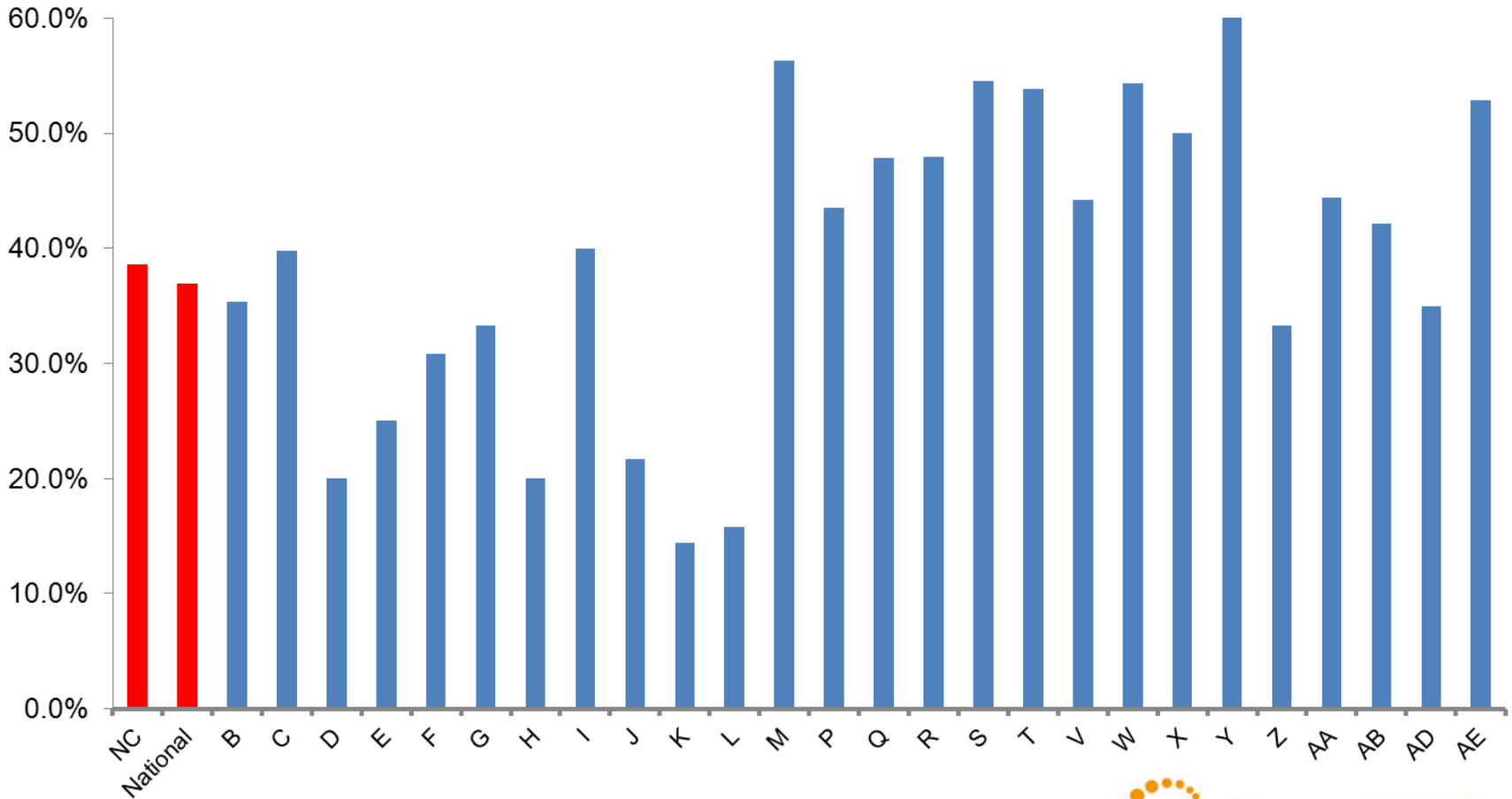






Cardiac Arrest Resuscitation System

# North Carolina CARES Bystander CPR Year to Date 2012 September 26, 2012

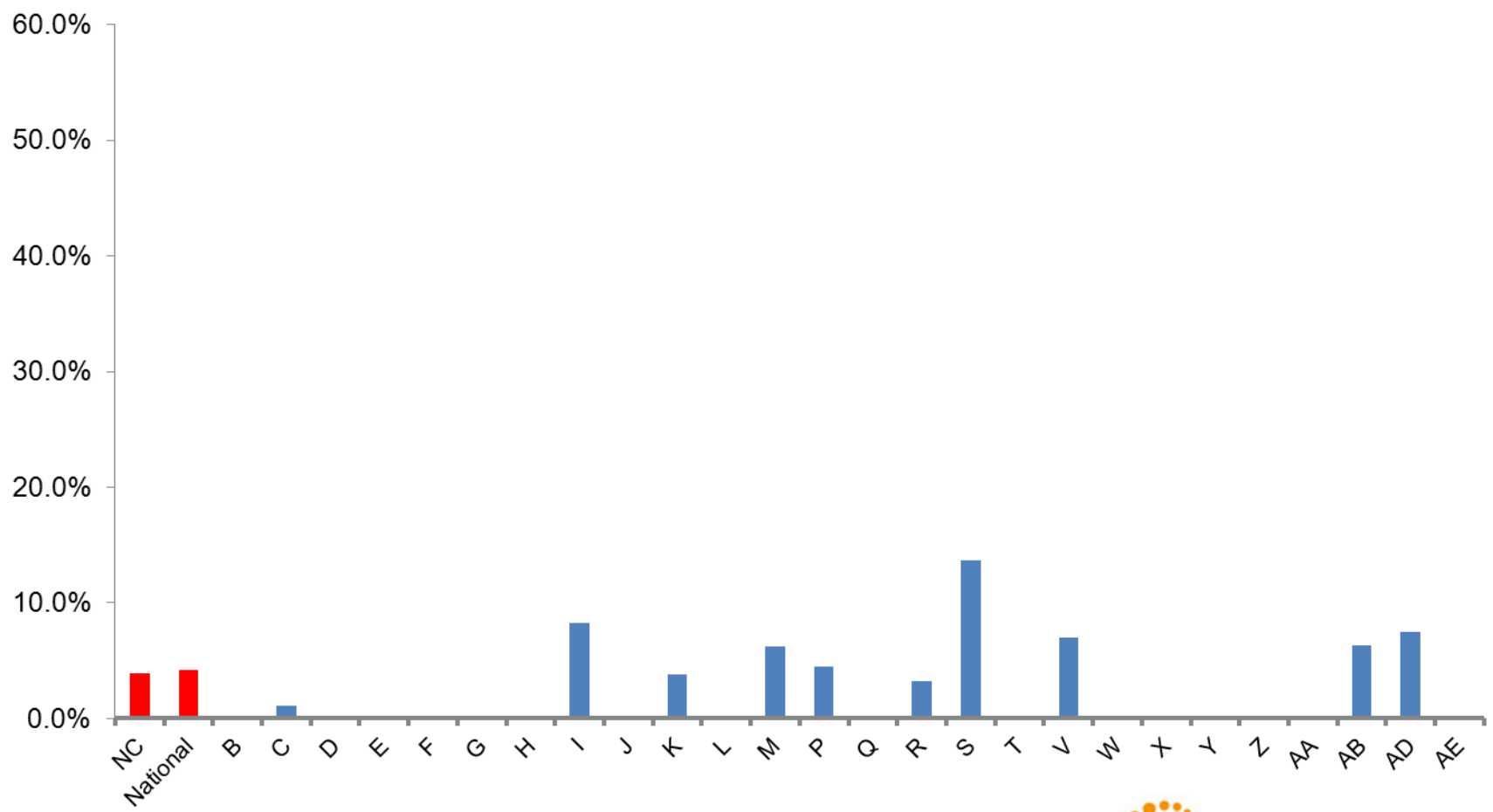


SO EASY A DOG CAN DO IT!





# North Carolina CARES Bystander AED Application Year to Date 2012 September 26, 2012

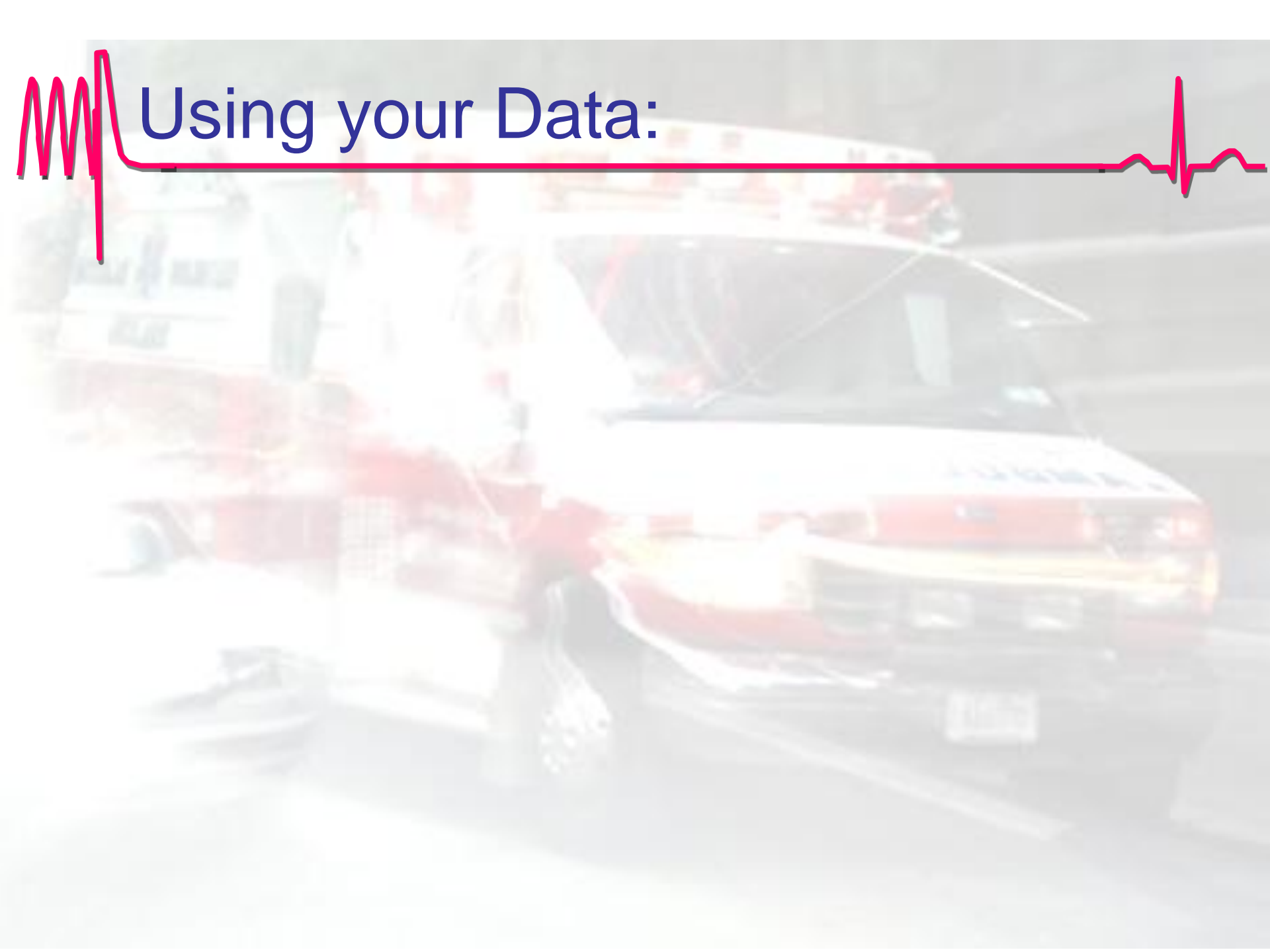




# NC Success Stories:

- Pregnant Woman/School Teacher – Charlotte
- Legislator-Raleigh
- Police Officer - Yadkinville
- Baseball Coach-Winston-Salem
- Former Girl scout performs CPR-Durham
- Rural EMS: Stokes County Survival Rate 66%

# Using your Data:





# Good data practices:

- All fields complete
- Know your data definitions
- Know the capability of your registry
- You must monitor for compliance not just data metrics

# Dispatch CPR Instruction:

## Dispatch Instruction

Yes	No	Unknown	Blank
31%	24%	43%	1%



# Know your Registry:

- Case Criteria
  - Cardiac Etiology where EMS attempts resuscitation
- Canned Reports
  - CAD Times, Utstein, Summary Reports
- Export of Raw Data





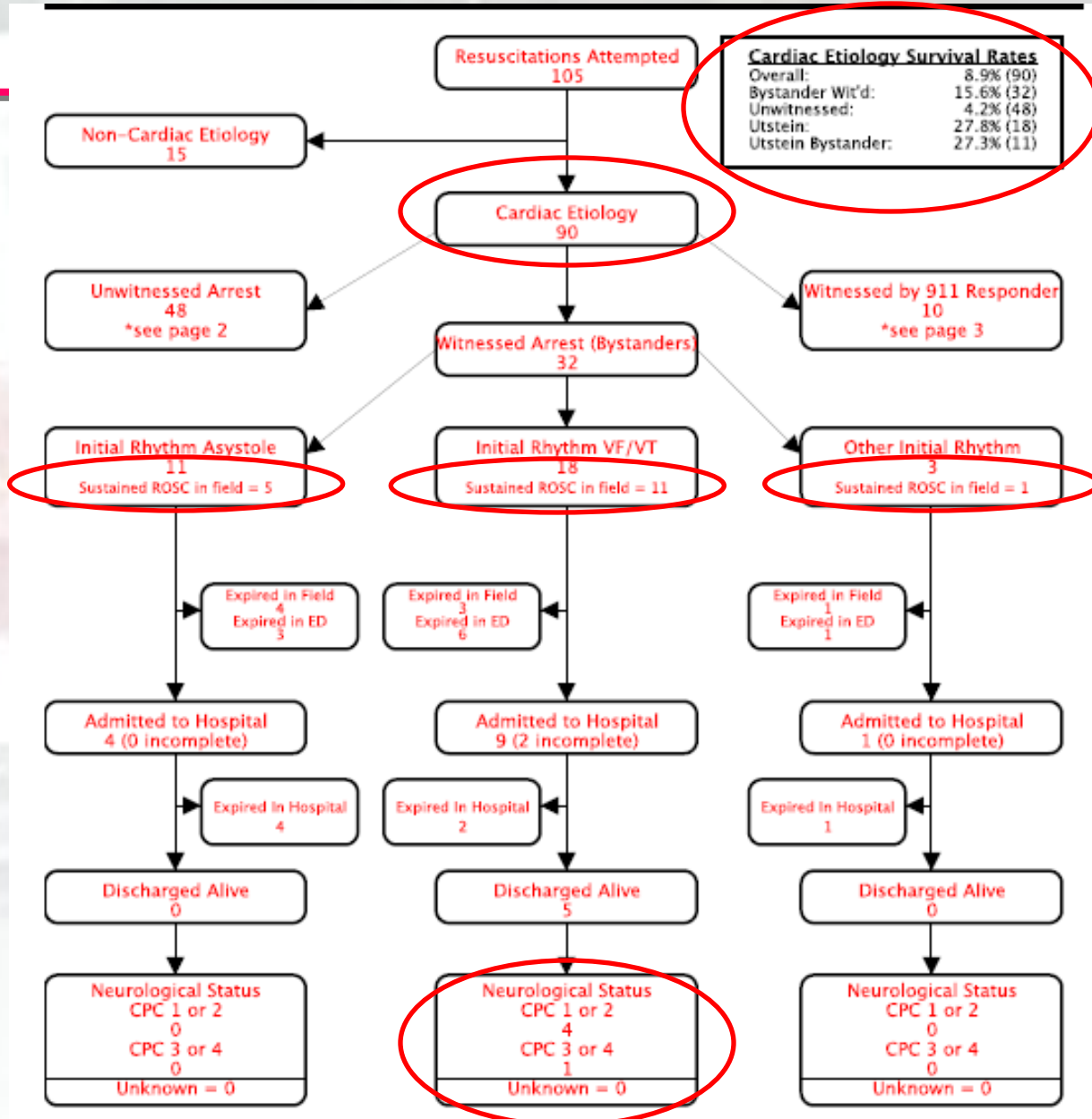
# Definitions:



- Overall survival
  - All-comers of cardiac etiology
- Utstein Survival
  - Witnessed, VT/VF
- Bystander CPR
  - All cases with bystander initiated CPR
- Bystander AED
  - All cases that have an AED applied by the bystander

Refer to handout

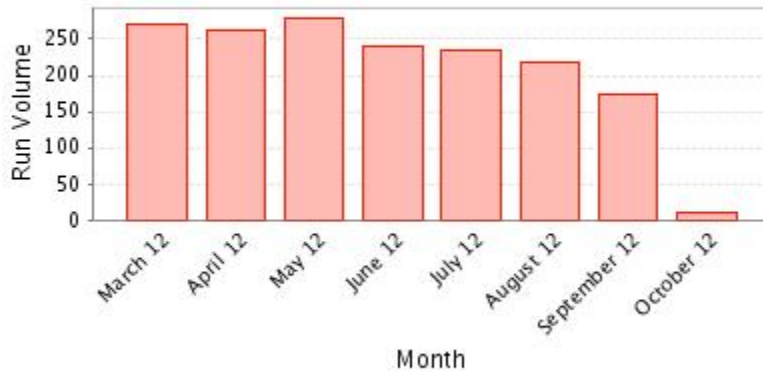
# Utstein



# Run Volumes:

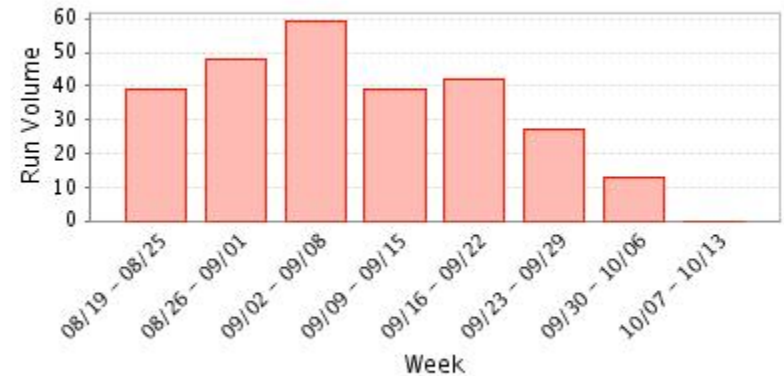
## Agency Productivity

### Run Volume By Month



## Agency Productivity

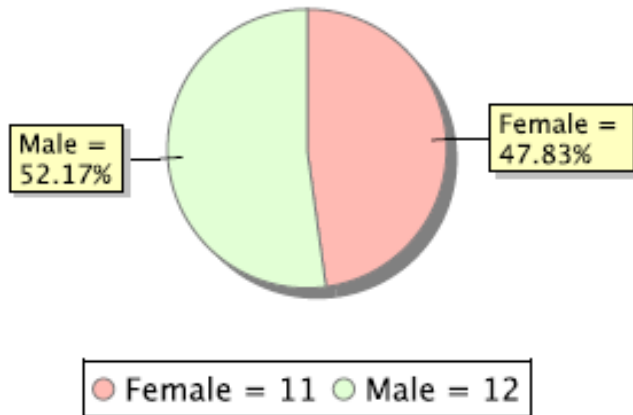
### Run Volume By Week



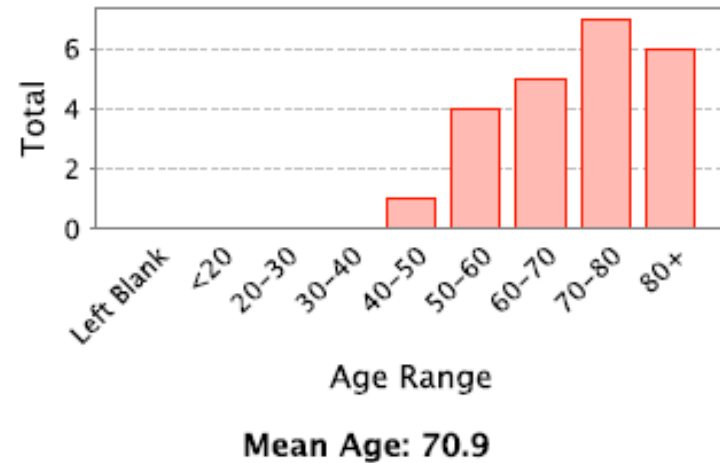
- Under Reports Tab
- Helps identify potential missed cases

# Demographics:

Gender



Age



Location Type	Count
Home/Residence	16 - 69.6%
Nursing Home	5 - 21.7%
Healthcare Facility	1 - 4.3%
Other	1 - 4.3%

- Gender
- Age range
- Location



# Summary Data:

- Demographic Information
- Bystander CPR rate
- AED rate of application
  - Careful how determined – should be applied by bystander/total cases



# Summary:

## Who Initiated CPR? (%) N=48

Not Applicable 0 (0.0)

Total Bystanders\* 17 (35.4)

First Responder 18 (37.5)

Emergency Medical Services (EMS) 13 (27.1)

## Was an AED applied prior to EMS arrival? (%) N=48

Yes 12 (25.0)

No 36 (75.0)

## Who first applied automated external defibrillator? (%)

**N=12** \* need total number of arrests not

Total Bystanders\* 0 (0.0)

First Responder 12 (100.0)

Age	N=48
Mean	62.3
Median	67.0
Gender (%)	N=48
Female	17 (35.4)
Male	31 (64.6)
Race (%)	N=48
American-Indian/Alaskan	0 (0.0)
Asian	1 (2.1)
Black/African-American	9 (18.8)
Hispanic/Latino	0 (0.0)
Native Hawaiian/Pacific Islander	0 (0.0)
White	38 (79.2)
Unknown	0 (0.0)
Location of Arrest (%)	N=48
Healthcare Facility	2 (4.2)
Home/Residence	37 (77.1)
Industrial Place	0 (0.0)
Nursing Home	3 (6.3)
Other	0 (0.0)
Place of Recreation	2 (4.2)
Public/Commercial Building	4 (8.3)
Street/Highway	0 (0.0)
Transport Center	0 (0.0)
Arrest witnessed (%)	N=48
Bystander Witnessed	21 (43.8)
Witnessed by EMS	8 (16.7)
Unwitnessed	19 (39.6)
Who Initiated CPR? (%)	N=48
Not Applicable	0 (0.0)
Total Bystanders*	17 (35.4)
First Responder	18 (37.5)
Emergency Medical Services (EMS)	13 (27.1)
Was an AED applied prior to EMS arrival? (%)	N=48
Yes	12 (25.0)
No	36 (75.0)
Who first applied automated external defibrillator? (%)	N=12
Total Bystanders*	0 (0.0)
First Responder	12 (100.0)
Who first defibrillated the patient? (%)	N=48
Not Applicable	25 (52.1)
Total Bystanders*	0 (0.0)
First Responder	7 (14.6)
Responding EMS Personnel	16 (33.3)
First Arrest Rhythm (%)	N=48
Vfib/Vtach/Unknown Shockable Rhythm	12 (25.0)
Asystole	25 (52.1)
Idioventricular/PEA	10 (20.8)
Unknown Unshockable Rhythm	1 (2.1)
Sustained ROSC (%)	N=47
Yes	15 (31.9)
No	32 (68.1)
Was hypothermia care provided in the field? (%)	N=48
Yes	25 (52.1)
No	23 (47.9)

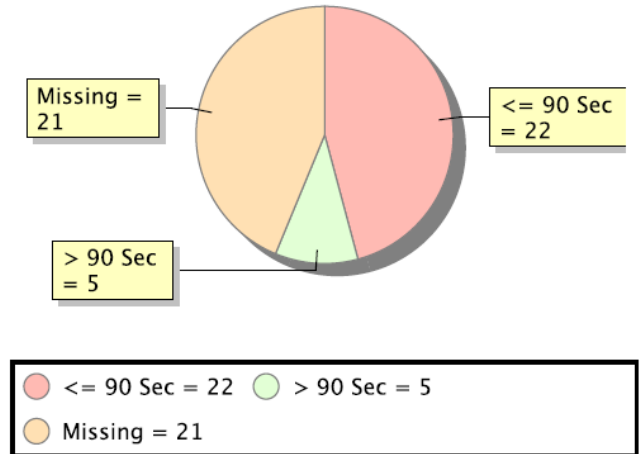
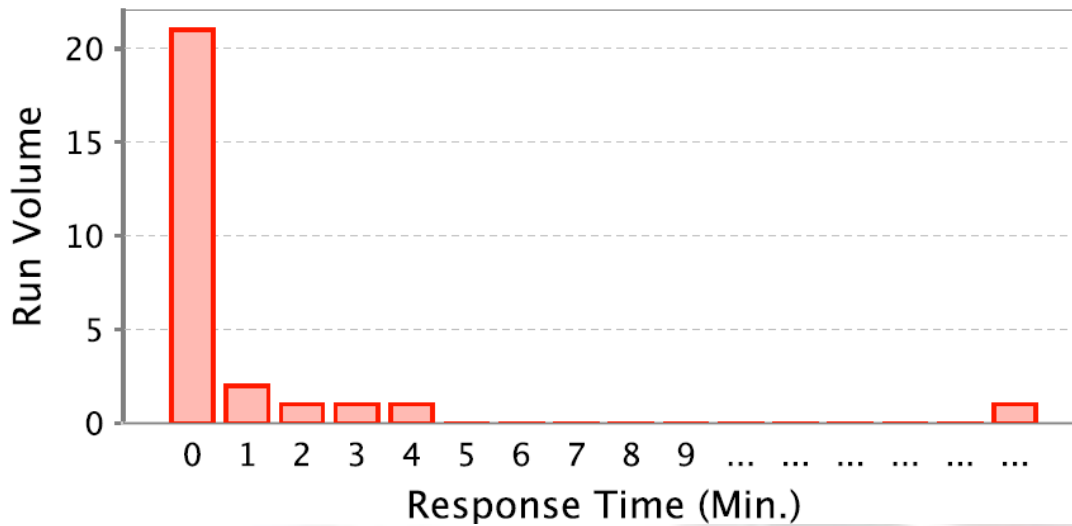


# CAD Times:

- Meant for internal process improvement
- Consistency of data element definition
- Recognition of response times, need for bystander CPR and AED use
- Prompt to look at additional data: dispatch call to recognition of cardiac arrest, call to CPR instruction

# CAD Times: EMS and FR

First Responder Times: 911 to Dispatch



- 911 to arrival
- 911 to dispatch
- Dispatch to arrival
- <4 > 4
- missing





# Track:

- Metric from HR/RACE CARS
  - OA Survival, Utstein, Bystander rate
- Chose other metrics to track, ex. ROSC
  - AED application rate, ROSC in field, Dispatch instruction
- Generation of reports
  - Pull quarterly but individualize the time frame pulled
  - Case by Case and aggregate data
  - Share it



# Remember your resources:

- Cares
  - Canned reports
  - Excel export report
- Protocols
  - Gap analysis
- National/formal reports-HR –SCA index, community data sharing



# P A S – I T:

- Pull data
  - Define time frame
  - Individual cases
  - Data over Time
- Analyze Data
- Share with others
- Implement improvement efforts
- Track progress

# Building Reports:

	Metric	Case	2012 Cumulative	Cumalitive Percentage	Goals:
<b>Dispatch</b>	Call to Recongntion				
	Call to CPR instruction			20.80%	
<b>First Responder</b>	Call to arrival at pt side		3		
	Call to CPR			38%	
	Call to AED shock			15%	
<b>EMS</b>	Call to arrival at pt side		10		
	Call to CPR				
	Call to defibrillation		16		
	Sustained ROSC yes or no	no		25%	
<b>Hospital</b>					
<b>Survival:</b>	Discharged alive with good to moderate CPC				
<b>Overall</b>				10.40%	
<b>Utstein</b>	score: yes or no	no		22.40%	
<b>Bystander</b>	CPR	yes		35.40%	
	AED application	no		0%	



# First Responder:

<b>Cardiac Etiology Cases</b>	48
<b>First Responder Data</b>	
CPR initiation	38%
AED applied	25%
AED shock	15%
<b>FR Data Available</b>	
FR Dispatch	56%
FR En route	52%
FR Onscene	48%

# Individual Case Feedback:

Event	Time	Time elapsed
Witnessed arrest	7:16	0
CPR	7:16	0
911 Call	7:16	0
Dispatch CPR instructions given		
FR Dispatched	7:17	0:01
Ambulance Dispatched	7:17	0:01
Ambulance En Route	7:18	0:02
FR En Route	7:18	0:02
FR On Scene	7:19	0:03
Ambulance On Scene	7:24	0:08
EMS Patient Contact	7:26	0:10
First Defibrillation	7:32	0:16
Leave Scene	8:31	1:15
Arrived in ED	9:10	1:54
Died in field, no ROSC		
from 911 call, 16 minutes to defibrillation		
FR on scene 13 minutes before defibrillation		

# Hospital Reports:





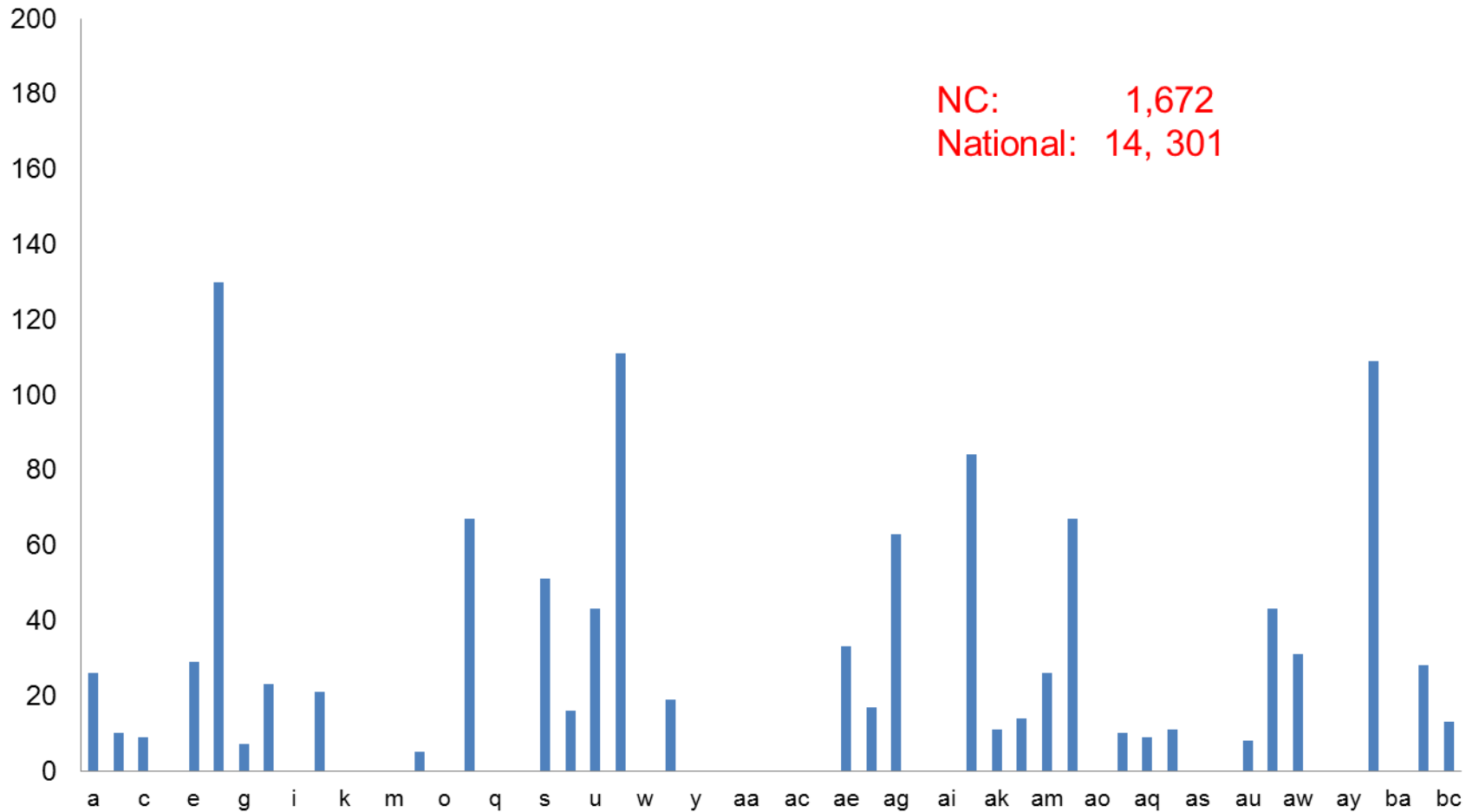
# Hospital:

- CARES hospital data is limited:
  - Dies in ED – 1 element
  - Survives to DC – 10 elements
- Consider voluntarily entering into the INTCAR registry





# North Carolina CARES Cases Transported to the Hospital Year to Date: 2012 September 26, 2012



NC: 1,672  
National: 14,301



<b>Volumes</b>	
National	14, 301
NC	1672
Transported to Hospital	1191
<b>Pre-Hospital</b>	
ROSC In Field	614
Hypothermia in Field	535
<b>ED</b>	
Dead in ED	270
Ongoing Resus in ED	864
Admitted to Hospital	364
<b>In-hospital</b>	
<b>STEMI</b>	
Yes	84
No	291
Unknown	502
Blank	314
MI	43
Hypothermia in Hospital	194
Angio	60
Stent	26
ICD	26
CABG	1
<b>Outcomes</b>	
Died in Hospital	144
DC Alive	149
DC Neuro Intact	125
DNR during Stay	69
<b>Incomplete Cases</b>	<b>298</b>



# Feedback


Code Cool Feedback  
Direct Presenters by EMS

Date of Service:  
Time of Code Cool Activation:  
EMS Agency:  
Paramedics:  
ED Physician:  
ED Staff:  
Intensivist:  
CCU RN:  
Cardiologist:

Initial Rhythm:

Bystander CPR?            Y   N  
AED used?                Y   N  
Pre-hospital TH initiated?   Y   N  
EKG obtained in field?   Y   N  
STEMI?                    Y   N  
Cardiology Consulted?   Y   N

	Recommended Targets (mins)	Actual Data
Arrest to CPR Initiated		
CPR to ROSC		
EMS Total Time		
ED Door to Code Cool Activation		
ED Door to EKG Obtained		
ED Door to Arctic Sun Initiated		
Total Time in ED		
ROSC to TH Initiated		
ROSC to Target Temp Reached		

- 
- Feedback on all Code Cool activations
  - PI Improvement



# Code Cool Data

- Start date: September 1

<b>Total Number of Patients:</b>	<b>6</b>
<b>Initial Rhythm</b>	
Asystole/ PEA	2
V-Fib/ V-Tach	3
Unknown	1
<b>Disposition</b>	
Cooled to Target Temperature	2
Death in ED	2
Canceled	1
Other	1
<b>Outcomes</b>	
Discharged CPC 1-2	3
Discharged CPC 3-5	0
Death	3



# CARES Data

## Hospital Report

Presumed Cardiac Etiology; Resuscitation Attempted by 911 Responder; End of Event = Pronounced in ED or Ongoing Resuscitation in ED Service Date: From 01/01/2012 Through 10/1/2012

	Number of Patients (%)
Sustained ROSC in the field	50 (76.9)
Hypothermia care initiated/continued in the hospital (among admitted patients)	26 (65.0)
Discharged with good/moderate CPC	14 (21.5)

Initial Rhythm	Total	Survived to Admission (61.5)	Survived to Discharge (23.1)
Shockable	24(36.9)	17(42.5)	12(80.0)
Unshockable	41(63.1)	23(57.5)	3(20.0)
Asystole	23	14	1
VFib	21	14	10
VTach	2	2	1
Idioventricular/PEA	14	7	1
Unknown Unshockable	4	2	1
Unknown Shockable	1	1	1
	65	40	15



# Next Steps

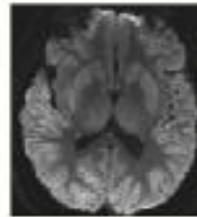
- Develop regional EMS and referral hospital treatment and transfer plans
- Expand collection of data to all counties (CARES & INTCAR)
- Expand adoption of team-based resuscitation method to all EMS agencies and Emergency Departments
- Roll out community education of hands-only CPR to Southeastern region



# INTCAR:

- International Registry for Cardiac Arrest Registry
- <http://www.intcar.org/>
- is a joint venture of hospitals, research societies and individuals dedicated to improving post-resuscitation care for cardiac arrest survivors.
- allows members to participate in research groups of their own design and choosing

# Neuroimaging



# Cardiology



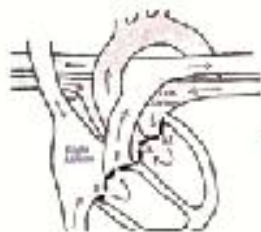
# Seizures and EEG



# Methods/ Complications



# Prognostication



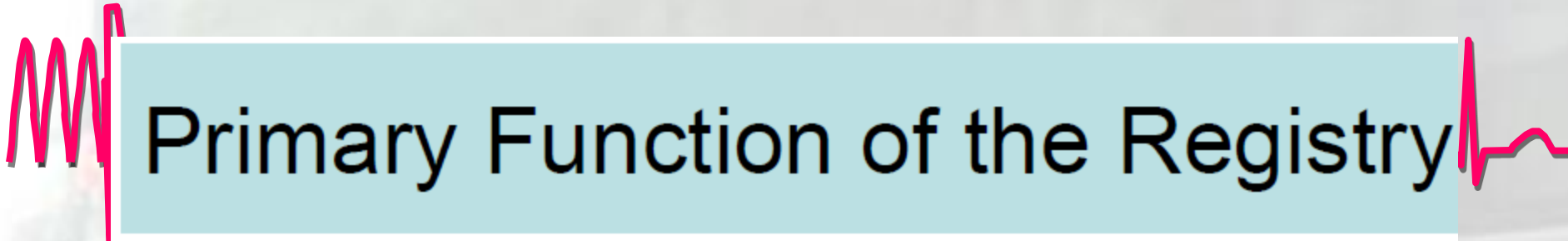
# Hemodynamics





# Core Set:

- 108 data elements
- 2 hours to abstract and enter
- Clinical abstractor
- Subset Example:
  - The Cardiology group was developed to evaluate the relationship between cardiac features of cardiac arrest and outcome, and was founded in 2009.



# Primary Function of the Registry

- Collect data
  - HOW and on WHOM is hypothermia being performed after Cardiac Arrest
  - Characteristics of the patients
  - Utilization of PCI, EEG, MRI, etc
  - Outcomes
- Return reports to member institutions for internal QI purposes, compare outcomes and practices to norms within the registry

# Secondary Functions

- Research within the registry
  - Requires approval and cooperation of the steering committees
- “Networking” function to connect centers
  - Research groups
  - Provide support for new sites

*Acta Anaesthesiol Scand* 2009; 53: 926–934  
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ACTA ANAESTHESIOLOGICA SCANDINAVICA  
doi: 10.1111/j.1399-4075.2009.02021.x

## Outcome, timing and adverse events in therapeutic hypothermia after out-of-hospital cardiac arrest

N. NILSSON<sup>1,2</sup>, J. HOVDENAR<sup>3</sup>, F. NILSSON<sup>4</sup>, S. RUTBERGSON<sup>5</sup>, P. STÅLEBERG<sup>6</sup>, K. SUNDQVIST<sup>7</sup>, F. VALBERG<sup>8</sup>, M. WASSCHER<sup>9</sup> and H. FINBERG<sup>1,10</sup>, for the Hypothermia Network  
<sup>1</sup>Department of Clinical Sciences, Lund University, Lund, Sweden, <sup>2</sup>Departments of Anaesthesiology and Intensive Care, Helsingborg Hospital, Helsingborg, Sweden, <sup>3</sup>Rikshospitalet, Oslo, Norway, <sup>4</sup>Competence Center for Clinical Research, Lund University, Lund, Sweden, <sup>5</sup>Uppsala University Hospital, Uppsala, Sweden, <sup>6</sup>Centre Hospitalier de Luxembourg, Luxembourg, Luxembourg, <sup>7</sup>Department of Anaesthesiology and Intensive Care, Institute for Experimental Medical Research, Ullevål University Hospital, Oslo, Norway, <sup>8</sup>Departments of Anaesthesiology and Intensive Care, Landspítali University Hospital, Reykjavik, Iceland, <sup>9</sup>Rigshospitalet, Copenhagen, Denmark and <sup>10</sup>Sweden and Lund University Hospital, Lund, Sweden

*Acta Anaesthesiol Scand* 2009; 53: 926–934



# INTCAR Commitment



- Identify a principle investigator and data coordinator
- Report ALL unconscious patients admitted to your ICU, ICU group, or hospital with a primary diagnosis of cardiac arrest\*
  - Even if not treated with hypothermia
- PI should maintain contact with INTCAR administrator, and must take responsibility for high quality data entry

# Registration

- Go to the INTCAR or the Neurocritical Care Society website and follow registration instructions
- Seek exemption from local IRB to enter fully de-identified patient data
- Administrator will contact you by email, conduct a brief telephone interview, and provide you with a logon and password
- Review the “test patient” field
- Discuss data questions with administrator
- Begin entering patient data for ALL comatose survivors of cardiac arrest admitted to your institution



# Database Management

- Submit to INTCAR
- Develop a standing database to pull data back locally
- Develop reports to be generated for Quality Improvement
- Research questions addressed by query
- May add fields locally

# Community Reporting:





# Public Health Crisis:

- have significant impacts on community health, loss of life, and on the economy
- Need transparency of data
- Creates accountability
- Can help leverage resources



HOME

ABOUT

PARTICIPATE

REPORTS



Every Second Counts. Every Action Matters.

Community SCA  
Response Guide



### Learn About Our Partners



# Detailed, reliable data on sudden cardiac arrest

## Welcome

Welcome to the  
HeartRescue P  
treated and m

The Data Bank

- Publicly stat
- A common s
- A commitme

This site is designed to bring SCA data to your fingertips, presenting it in context with both major risk factors such as heart disease and diabetes and demographic information such as household income.

If your community is participating in this program and sharing its data, you can view information such as the

Home page for the Data Bank.

This site links to the [www.heartrescueproject.com](http://www.heartrescueproject.com) and will be reached by links on that site

**Massachusetts:  
Plymouth**

**Demographics**

1. Median Age	40.9
2. Median Household Income	72,634
3. Percent of Population with Bachelors Degree or Higher	32.5%
4. Population	494,919
5. Population Density	750.9

**Out-of-Hospital Cardiac Arrest Response**

**Bystander**

6. Bystander CPR	28
7. Bystander CPR - Rate	39.0%
8. Witnessed Events - Bystander	71

**Pre-Hospital**

9. Arrests - Cardiac etiology	291
-------------------------------	-----

**Hospital**

10. Treatment Provided - Number	76
---------------------------------	----

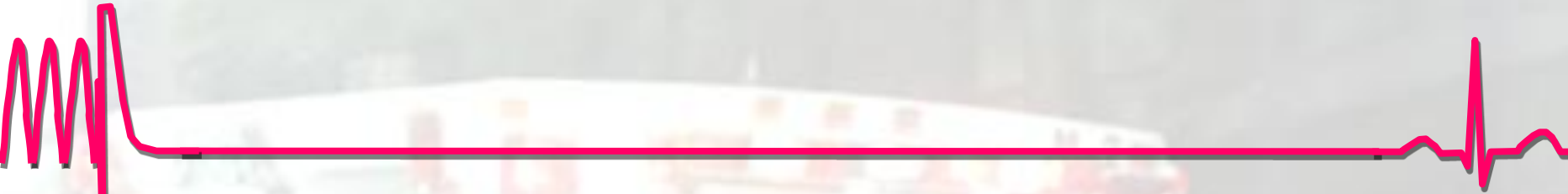
This table of data is display (continued on next slide.)

<b>Hospital</b>	
10. Treatment Provided - Number	76
<b>Risk Factors</b>	
11. Cardiovascular Deaths (per 100,000 population)	241.3
12. Diabetes Prevalence Rate	8.3%
13. Heart Attack Prevalence Rate	5.1%
14. Heart Disease Prevalence Rate	4.2%
15. Obesity Prevalence Rate	23.1%
16. Smoking Rate (percent of adults that smoke)	19.9%
<b>Survival</b>	
17. Events - VT / VF	119
18. Shockable Rhythm Survival Rate	46.0%
19. Survival Rate - Overall	26.5%
20. Survivors, Total	77

**Data Notes**

1. Source: U.S. Census Bureau American Fact Finder
2. Source: U.S. Census Bureau American Fact Finder
3. Source: U.S. Census Bureau American Fact Finder





	<b>Massachusetts: Hampshire</b>	<b>Massachusetts: Plymouth</b>
<b>Demographics</b>		
1. Median Age	36.2	40.9
2. Median Household Income	59,591	72,634
3. Percent of Population with Bachelors Degree or Higher	42.4%	32.5%
4. Population	158,080	494,919
5. Population Density	299.8	750.9
<b>Out-of-Hospital Cardiac Arrest Response</b>		

A county to county(s) comparison would list the data side by side where it is available.

You can compare up to four counties.

		Compared with counties in the same Median Age quartile		
Massachusetts: Plymouth		Low	Median	High
<b>Demographics</b>				
1. Median Age	40.9	37.4	39.8	41.0
2. Median Household Income	72,634	14,916	41,007	95,563
3. Percent of Population with Bachelors Degree or Higher	32.5%	6.9%	32.1%	53.7%
4. Population	494,919	19,677	26,415	19,378,102
5. Population Density	750.9	3.4	5.9	4,704.8
<b>Out-of-Hospital Cardiac Arrest Response</b>				

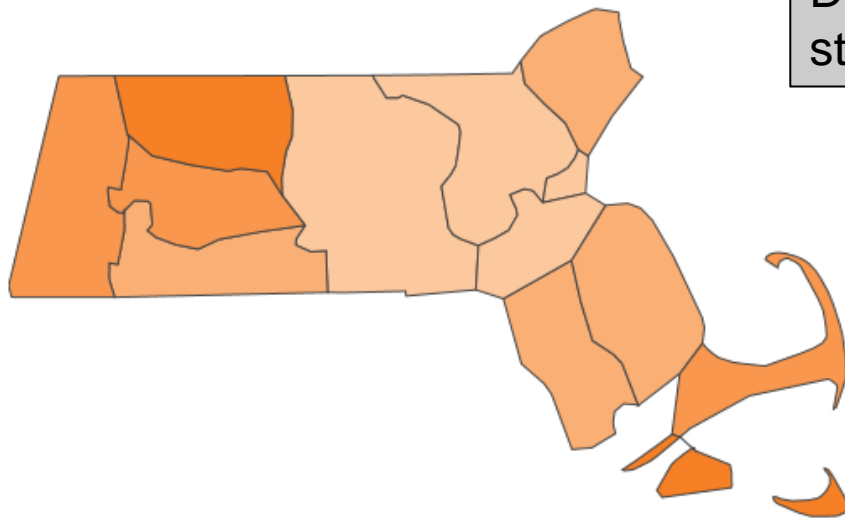
Comparison to a group of counties would compare it to the low, median and high value among that group. (There must be at least five counties in the group for data to appear in the comparison columns.)

**Location**

Massachusetts

**Data**

Out-of-Hospital Cardiac Arrest Response, Bystander: Bystander CPR



Data is displayed by quartile for the state.



Print



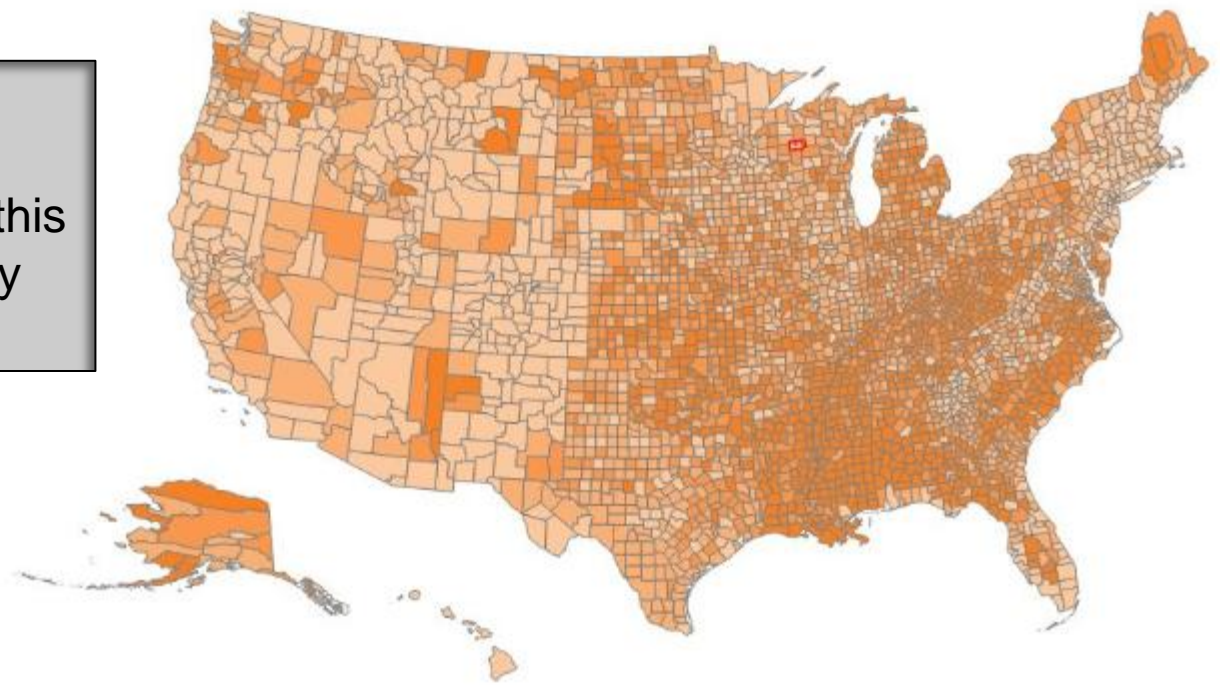
**Location**

United States

**Data**

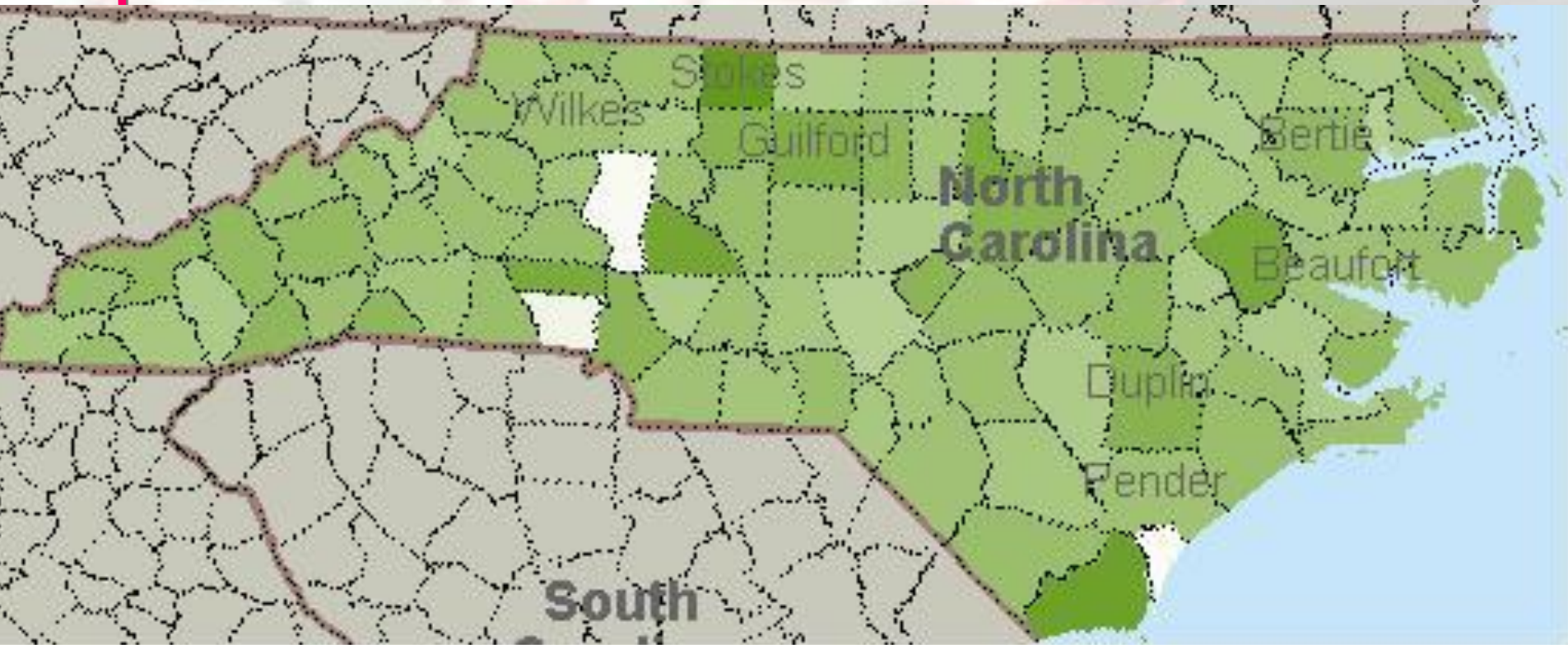
Risk Factors: Obesity Prevalence Rate

You can display risk factors by state or nationally – such as this example of obesity by county for the U.S.

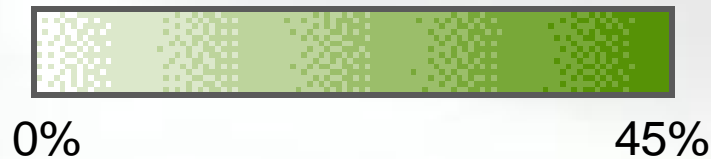


Print

# Regional Trends



Utstein Style Survival Rates





# Improving outcomes in cardiac arrest

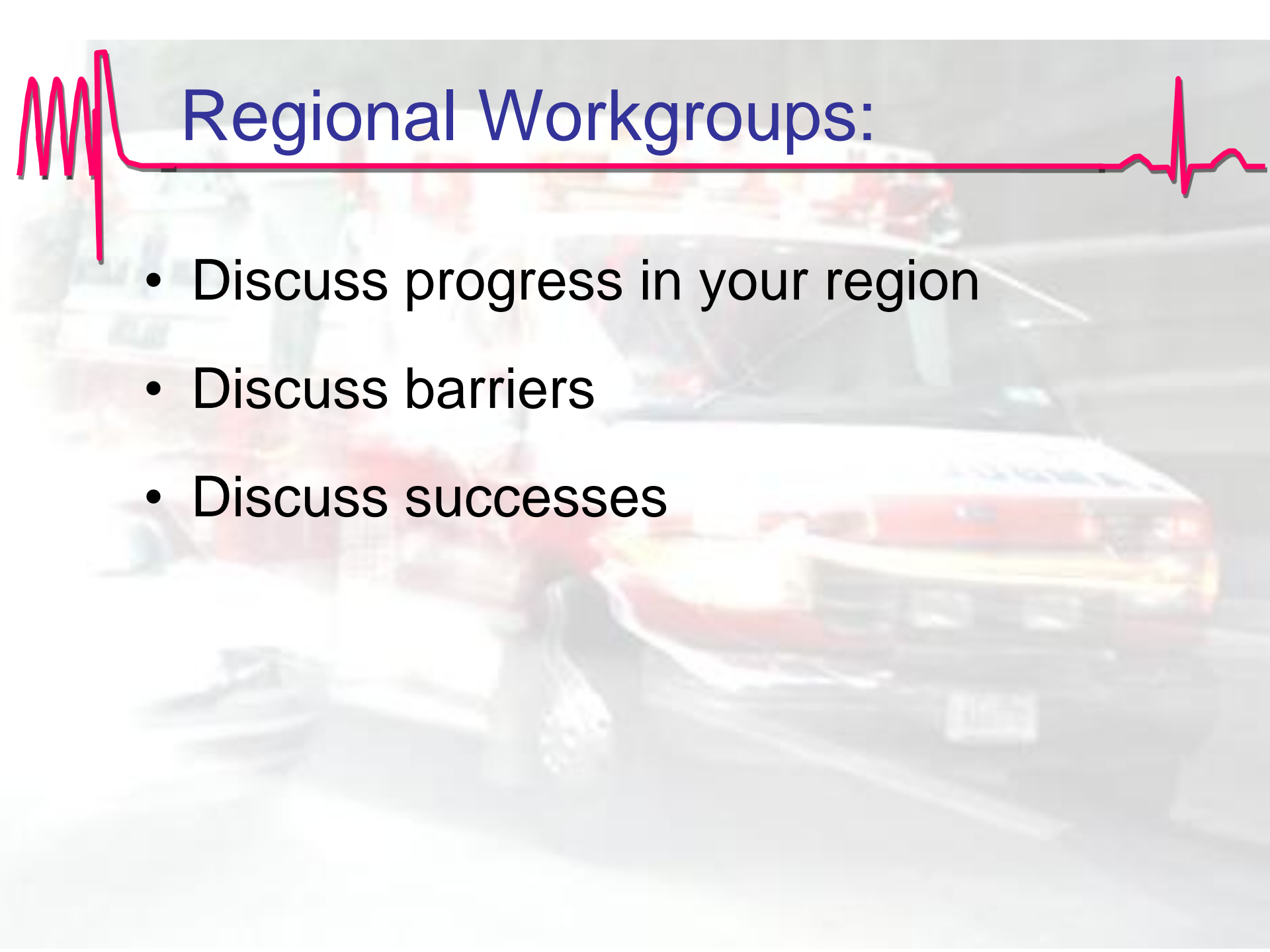
## Conclusions:

- Cardiac arrest is common and the third leading cause of death.
- Victims of out of hospital cardiac arrest are unlikely to survive
- Simple interventions in the chain of survival are likely to improve survival
- Data drives change

**USE YOUR CARES DATA  
TO IT'S FULL POTENTIAL!**



# Regional Workgroups:

- Discuss progress in your region
  - Discuss barriers
  - Discuss successes
- 

Next Steps:



# Community Updates:

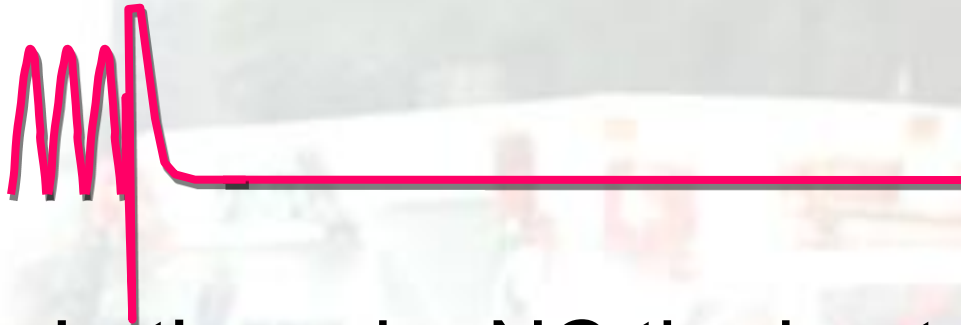
- [House Bill 837](#) -passed
  - requires students to learn CPR
  - pass a test showing proficiency in order to graduate
  - Effective with the Class of 2015
- [House Bill 914](#) -passed
  - requires at least one AED in every state building
  - state workers must be trained to use them





# Project Summary:

- Context
  - Little has been done in 30 years
  - #1 Killer in the United States
  - NC survival rate likely < 5%
- Objective
  - Improve survival of OOHCA by 50% over 5 years
- Design and Setting
  - A quality improvement study that examines survival from OOHCA in 5 regions across NC
- Patients
  - Cardiac Etiology
- Interventions
  - AHA Guidelines for CPR, ACLS, Post Cardiac Arrest Care, Establishing systems of Care



Let's make NC the best place in the country to have a heart attack or a cardiac arrest!



