Regional Approach to Cardiovascular Emergencies Cardiac Arrest Resuscitation System

Team Resuscitation and High Quality CPR

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Objectives:

- Discuss team basics
- Discuss where we resuscitate
- Update on science behind CPR
- Building a team in your system
- Strategies for Improved Survival





Si's First Rule of Resuscitation

Live Where You Have a Better Chance of Survival Jack!

Si's Rules of Resuscitation

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Careful with Words / Phrases

- Team Focused
- Pit Crew
- High Quality
- Uninterrupted
- Controlled ventilations



Make Up / Building a Team

- Leader
- Awareness of how you work
- Clearly define roles and responsibilities
- Feedback

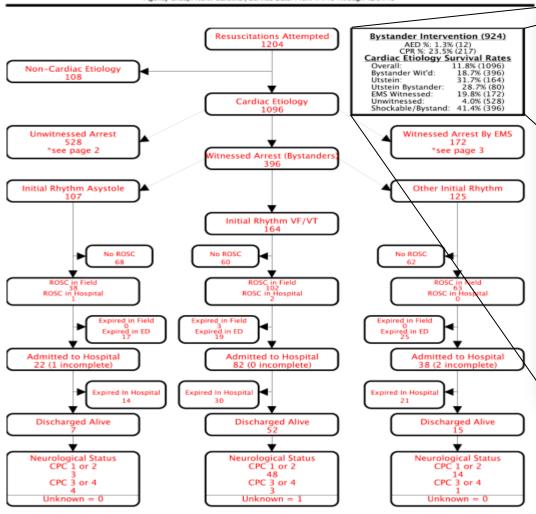
Where Do You Start

- First you must know where you are
 - Many believe their success is far greater than actual
- CARES is one place to start
- Establish a goal

CARES Survival Report

Utstein Survival Report

Agency Group: North Carolina | Service Date: From 1/1/10 Through 12/31/10



Bystander Intervention (924)

AED %: 1.3% (12) CPR %: 23.5% (217)

Cardiac Etiology Survival Rates

Overall: 11.8% (1096)

Bystander Wit'd: 18.7% (396)

Utstein: 31.7% (164)

Utstein Bystander: 28.7% (80)

EMS Witnessed: 19.8% (172)

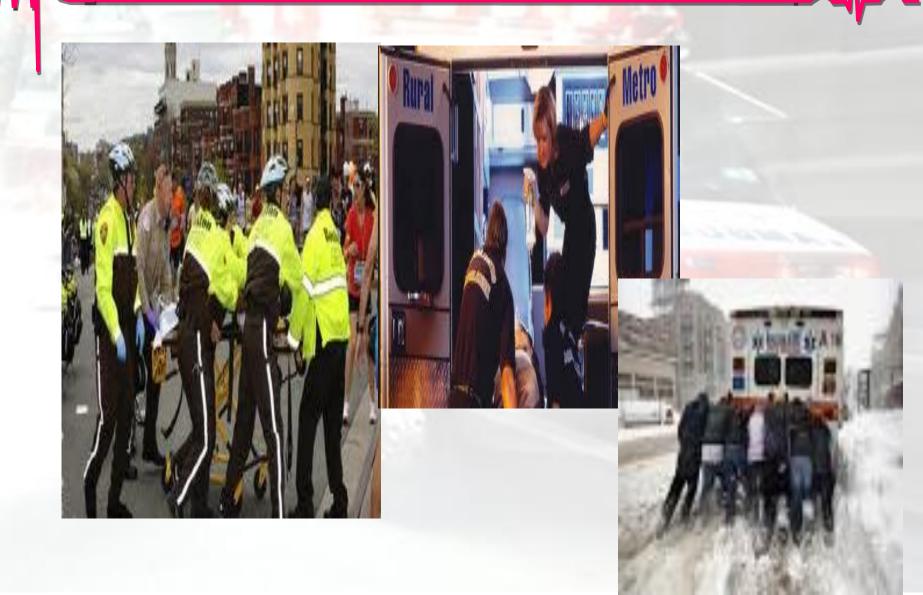
Unwitnessed: 4.0% (528)

Shockable/Bystand: 41.4% (396)

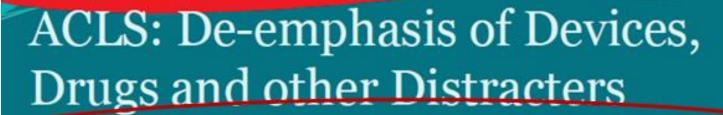
Would you do this?



Would you do this?



HIGH QUALITY CPR



Association Asso Learn and Lo

- Focus on high-quality CPR and defibrillation
- Atroning no longer recommended for routing use in

PREHOSPITAL HIGH QUALITY COMPRESSIONS

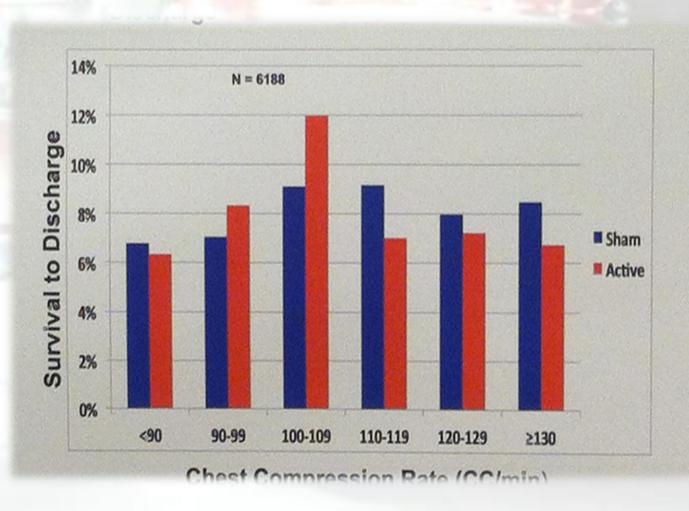
- Goal: High quality means continuous chest compressions with <u>limited</u> interruptions
 - Rate: 100 120/min
 - Depth: 2 inches
 - Allow for complete chest recoil
 - Change every 2 minutes with pulse check
 - not to exceed 5 seconds
 - Address airway 2 cycles unless indicated earlier



Why 100 - 120 Rate?

- Study measured rates from 2005 2007
- 3098 patients enrolled
- Mean compression rate 112
- ROSC peaked at 120
- ROSC declined markedly < 75
 - In this study ROSC not associated with hospital discharge

Why 100 - 120 Rate?

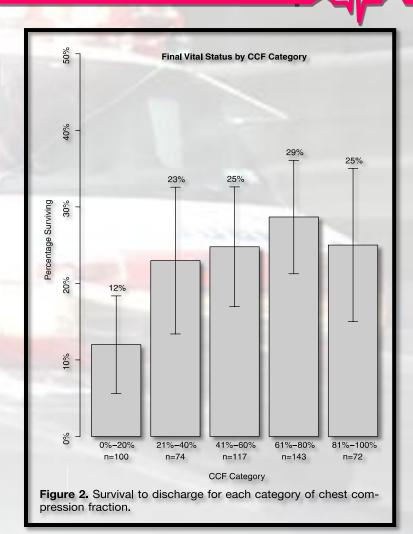


Chest Compression Fraction & Survival

Graph shows survival as it relates to chest compression fraction:

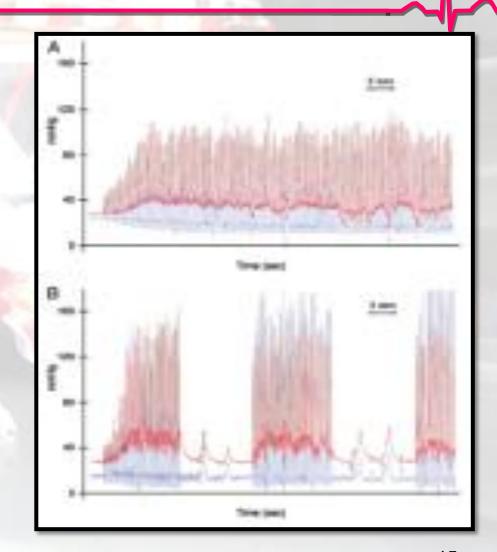
- Move from lower levels of CCF to intermediate has significant benefit
- Supports evidence that increasing pre-shock coronary and cerebral blood flow can improve outcomes

Increased chest compression fraction is independently predictive of better survival



Chest Compression only CPR:

- Bystanders more willing to initiate
- Arterial blood is adequately oxygenated at onset of primary cardiac arrest
- Less likely to cause regurgitation of stomach contents
- Rescue breathing interrupts critical chest compressions
- Easier to teach
- Observational evidence of improved survival





Depth and Speed Matter

- ROC Study
- 1029 Adult patients including 58 EMS agencies
- Median compression rate is 106
- Median compression depth is 37.5 mm
- 53 % with compression depth < 38 mm
- 92 % with compression depth < 50 mm
 - Faster compression rate = less depth
- Survival improved with depth > 38 mm



Why 2 Minutes?

- 45 Providers, single rescuer CPR 10 minutes
- Child and Adult manikins with AV feedback
- Mean compression rate remained > 100
- Adequate compressions
 - Fell from 85 % to < 40 % over 10 minutes
 - < 70 % after 90 seconds in child</p>
 - < 70 % after 120 seconds in adult</p>
- Self reported fatigue low by 2 minutes





Si's First Rule of Resuscitation

Pump Hard and Pump Fast Jack!



Dogma

WHY CAN'T WE LET GO OF THE AIRWAY



Why De-emphasis of Airway?

Nationwide Japanese Registry 649,654

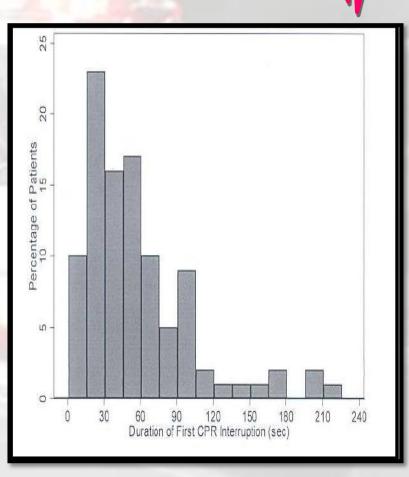
ETT or BIAD Good Neurological Outcome 1 %

BVM Good Neurological Outcome 3%

Kohei Hasegawa, MD, MPH; Atsushi Hiraide, MD, PhD; Yuchiao Chang, PhD; David F. M. Brown, MD JAMA. 2013;309(3):257-266. doi:10.1001/jama.2012.187612.

Advanced Airway Placement Interruptions in CCC

- 100 cases reviewed
- Median 2 intubation attempts
- Median duration of interruption for 1st attempt = 46.5 sec.
- Median total interruptions for all attempts = 109.5 sec

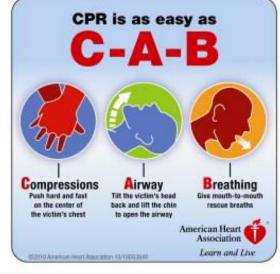


Interruptions in Cardiopulmonary Resuscitation From Paramedic Endotracheal Intubation (WANG 2009)

PREHOSPITAL HIGH QUALITY VENTILATIONS

Gdal: High (hyperventilahyperoxyge)

- Don't int for insert
 - Adult de-sa
 - Ventil
 - Maintain SpO2 ≥ 94 %
 - Do NOT Hyperventilate



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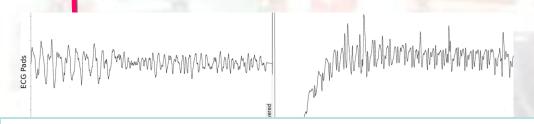
Si's First Rule of Resuscitation

Forget about the airway initially...

Jack!



Perishock Pause Independent Predictor of Survival



Perishock Pause = interruption in chest compressions before and after defibrillatory shock

Optimal Pre-Shock Pause: < 5 seconds, max of 10 seconds



Figure 1. Diagram of preshock, postshock, and perishock pause. Preshock pause of 10 seconds, postshock pause of 2.3 seconds and perishock pause of 12.3 seconds depicted in the impedance channel of the cardiopulmonary resuscitation process file.

Resuscitation Science

Perishock Pause

An Independent Predictor of Survival From Out-of-Hospital Shockable Cardiac Arrest

Sheldon Cheskes, MD; Robert H. Schmicker, MS; Jim Christenson, MD; David D. Salcido, MPH; Tom Rea, MD; Judy Powell, RN; Dana P. Edelson, MD; Rebecca Sell, MD; Susanne May, PhD; James J. Menegazzi, PhD; Lois Van Ottingham, RN, BSN; Michele Olsufka, BSN; Sarah Pennington, RN; Jacob Simonini, ACP; Robert A. Berg, MD; Ian Stiell, MD, MSc; Ahamed Idris, MD; Blair Bigham, MSc; Laurie Morrison, MD, MSc; on behalf of the Resuscitation Outcomes Consortium (ROC) Investigators

Study showed that odds of survival were significantly lower for patients with:

- 1. Pre-shock pause > 20 seconds
- 2. Peri-shock pause > 40 seconds

No Pause CPR





TEAM APPROACH TO RESUSCITATION

Define Your Team

- First Responders with ALS
 - Define roles as responders arrive on scene
 - Define team leader and when this is established

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First Responders with ALS

- First responder: Compressions
- Second responder: AED, Airway, cycle with compressor
- Third responder: Team leader, cycle with compressor
- Fourth responder: Team leader

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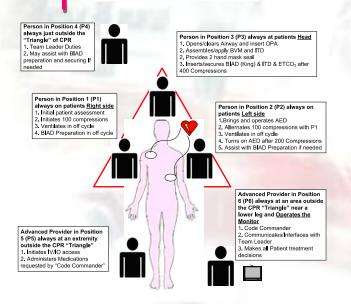
Career agency with ALS

- Fire department / squad
 - Firefighter 1: Compressions
 - Firefighter 2: AED
 - Engineer 3: Airway
 - Captain: Team Leader



Pit Crew Approach

CPR Procedure



Pre-assigned Roles

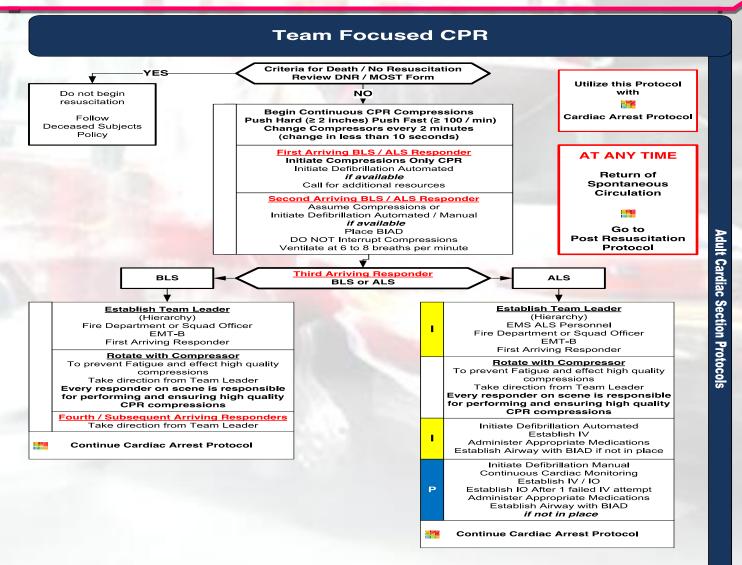
- Pit Crew Leader
- Airway Leader
- 3. IV/IO & Medications
- CPR Chief
- CPR Duty Chief
- 6. Variable Player

- Each person has assigned role
 - Providers focus on their assigned job expertly and efficiently
 - Practice in each role
 - Helps minimize interruptions

Variations to this model exist for:

- 3 Rescuers
- 4 Rescuers
- 5 Rescuers
- 6 Rescuers

Team Focused CPR NCCEP / NCOEMS Protocol 2012



Pit Crew Approach to Resuscitation

Focus on:

 Leadership, team approach, skills & competencies, communication & teamwork, best practices, and rehearsal

Emphasis on:

- Minimally interrupted CPR
- Controlled ventilations
- Defibrillation
- Appropriate timing of interventions

Henderson EMS, Nevada

- Created Team Based Method
- Developed 4 roles with specific responsibilities
 - 1. Compression Tech
 - 2. Monitor Tech
 - 3. Ventilation Tech
 - 4. Medication Tech

Identified which roles would be filled in what order as providers arrived to scene

Pittsburg EMS, PA

- Developed the 375E5 Program
 375 Compressions & Epinephrine in 5 minutes
- Re-tasked the first 5 minutes of cardiac arrest management to:
 - Maximize hands on compression time

Goal: Maximize coronary & cerebral perfusion pressures

375E5 / Henderson, NV

Problem	Mitigation
Delay in initiating CCC	Rapid ABC assessment and initiation of CCC; one rescuer CCC while monitor placed
Pauses of CCC for rhythm analysis and defibrillation	Brief pause for rhythm analysis; continue CPR until ready for shock, clear and then resume CCC immediately
Pauses of CCC for advanced airway placement	Defer until later in the arrest unless clinically indicated to do earlier or placement with interruption of CCC

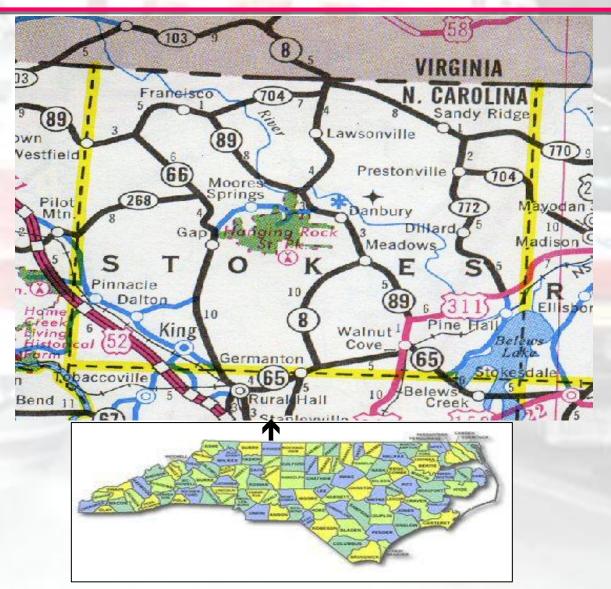
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Wait a minute: I am not Wake, Mecklenburg or Durham County.

My response times are longer, transport times are longer, I have limited resources and I don't have a major medical center.

CAN THIS MAKE A DIFFERENCE IN MY COUNTY?

Stokes EMS System Overview



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Stokes EMS System Overview

- 5 ALS credentialed Ambulances supported by 1-3ALS Quick Response Vehicles.
- 57 FT/PT employees.

- Approximately 8000 call responses per year.
 - 67% ALS responses (Based on 2011 figures)
 - 31% BLS responses (Based on 2011 figures)

Stokes EMS Interpretation of the 2010 AHA Changes

- High Quality, Uninterrupted,
 Continuous Chest Compressions
 - CPR where patient is found
- BIAD vs. Intubation
 - BIAD
- Avoiding excessive Hyperventilation
 - ITD

Team Focused Approach

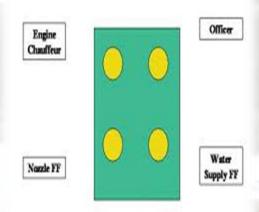


- Post-Resuscitation Care
 - Therapeutic Hypothermia

TERMINATION ON SCENE

Assignment of On-Scene Responsibilities

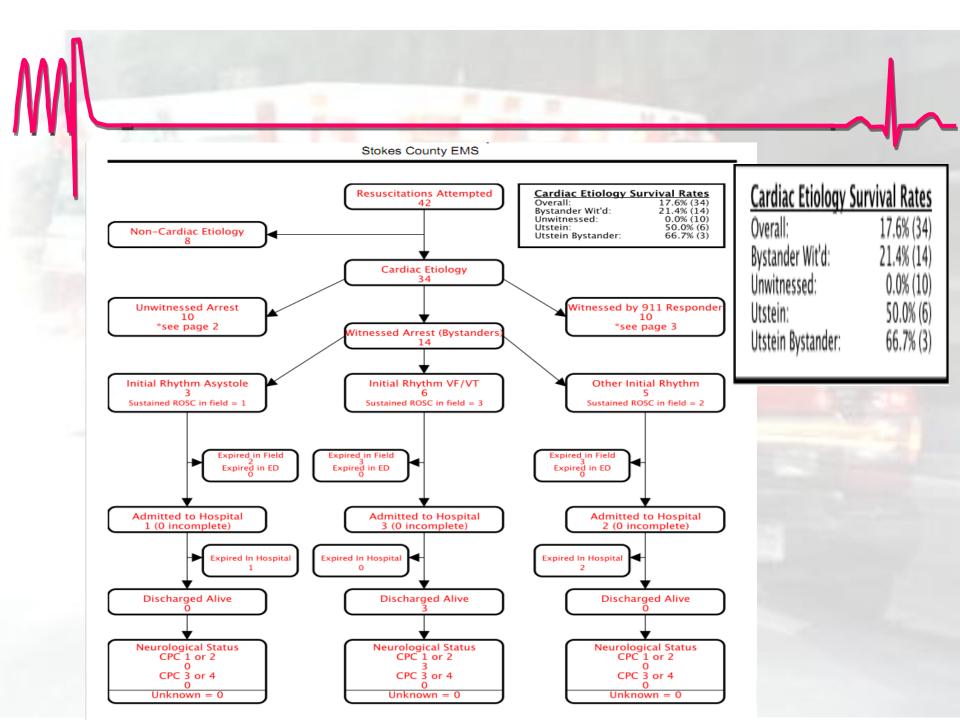
- Fire Department / Squad
 Assignments
 (Career/Volunteer).
- Build upon the team as more personnel arrive.
- On scene command
 - Fire Department (manager of the scene)
 - EMS (manager of patient Care)



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Training of EMS / First Responders

- On shift Scenarios
- Everyone on scene is responsible for the quality of CPR (Not just the Team Leader)
- Role playing
 - Team Leader
 - Airway management
 - Chest Compressions/AED Placement
 - EMS interventions
 - Family Interactions (included in this explanation of discontinuation of efforts)
 - · Beginning care of a new patient



Summary

- Define your team your way
- Practice with all responders
 - Ensure knowledge of roles
 - Ensure all knowledgeable of the science
- Immediate feedback during event
- Debrief following event
- Gather data if possible
 - Partner with another agency for data

