2016 “Strive to Revive”
Improving Cardiac Resuscitation

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Introduction Slide

• Leslie H. (Les) Fryman
• Captain, Lexington Division of Fire and EMS
• 20+ Years with the LFD and 24 in EMS Statewide
• Fire and EMS Training Officer at Fire Training Academy
• Masters of Science, Safety, Security, and Emergency Management from Eastern Kentucky University, December 2009
  • Discipline in Fire and Emergency Services
• Bachelor of Science, Security and Loss Prevention from Eastern Kentucky University December 1990
• Flight Paramedic for AirMethods of Kentucky for over 7 Years
• Paramedic in the Emergency Department for UK Healthcare
• Haz Mat Specialist/ Advanced Haz Mat Life Support Certified
• Paramedic in Kentucky and Ohio
Presenter Disclosure Information

**Captain Les Fryman**
Who’s Your Cardiac Arrest Pit Crew?

**FINANCIAL DISCLOSURE:**
No relevant financial relationship exists

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Hospital Code Blue Called
Who’s Your Cardiac Arrest Pit Crew

HIGH PERFORMANCE CPR: A BEGINNERS GUIDE TO IMPLEMENTATION
QUESTION FOR AUDIENCE: How many of you practice CPR (outside of your AHA class)?

Practice.... We’re Talking About Practice
How do we Succeed?

2014 OHCA Statistics

Incidence and Outcome of Out-of-Hospital Cardiac Arrest in the U.S.

<table>
<thead>
<tr>
<th></th>
<th>Annual number of cases</th>
<th>Annual number of fatalities</th>
<th>Survival, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMS assessed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>424,000</td>
<td>401,000</td>
<td>5.2</td>
</tr>
<tr>
<td>Children</td>
<td>9,500</td>
<td>8,800</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>EMS treated</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>211,000</td>
<td>187,000</td>
<td>10.4</td>
</tr>
<tr>
<td>Children</td>
<td>7,700</td>
<td>7,000</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Shockable rhythm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>47,000</td>
<td>40,000</td>
<td>28.3</td>
</tr>
<tr>
<td>Children</td>
<td>560</td>
<td>370</td>
<td>26.7</td>
</tr>
<tr>
<td><strong>Bystander-witnessed, shockable rhythm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>24,000</td>
<td>16,000</td>
<td>31.7</td>
</tr>
<tr>
<td>Children</td>
<td>240</td>
<td>160</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Summary by Sudden Cardiac Arrest Foundation. Figures are point estimates.


2014 OHCA Statistics

Survival from EMS-Treated Out-of-Hospital Cardiac Arrest

- All Heart Rhythms: 89%
  - Survivors: 11%
- Bystander Witnessed, Shockable Heart Rhythms: 69%
  - Survivors: 31%

Data source: American Heart Association Heart Disease and Stroke Statistics 2016 Update
Sudden Cardiac Arrest Foundation, sca-aware.org

Practice.... We ARE Talking About Practice....
TOO MANY PEOPLE ARE GOING HERE TOO EARLY!

SURVIVAL is the BENCHMARK for EMS PERFORMANCE
### Table 2. Key Challenges to Improve CPR Quality for Adults, Children, and Infants

<table>
<thead>
<tr>
<th>CPR Component</th>
<th>Key Challenges to Improving Quality</th>
</tr>
</thead>
</table>
| Recognition         | • Failure to recognize gasping as sign of cardiac arrest  
                      | • Unreliable pulse detection          |
| Initiation of CPR   | • Low bystander CPR response rates   
                      | • Incorrect dispatch instructions    |
| Compression rate    | • Slow compression rate              |
| Compression depth   | • Shallow compression depth          |
| Chest wall recoil   | • Rescuer leaning on the chest       |
| Compression         | • Excessive interruptions for        
                      |   • Other                           |
| interruptions       |   • Ventilations                     
                      |   • Defibrillation                   
                      |   • Intubation                       
                      |   • Intravenous (IV) access          
                      |   • Other                           |
| Ventilation         | • Ineffective ventilations           
                      | • Prolonged interruptions in compressions to deliver breaths  
                      | • Excessive ventilation (especially with advanced airway) |
| Defibrillation      | • Prolonged time to defibrillator availability  
                      | • Prolonged interruptions in chest compressions  
                      |   • Pre- and post-shocks             |
| Team Performance    | • Delayed rotation, leading to rescue  
                      |   • Fatigue and decay in compression quality  
                      |   • Poor communication among rescuers, leading to unnecessary interruptions in compressions  

**A QUICK REVIEW OF RELATED SCIENCE**
**DUTY CYCLE**

**Compression**
- Increased intrathoracic pressure
- Ejects blood from heart and lungs
- “Good” compression increases forward output and BP

**Decompression (recoil)**
- Decreased intrathoracic pressure
- Refilling of heart and lungs
- “Good” recoil → vacuum → refilling → forward output

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**Effect of Interrupted Precordial Compression on Resuscitation Outcome**

![Graph showing success rate of resuscitation over time with interrupted CPR](image-url)

- Successfully Resuscitated:
  - 3 seconds: 100% (p<0.05)
  - 10 seconds: 80% (p<0.01)
  - 15 seconds: 40% (p<0.05)
  - 20 seconds: 0% (n=5 per group)

Yu T et al. Circulation 2002;106:368-372
Coronary and Cerebral Perfusion and CPR Quality

- Median Pressure (mm Hg)*
- % of Baseline

**Poor CPR**
- CNP: 12
- CNS blood flow (%): 20
- Prior to epinephrine

**Good CPR**
- CNP: 36
- CNS blood flow (%): 39
- Prior to epinephrine

- CNP: 22
- CNS blood flow (%): 35
- @ Peak epinephrine

Statistically significant: *p < 0.06

Cathy M et al., Resuscitation 2006;71:369-75

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**DELAYS AND INTERRUPTIONS KILL!**
DEATH
BY HYPERVENTILATION
A COMMON EXPERIENCE
IN CARDIAC ARREST

TRANSITION TIME-NO FLOW-
DEFIBRILLATION
• Perceived performance does not always match observed performance.

• Aufderheide et al. showed that duty cycle, chest compression depth and complete recoil were performed significantly less well when directly observed than EMT perceptions of their performance.

• Wik et al. showed that chest compression rate and depth were both significantly below AHA guidelines by trained EMS providers, and no flow time (when there was neither a pulse nor CPR being given) was almost 50% in directly observed performance evaluations.

• The likelihood of ROSC increases significantly with higher mean chest compression rate (in a hospital study 75% of patients achieved ROSC with 90 or more chest compressions/minute compared to only 42% with 72 or fewer chest compressions/minute).
HAVING QUALITY TIME ON THE CHEST IS ESSENTIAL
DISTRACTIONS AROUND EVERY CORNER

2014 OHCA Statistics
“Quality CPR is a means to improve survival from cardiac arrest. Scientific studies demonstrate when CPR is performed according to guidelines, the chances of successful resuscitation increase substantially. Minimal breaks in compressions, full chest recoil, adequate compression depth, and adequate compression rate are all components of CPR that can increase survival from cardiac arrest. Together, these components combine to create high performance CPR (HP CPR)”
Pit Crew Excellence

**FORMULA 1**

Crew: 14 +

4 Tires
(Mid-race refueling is banned)
Hospital Pit Crew CPR Model

Pre-hospital Pit Crew CPR
EACH PERSON HAS AN ASSIGNED ROLE AND PRACTICES AGAIN AND AGAIN!

1. PIT CREW LEADER
2. AIRWAY LEADER
3. DEFIB-IV/IO-MEDS
4. CPR CHIEF
5. CPR DEPUTY CHIEF
6. *VARIABLE PLAYER

PRE-ASSIGNED ROLES
Pit Crew CPR Format

Second Model with Limited Personnel
RESUSCITATION PIT CREW MODEL

1. BOSS
2. CPR 1
3. ACCESS M ED S MONITOR
4. CPR 2
5. AIRWAY ASSISTANT
6. AIRWAY VENTILATION

CPR 1:
- Compress > 2 inches
- Minimize interruptions
- Full recoil
- Rate between 100 and 120/min

CPR 2:
- Minimize pauses
- Administer drugs
- Prioritize compressions C-A-B
- Hover hands

AIRWAY VENTILATION:
- Intubation
- Rapid rhythm analysis
- Switch compressor every 2 min.
- IV placement

AIRWAY ASSISTANT:
- Improved survival

EMT CPR Foundation:
- Paramedic Advanced Life Support

Prioritize: C-A-B
- Rapid rhythm analysis
- minimize pauses
- Administer drugs
- Prioritize compressions C-A-B
- Hover hands
- Rate between 100 and 120/min
- Full recoil
- Compress > 2 inches
- Intubation
- IV placement
- Switch compressor every 2 min.
- Minimize interruptions
• EMTs own CPR
• Minimize interruptions in CPR at all times
• Ensure proper depth of compressions (>2 inches)
• Ensure full chest recoil/decompression
• Ensure proper chest compression rate (100-120/min)
• Rotate compressors every 2 minutes
• Hover hands over chest during shock administration and be ready to compress as soon as patient is cleared
• Intubate or place advanced airway with ongoing CPR
• Place IV or IO with ongoing CPR
• Coordination and teamwork between EMTs and paramedics
ALWAYS TRUE!

• C-A-B
• Minimize interruptions in compressions
• Compress at least 100-120/min
• Allow complete chest wall recoil/decompression between compressions
• Rhythm assessment every 2 minutes
• Rotate compressors every 2 minutes
• Hover over patient with hands ready during defibrillation so compressions can start immediately after the shock (or analysis) has occurred

HOVERING
THIS IS WHERE IT IS AT

VIDEO TAPE PRACTICE
USE INSTRUMENTED MANIKINS

FREQUENCY OF PRACTICE
Debriefing is a learner-focused, nonthreatening technique to help individual rescuers and teams reflect on and improve performance. Debriefing should be included in ALS courses to facilitate learning and can be used to review performance in the clinical setting to improve subsequent performance.

2010 AHA Guidelines for CPR & ECC

Structured and Supported Debriefing, available on OnlineAHA.org, builds on basic debriefing skills and teaches how to facilitate an effective 10-minute debriefing session after conducting a skills practice session.

These same skills can be used when debriefing clinicians after an actual cardiac arrest.

For detailed information on Structured and Supported Debriefing, visit

www.OnlineAHA.org
Are you interested in high quality resuscitation related news, discussion topics and other associated interests?

**HEART**Safe Community and
American Heart Association-
Public Safety

WE’LL LOOK FOR YOU!
PRACTICE
IS NOT
PERFECT!

PRACTICE
MAKES
PERMANENT

learnmindpower.com