Regional Approach to Cardiovascular Emergencies Cardiac Arrest Resuscitation System

Team Resuscitation and High Quality CPR

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- 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

EMS Makes a Difference

OWN IT?

no

Own it!

- Respiratory Distress
- STEMI
- Trauma
- CVA
- Cardiac Arrest

Careful with Words / Phrases

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

SUCCESS

First it's pretty tires, then it's pretty guns. Next thing you know, you're shavin' your beard and wearin' Capri pants!



"Hey! There are two types of people, eduacated and unducated..."



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
- Who makes up your team?

CARES Survival Report



<u>Bystander Intervention (924)</u>			
6 (12)			
6 (217)			
urvival Rates			
11.8% (1096)			
18.7% (396)			
31.7% (164)			
28.7% (80)			
19.8% (172)			
4.0% (528)			
41.4% (396)			

Would you do this?



Would you do this?



LAY BACK, BRINK A SIP OF TEA, MOW SOME GRASS, AND IF YA GET TIRED, TAKE YA A NAP.

HIGH QUALITY CPR

ACLS: De-emphasis of Devices, Drugs and other Distracters

Focus on high-quality CPR and defibrillation

Atroning no longer recommended for routing use in

Association.

Learn and L



 "These boys packed so much stuff, Hey, they could survive a zombie, apoca-liss"





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

TEAM APPROACH TO RESUSCITATION



Define Your Team





4138388

"The First, First Responder"

- Time from collapse to CPR critical
- PAI CPR decreases this time interval
- Goal for CPR initiation is?
 - 1 minute
- US average response time 4 6 minutes
- Average response time for ALS in US?
 - 8 12 minutes



- First Responders with ALS
 - Define roles as responders arrive on

scene

 Define team leader and when this is established



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

Career agency with ALS

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

Pit Crew Approach



Pre-assigned Roles
1. Pit Crew Leader
2. Airway Leader
3. IV/IO & Medications
4. CPR Chief
5. 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

Team Focused CPR



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

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



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

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)



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



"I can fly, I don't even need a cape.."

HEY, WITH THESE CORRECTIVE LENSES





Termination of CPR

- Why transport CPR?
 - Cardiac Arrest Survival is Rare Without
 Prehospital Return of Spontaneous Circulation
 - Wampler, DA et al. Prehospital Emerg Care 2012, Jul 26; (E-pub)
 - 2483 patients in the ROC 2008-10
 - Survival 6.6%
 - Field ROSC 36% (17.2% survival)
 - No ROSC 0.7% survival
 - If TOR rules followed transport decreased 50 %







Adult Cardiac Section Protocols

2012



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

Idris AH et al. Relationship between chest compression rates and outcomes from cardiac arrest. Circulation 2012 Jun 19; 125:3004.

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



Ramaraj R, Ewy GA. Heart 2009;95:1978-1982.

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

Stiell IG et al. What is the role of chest compression depth during out-of-hospital cardiac arrest resuscitation? Crit Care Med 2012 Jan 5

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</p>
 - < 70 % after 90 seconds in child</p>
 - < 70 % after 120 seconds in adult</p>
- Self reported fatigue low by 2 minutes

Badaki-Makun O et al. Chest compression quality over time in pediatric resuscitations. Pediatrics 2013 Mar; 131:e797.



Si's First Rule of Resuscitation

Pump Hard and Pump Fast Jack!

See things in a new way so you can GET (RE)STOKED

Dogma

WHY CAN'T WE LET GO OF THE 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

Goal: High (hyperventila hyperoxyge – Don't int for insert

- Adult de-sa
- Ventil
- Maintain SpO2 ≥ 94 %
- Do NOT Hyperventilate

CPF	is as eas	y as B
Ent.		
Compressions Push hard and fast on the center of the victim's chest	Airway Titt the victim's head back and lift the chin to open the airway	Breathing Give mouth-to-mouth rescue breaths
COTIO Assessor Heart Assoc a	A	American Heart Association Learn and Live

sion

s to



Si's First Rule of Resuscitation

Forget about the airway initially... Jack!

Easy

DEFIBRILLATION

Perishock Pause Independent Predictor of Survival

B WWWWWWWWWWWWWW

630

625

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

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

645

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.

Time (Seconds)

635

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



TIME IS CRITICAL

Survival decreases by 10% for every minute treatment is delayed



survival

time to cpr and shock



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





Importance of the First Link

Description and Recognition of an Out-of-Hospital Cardiac Arrest in an

Emergency Call

Jocelyn Berdowski, MS, MSE; Freerk Beekhuis, RN; Aeilko H. Zwinderman, PhD; Jan G.P. Tijssen, PhD; Rudolph W. Koster, MD, PhD

Berdowski, *J. Circulation*. 2009;119:2096-2102



Rea TD et al. Circulation. 2001;104: 2513-2516.

Common Delays in Delivering CPR

- Research showed these common causes of delay to CPR:
 - Unnecessary questions asked
 - Bystander not near patient
 - Omission of "breathing normally"
 - Deviation from protocols

Unnecessary questions cause delays

- How old is the patient?
- Does the patient have a heart history?
- Duplication of questions.
- What is the patient experiencing?



W



If patient is not conscious and not breathing - normally do we really need to ______istory?

All we n

We need to oner CFK without delay and inform the caller that we will help them.

The Agony of Agonal Respirations"

Agonal Breathing Facts

- Agonal breathing present 40 % of arrests
- Commonly mistaken for signs of life
- Very difficult to recognize over phone
- Prevents bystanders from CPR
- Caller may report as breathing to EMD

Agonal Breathing Facts

- Agonal breaths is the last respiratory pattern seen before apnea
- Duration may be 1 or 2 breaths
- Duration may be minutes to hours in some cases

Agonal Respirations

- Described by callers in a variety of ways:
 - barely breathing
 - heavy, labored breathing
 - gasping
 - snoring, snorting
 - gurgling
 - groaning, moaning
 - breathing every once in awhile

2-Question Approach

