



# The RACE Coordinator Meeting

## December 3<sup>rd</sup>, 2013

Regional Approach to Cardiovascular Emergencies *Cardiac  
Arrest Resuscitation System*



HeartRescue  
PROJECT



Cardiac Arrest Resuscitation System





# Objectives:

- Review the RACE Coordinator role in STEMI and Cardiac Arrest Care
- Discuss challenges and strategies for being successful in your role
- Review goals for Cardiac Arrest Care
- List strategies to implement on return to work





# The Statistics:

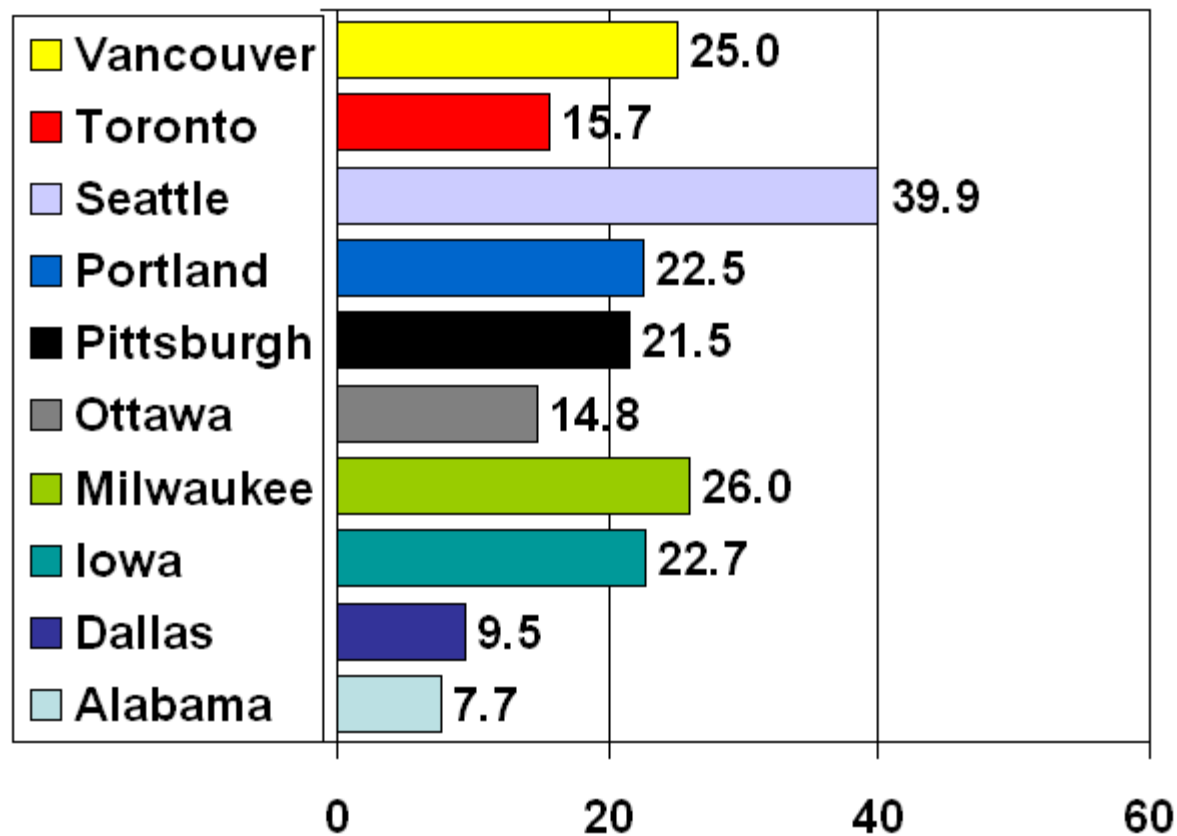
- Sudden Cardiac Arrest (SCA) is the 3<sup>rd</sup> leading cause of death in the US
- Survival rates have not changed in 30 years
- 80% of SCA die before they reach the hospital
- National Public Health Crisis



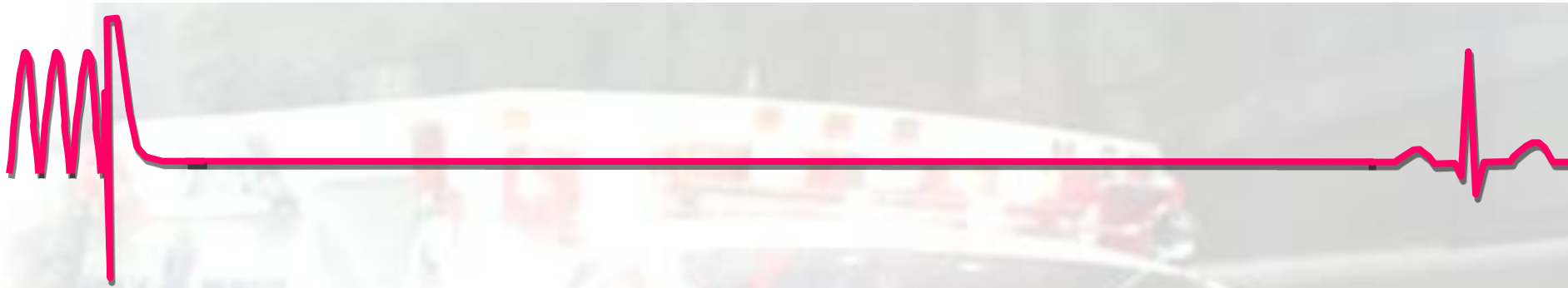
# Variation in survival VF arrest

## Resuscitations Outcomes Consortium

### Survival to discharge







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



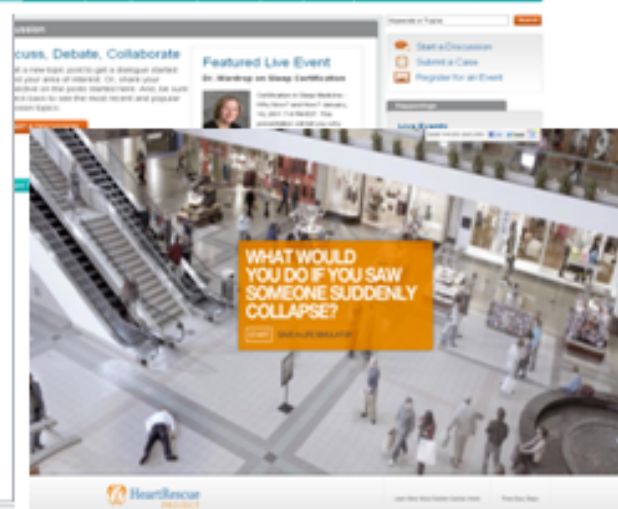
# HeartRescue Partners







## 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.

### National Highlights - Year 3:

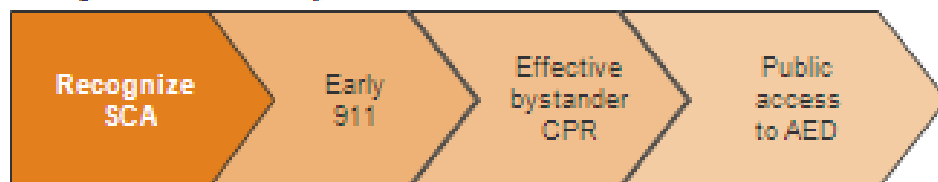
- Partner programs now covering 70% or more of state populations
  - OHCA data elements submitted to CARES Registry for 2011, 2012
  - 990 survivors in 2011 to 1,495 in 2012
- Presented project activities to 1,500 EMS leaders at 8 conference events
- State partners hosted 25+ Resuscitation Academies reaching 1,200+ EMS leaders with best practice education
- Over 5.3 million people saved a life virtually with Save-a-Life Simulator on <http://www.HeartRescueNow.com>
- Accepted for publication in American Heart Journal, 'Multistate implementation of guideline-based cardiac resuscitation systems of care: Description of the HeartRescue Project'



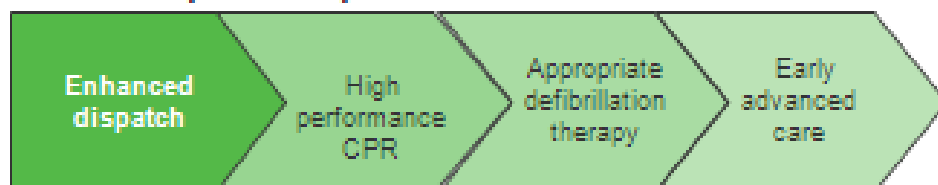
# How to improve:

## Improving SCA Survival

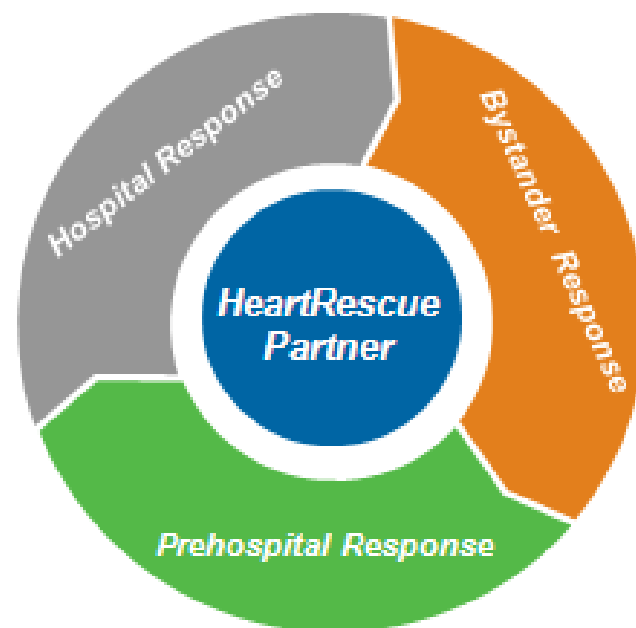
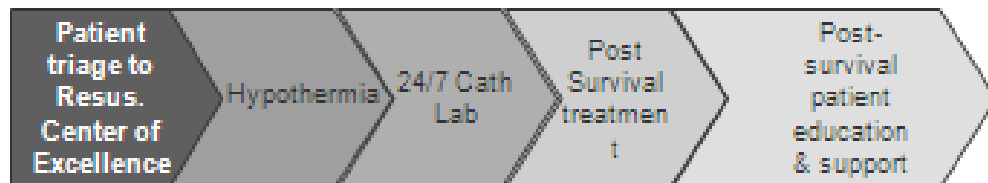
### 1: Bystander Response



### 2: Prehospital Response



### 3: Hospital Response







# 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





# CPC Score:

Cerebral Performance Category

GOAL-ALIVE WITH GOOD  
NEURO OUTCOMES



*The level at the time of discharge*

**Level 1:** Alert, able to work and lead a normal life.

**Level 2:** Conscious and able to function independently, but may have hemiplegia, seizures, or permanent memory or mental changes.

**Level 3:** Conscious, dependent on others for daily support, functions only in an institution or at home with exceptional family effort.

**Level 4:** Coma, vegetative state.



# Adult Chain of Survival



1. Immediate recognition of cardiac arrest and activation of the emergency response system
2. Early CPR with an emphasis on chest compressions
3. Rapid defibrillation
4. Effective advanced life support
5. Integrated post–cardiac arrest care





# The Coordinator Role:

**Mayme Lou Roettig, RN, MSN**

Assistant Director, Center For Educational Excellence

Director, Systems of Care & Implementation Education





# Regional Approach to Cardiovascular Emergencies *Cardiac Arrest Resuscitation System*

## ***CARES Registry***

Clark Tyson MS, NREMT-P  
State Coordinator / NC  
CARES Coordinator  
December, 2013  
[Clark.tyson@dm.duke.edu](mailto:Clark.tyson@dm.duke.edu)







# Objectives:

- Discuss the CARES registry
- Review cardiac arrest statistics





# Quality Improvement

You cannot improve what you  
do not measure.





# CARES

- **C**ardiac
- **A**rrest
- **R**egistry to
- **E**nhance
- **S**urvival



# CARES Participation



## EMS Participation by County

- Participating
- Some Agencies Participating
- In progress
- Future Site

## Hospital Participation

- Participating
- Priority Recruitment Patients in System
- Listed Destination
- Future Site



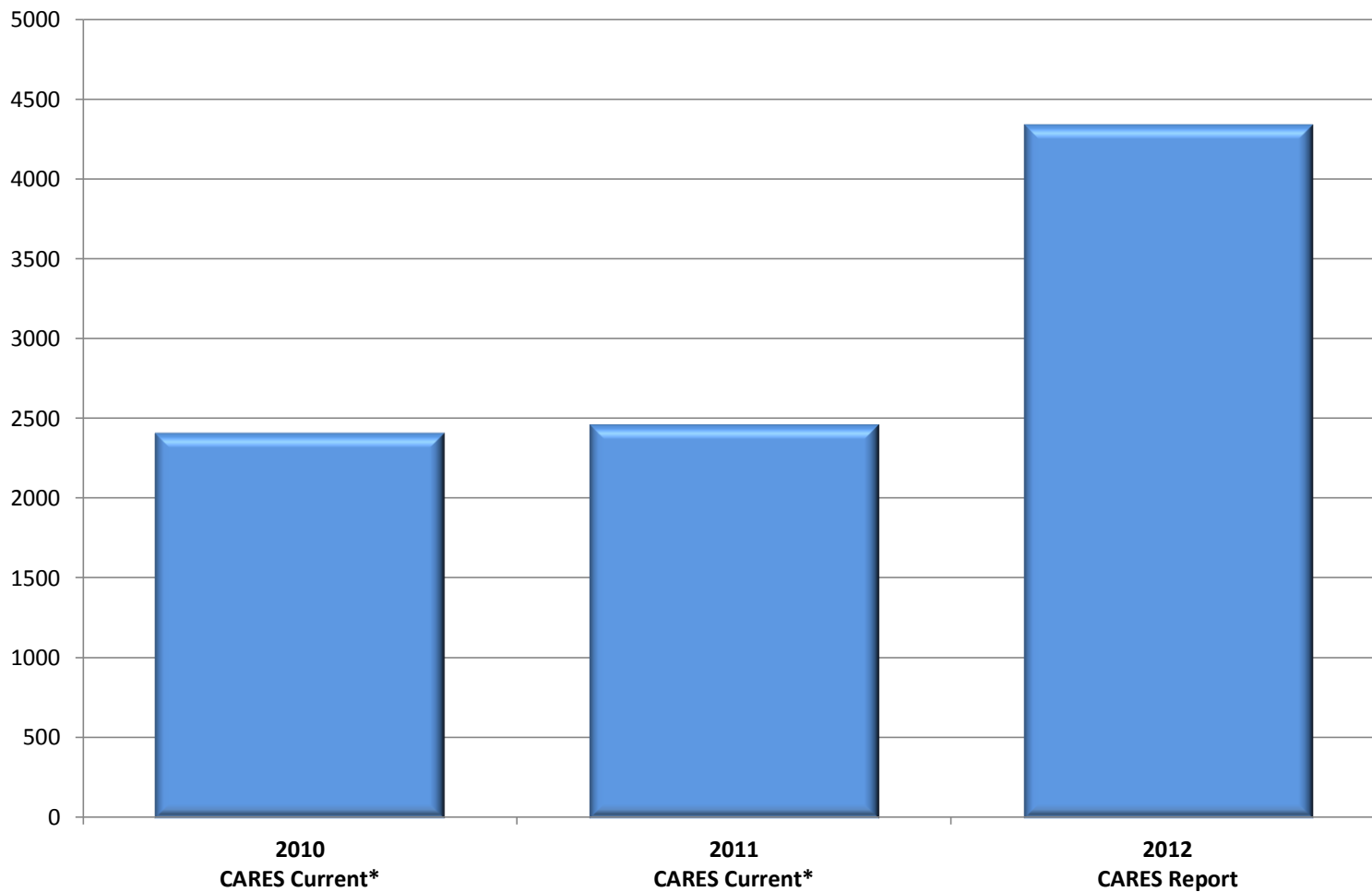
# CARES Participation

	Number	% Population	Cumulative Population
EMS Systems in NC	99	100%	
Systems reporting into CARES	63	81.70%	81.70%
Systems in Progress	0	0.00%	81.70%
Future Systems	36	18.30%	100
Cases in the CARES			
Original 2010 count	1206		
2010 to Date	2412		
2011 to Date	2465		
2012 to Date	4341		
Total 2013 (audited)	3246		
Grand Total to date	12464		
Hospitals in CARES			
Total Hospitals Needed for CARES NC data	145		
Hospitals identified by EMS as destination	118		
Hospitals Trained	87		





# North Carolina CARES CARES Volume 2010 - 2012 December 2, 2013







# Measuring Survival

- **Overall**

- Cardiac Etiology

- **Utstein**

- Cardiac Etiology

- Witnessed Arrest

- Found in V-fib / V-tach rhythm

**Must compare apples to apples**

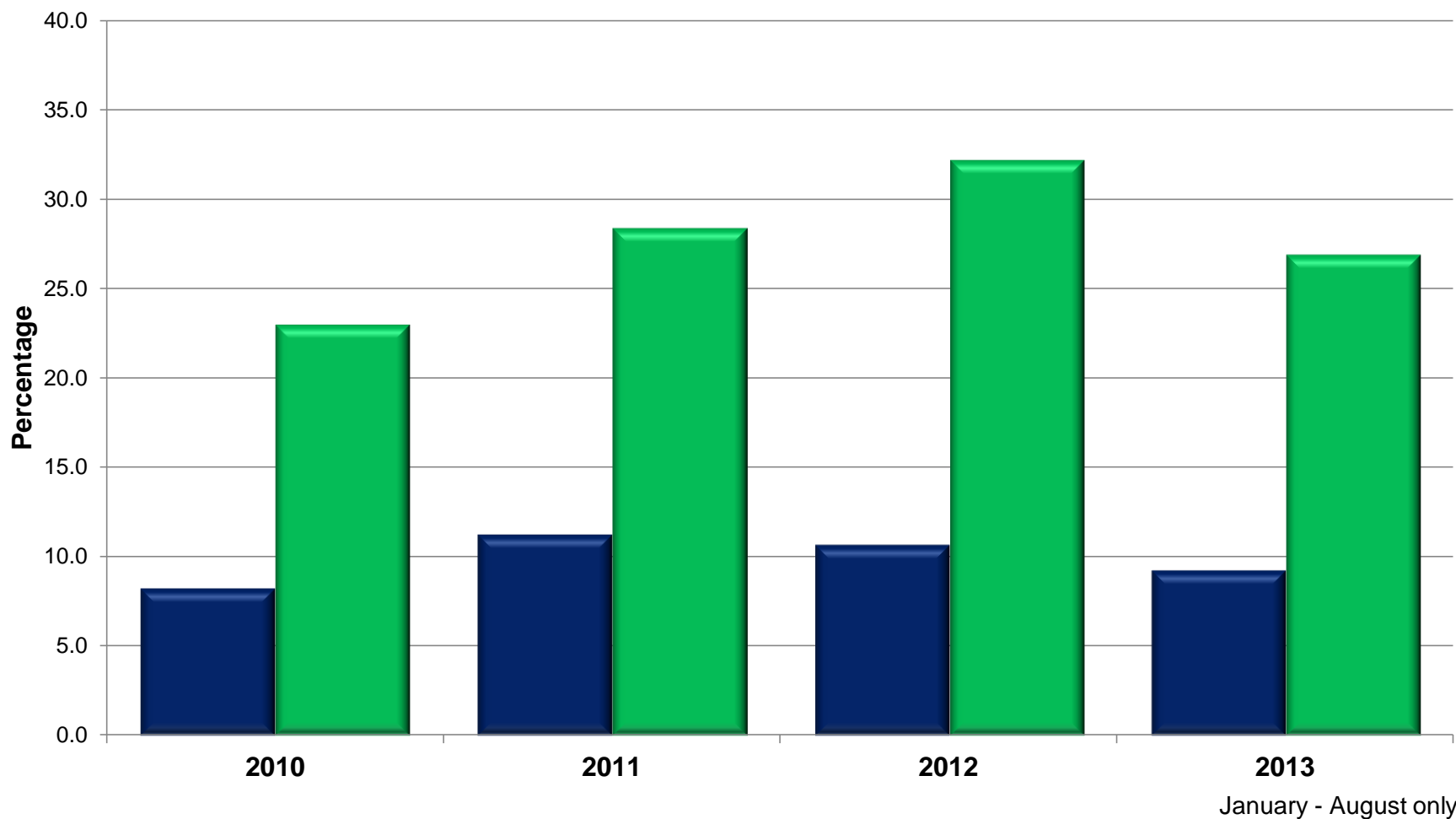




# North Carolina CARES Overall Survival vs Utstein Survival Rates 2010 - 2013 November 27, 2013



■ Overall Survival Rate ■ Utstein





# Hospital Report

	Total (%)	Admission (%)	Discharge (%)
<b>Pre-Hospital Characteristics</b>	N	N (%)	N (%)
Gender = Male	N (%)	N (%)	N (%)
Mean Age	X	---	---
Initial Rhythm			
Shockable	N (%)	N (%)	N (%)
Unshockable	N (%)	N (%)	N (%)
<b>Witnessed Status</b>			
Unwitnessed	N (%)	N (%)	N (%)
Bystander Witnessed	N (%)	N (%)	N (%)
Witnessed by 911 Responder	N (%)	N (%)	N (%)
<b>Sustained ROSC</b>			
No Sustained ROSC	N (%)	N (%)	N (%)
Sustained ROSC in field, pulseless at ED arrival	N (%)	N (%)	N (%)
Sustained ROSC in field, pulse at ED arrival	N (%)	N (%)	N (%)
Hypothermia care initiated in the field	N (%)	N (%)	N (%)





# Hospital Report



## In-Hospital Characteristics

Total (%)

Discharge (%)

Died in ED	N (%)	---
Admitted to hospital	N (%)	N (%)
Hypothermia care initiated/continued in hospital	N (%)	N (%)
Myocardial infarction	N (%)	N (%)
Coronary angiography performed	N (%)	N (%)
Cardiac stent placed	N (%)	N (%)
CABG performed	N (%)	N (%)
ICD placed/scheduled	N (%)	N (%)
Discharged alive	N (%)	---
Discharged with good/moderate CPC	N (%)	----





# North Carolina

- Est. Cardiac Arrest 2012  
- 7189
- Estimated Survivors Overall 2012  
- 755
- A 1% change in survival = 72 lives

Extrapolated from 2012 CARES Data based upon population reporting per month.





# Feedback

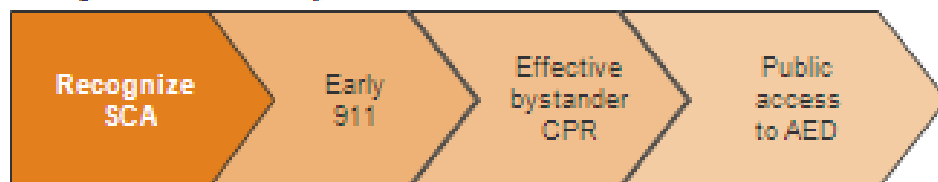
- All Resuscitation Team members get outcomes of the arrest
- Establish feedback plan
- Requires EMS, First Responders, Hospitals, and Telecommunications to establish a contact and build relationships



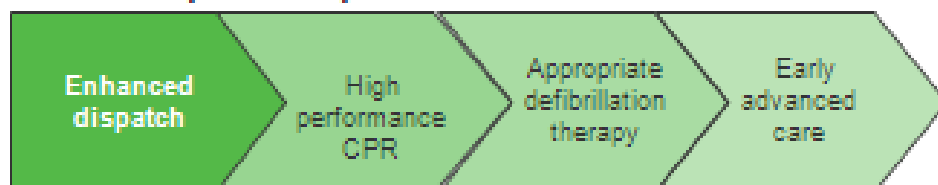
# How to improve:

## Improving SCA Survival

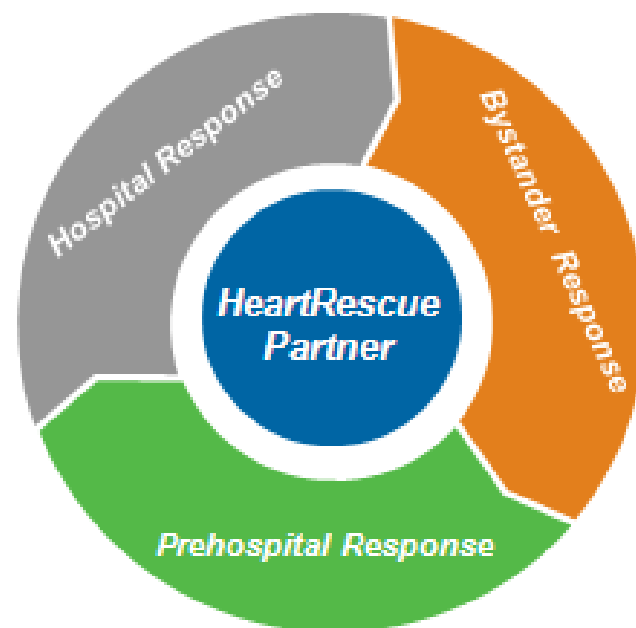
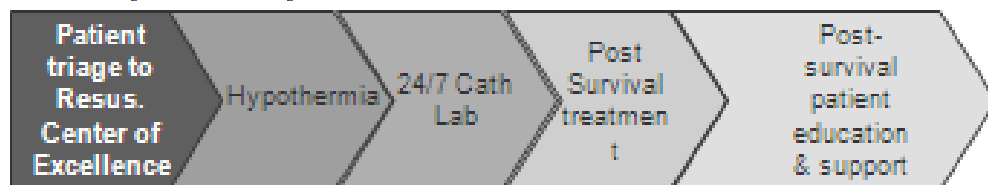
### 1: Bystander Response



### 2: Prehospital Response



### 3: Hospital Response







# Pre-hospital: Telecommunications:

- 2 question approach:
  - Are they conscious?
  - Are they breathing normally?
- Immediate instruction on compression only CPR
- QI on all cardiac arrests:
  - Time to recognition
  - Time to first compression
- Provide EMS any data needed for CARES





# Pre-hospital: First Responders

- Adopt the Team Approach to Resuscitation
- Adopt High Quality CPR concepts
- Practice and practice with EMS
- Feedback on performance
- Provide EMS any data needed for CARES





# Pre-hospital: EMS



- Adopt the Team Approach to Resuscitation
- Adopt High Quality CPR concepts
- Practice and practice with First Responders
- Feedback on performance
- Practice ALS skills while CPR being performed
- Run Resuscitation at Scene
- Collect data
- Provide feedback



The background of the slide is a blurred image of a white and red race car, likely a NASCAR vehicle, on a track. A bright red ECG (heart rate) line is superimposed over the top of the image, starting with several sharp peaks on the left and then settling into a steady rhythm towards the right.

## Hospital:

Lisa Monk MSN, RN, CPHQ

NC RACE CARS Director

[Lisa.monk@duke.edu](mailto:Lisa.monk@duke.edu)



## OUTCOME

Increase survival  
in out-of-  
hospital sudden  
cardiac arrest  
(how much? By  
when?)

### Primary Drivers?

Bystander Response

- Community awareness activities
- Early Recognition of Arrest
- Bystander CPR Training
- Public Access Defibrillation
- 911 Dispatcher Pre-Arrival Instructions

Pre-Hospital Response

- Establish Sudden Cardiac Arrest Data Collection
- Improving Recognition of SCA & initiation of PAIs by 911 call takers
- High quality CPR with minimal interruptions (C-A-B)
- Establish OHCA System of Care?
- Implement quantitative waveform capnography for ET patients
- Develop Teamed / Role-Based Resuscitation

Hospital Response

- Optimize cardio-pulmonary function & vital organ perfusion after ROSC
- Transport/transfer to appropriate hospital or CCU with comprehensive post cardiac arrest treatment system of care.
- Identify and treat advanced ACS & other reversible causes
- Control temperature to optimize neurological recovery.
- Anticipate, treat, & prevent multi-organ dysfunction. Include avoiding excessive ventilation and hyperoxia.

Survivor Support

- At discharge refer survivors / families to resources for physical rehab to cope with brain injury.
- Provide honest and specific answers to questions
- Provide patient diagnosis specific resources about condition
- Share knowledge about what to expect & how to react when systems are experienced post discharge.
- Provide ICD coaching and coping skills

### Secondary Drivers?





## Hospital Response

- Optimize cardio-pulmonary function & vital organ perfusion after ROSC
- Transport/transfer to appropriate hospital or CCU with comprehensive post cardiac arrest treatment system of care.
- Identify and treat advanced ACS & other reversible causes
- Control temperature to optimize neurological recovery.
- Anticipate, treat, & prevent multi-organ dysfunction. Include avoiding excessive ventilation and hyperoxia.

## Survivor Support

- At discharge refer survivors / families to resources for physical rehab to cope with brain injury.
- Provide honest and specific answers to questions
- Provide patient diagnosis specific resources about condition
- Share knowledge about what to expect & how to react when systems are experienced post discharge.
- Provide ICD coaching and coping skills





# Hospital

## Hospitals

- Identify physician leader (Intensivist, neurologist, emergency medicine....)
- Commit to cardiac arrest planning
  - Coordinator, team, protocols, data collection, process improvement
- Commit to community education





# Establish Hospital Plans:

- Protocol for cardiac arrest patients.
- Cardiac arrest centers
  - Accept pts regardless of bed availability
  - Cath Lab 24/7 Protocols in place for cooling
  - Data Collection and Feedback
  - Identify a hospital coordinator
  - Commitment to community education





Cardiac  
Arrest  
Resuscitation  
System

## Resuscitation Capable Hospital Pre-Transfer Guidelines

### Inclusion Criteria

- Adults (age  $\geq 18$  years)
- Return of Spontaneous Circulation (ROSC) within 60 minutes of arrest
- Persistent Coma: Inability to follow commands and/or GCS  $< 9$

### Exclusion Criteria

- Severe or terminal illness with anticipated non-aggressive care
- Active hemorrhage
- Systemic infection/sepsis
- Severe refractory shock

### Resuscitation Priorities

- Airway: Intubation
- Breathing
  - Avoid hyperventilation (goal PaCO<sub>2</sub> of 38 – 42mmHg)
  - Avoid hyperoxia (rapidly decrease FiO<sub>2</sub> to maintain SpO<sub>2</sub>>95%)
- Circulation
  - Goal MAP>65
  - Anticipate and avoid hypotension
  - Norepineprine is the preferred vasopressor
  - ECG screen for STEMI

### Cooling Induction

- Initiate cooling as soon as possible after ROSC
- Refrigerated (4°C) NS 30 cc/kg IV bolus as tolerated
- Ice packs to groin, axilla and neck
- Shivering control with Propofol 10 mcg/kg/min
- Paralyze patient with Vecuronium 0.1mg/kg q1hr

Courtesy of David Pearson, MD, Carolinas Medical Center Code Cool



Cardiac  
Arrest  
Resuscitation  
System

Optimal Cardiac Arrest System Specification  
By Point Of Care Operations Manual  
Version 1.0  
© RACE 2012





Cardiac  
Arrest  
Resuscitation  
System

## Resuscitation Capable Hospital

**Goal: To Improve survival from cardiac arrest by 50%**

<input type="checkbox"/>	Standard and well executed ACLS Protocols
<input type="checkbox"/>	Baseline Neurologic examination
<input type="checkbox"/>	2 large bore IV
<input type="checkbox"/>	ECG: If new LBB or STEMI : Activate STEMI Plan
<input type="checkbox"/>	Early notification of the receiving hospital
<input type="checkbox"/>	Early activation of the transport plan
<input type="checkbox"/>	Implement Treatment protocols for STEMI and Cardiac Arrest
<input type="checkbox"/>	Send medical records including EMS Information, ECG, record of treatment with times, and EMTALA form (can fax records if need time to complete, EMTALA forms must go with patient)
<input type="checkbox"/>	Optimize BP to MAP>65mmHG
<input type="checkbox"/>	Titrate EtCO2 for 35-40
<input type="checkbox"/>	Consider CT of Brain
<input type="checkbox"/>	Pressure Infuse 2L of cold saline if candidate for hypothermia (if EMS started cooling do not stop)
<input type="checkbox"/>	Sedation and possibly paralysis
<input type="checkbox"/>	Train family in recognition of cardiac emergency and compression only CPR prior to patient discharge
<input type="checkbox"/>	Family and Staff support
<input type="checkbox"/>	Data measurement and feedback



Cardiac  
Arrest  
Resuscitation  
System

Optimal Cardiac Arrest System Specification  
By Point Of Care Operations Manual  
Version 1.0

© RACE 2012





Cardiac  
Arrest  
Resuscitation  
System

## Cardiac Arrest Center

**Goal: To improve the survival from cardiac arrest by 50%**

<input type="checkbox"/>	Standard and well executed ACLS protocols
<input type="checkbox"/>	Baseline neurologic examination
<input type="checkbox"/>	2 large bore IV's
<input type="checkbox"/>	ECG: STEMI to cath lab
<input type="checkbox"/>	Optimize BP to MAP>65mmHG
<input type="checkbox"/>	Titrate EtCO2 for 35-40
<input type="checkbox"/>	Consider CT of brain, do not delay cooling for scan or extensive testing before transfer unless clinically indicated
<input type="checkbox"/>	Pressure infuse 2L of cold saline if candidate for hypothermia (If EMS started cooling do not stop)-continue cooling in transport
<input type="checkbox"/>	Continue therapeutic hypothermia for 24 hours
<input type="checkbox"/>	Sedation and possibly paralysis
<input type="checkbox"/>	On-going neurological assessment and care
<input type="checkbox"/>	24/7 Cath lab availability for STEMI
<input type="checkbox"/>	Early coronary angiography if not a STEMI
<input type="checkbox"/>	ICD Evaluation
<input type="checkbox"/>	Rehabilitation plan
<input type="checkbox"/>	Train family in recognition of cardiac emergency and compression only CPR prior to patient discharge
<input type="checkbox"/>	Family and staff support
<input type="checkbox"/>	Data measurement and feedback



Cardiac  
Arrest  
Resuscitation  
System

Optimal Cardiac Arrest System Specification  
By Point Of Care Operations Manual  
Version 1.0

© RACE 2012





# HOSPITAL:

- Coordination by hospitals
  - Survey to understand what resources exist today
- Certification vs Education
  - AHA/Red Cross
  - RACE CARS developed materials
- AED devices – funding and identification
  - Train all hospital employees of some level of CPR
  - Train all heart patients and families on discharge

EMS, First Responders, and Hospitals will work together to off community education





# Community

Kathy Montero

RACE Community Coordinator

[Kathy.montero@dm.duke.edu](mailto:Kathy.montero@dm.duke.edu)





# Community



- Challenges
  - First Responder and EMS response times vary, usually > 4 minutes, rural communities even longer
  - CPR should be initiated within 4 minutes or brain damage begins to occur, survival is not likely after 10 minutes without CPR
  - AED locations and maintenance status often unknown
- First 3 links in the chain of survival involves the Community:
  - Recognition and access
  - CPR with focus on compression only
  - Rapid defibrillation - AED



Cardiac Arrest Resuscitation System





# Community: Statewide Strategies

**Goal: *to improve bystander CPR rates and AED use***

- Movie Theater PSA
- Grants Program
- Regional Community Education Networks
- Development of Website Resources
- Survivor Celebrations
- Track



# Community: Statewide Strategies

## Movie Theater PSA

- 19 week run (Aug '13 – early Jan '14)
- ~6 million impressions
- In selected NC markets:
  - ❖ Asheville – Regal Biltmore Grande Stadium
  - ❖ Concord – Carolina Mall Stadium 8 & AMC Concord Mills 24
  - ❖ Gastonia – Regal Franklin Square Stadium 14
  - ❖ Greenville – Regal Greenville Grande Stadium 14
  - ❖ Rocky Mount – Premiere Theatre 14
  - ❖ Southport – Surf Cinemas
  - ❖ Wilmington – Regal Mayfaire Stadium 16
  - ❖ Winston Salem – The Grand 18 - Winston-Salem



**RaceCars.dcri.duke.edu**





# Community: Statewide Strategies

## **Community Grants Program**

- Focused on Community links of chain of survival
- Measurable and sustainable
- Collect data
- RFAs coming in 2014





# Community: Statewide Strategies

## **Regional Community Education Networks**

- Engage multiple organizations
- Group focused on action

## **Website Resources**

- One stop shop





# Community: Statewide Strategies

## Survivor Celebrations

- Public recognition & awareness
- Create excitement and momentum
- Include public officials
- **Track progress:**
  - [https://duke.qualtrics.com/SE/?SID=SV\\_e4FROMWMPQ8DqNC](https://duke.qualtrics.com/SE/?SID=SV_e4FROMWMPQ8DqNC)
  - Numbers trained in CPR
  - Bystander CPR rates
  - AED use rates





# Community: Local Opportunities

- Movie Theater PSA
- Grants Program
- Regional Community Education Networks
- Development of Website Resources
- Survivor Celebrations
- Track



# 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





# Let's Change the Face of Cardiac Arrest





