The 2015 BLS & ACLS Guideline Updates... What Does the Future Hold?

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### Objectives

- 1. Discuss the 2015 BLS & ACLS Guidelines
- 2. Describe the literature supporting the guidelines
- 3. Discuss the 3 ongoing studies that are not included in the guidelines

## 2015 ACLS/BLS Guidelines:

https://eccguidelines.heart.org/ index.php/american-heartassociation/





According to the GWTG database, the survival rate from in-hospital cardiac arrest is:

A. 5% B. 18% **e** C. 30%

D. 50%

# What is the most common type of in-hospital cardiac arrest?

- A. PEA and Asystole 🙂
- B. Vfib and PEA
- C. Vtach and Vfib
- D. Asystole and Vfib

Asystole and PEA make up 67% of all adult in-hospital cardiac arrests

Circulation (2013); Morrison, et al.

# **CPR Quality**



### **Optimal Rate?**

- ROC PRIMED Study
- · Prospective observational study
- OHCA
- · After adjusting for
  - $\circ\,$  chest compression fraction &
  - depth

highest survival to discharge was found when the rate was...

### 100 - 119 per minute!

Idris, Guffey, Pepe et al (2015) Critical Care Medicine



## Optimal chest compression depth? ROC PRIMED Trial

#### • OHCA

- Current depth rec 50 mm
- 2005 rec. 38 50 mm
  No upper limit
- Highest survival depth interval of 40.3 mm – 55.3 mm
- Peak survival 45.6 mm (~1.8 inches)



Steill, Brown, Nichol et al (2014) Circulation

## **Compression Fraction**

- The amount of time spent providing compressions
- May also be called "compression ratio"
- Goal: At least 80%!



Is it acceptable to be off the chest for 20% of an arrest?



### Positioning





Leaning & recoil

## CCC Trial

- ROC Study group
- OHCA, survival to discharge
- Continuous 2 minutes of compressions without pauses in compressions for breathing
- vs.
- · Chest compressions with pauses for breathing
- Enrolled over 23,000 patients in 8 regions across the US & Canada

### Which is better?

#### 30 compressions : 2 ventilations?

OR

2 minutes continuous compressions with ventilations every 6 seconds?

• Compress 100 – 120 bpm

- Depth 5 6 cm (2 to 2.4 inches) • Class I, LOE C-LD
- · Avoid chest wall leaning, allow for full recoil
- Chest compression fraction should be as high as possible, with a minimum of 60% (with an unprotected airway)
  - Class IIb, LOE C-LD

# 2015 ACLS/BLS Guideline Update Recommendations:

- Reasonable to use audiovisual feedback devices during CPR for real time optimization of CPR performance
  - Class IIb, LOE B-R
- Insufficient evidence to recommend artifactfiltering algorithms for analysis of ECG rhythm during CPR
- Class IIb, LOE C-EO

## 2015 ACLS/BLS Guideline Update Recommendations:

- The routine use of an Impedance Threshold Devices (ITD) in addition to conventional CPR is not recommended.
  - Class III

<sup>•</sup> Class IIa, LOE C-LD

- The use of **mechanical compression devices** may be a reasonable for use by properly trained personnel.
- The use of mechanical compression devices may be considered in specific settings where the delivery of high quality manual compressions may be challenging or dangerous to the provider.
- Examples: Prolonged CPR, in the back of a moving ambulance, in the angiography suite
  - · Class IIB, LOE C-EO



# 2015 ACLS/BLS Guideline Update Recommendations:

- Continuous waveform capnography for confirming placement of an endotracheal tube
   Class I
- Low PETCO2 (< 10 mmHg) after 20 minutes in intubated patients is strongly associated with failure of resuscitation
  - Class IIb, LOE C-LD
- Should not be used in isolation or in nonintubated patients
- Class III

- Ventilation rate 10 breaths per minute with an advanced airway
  - Class IIb, LOE C-LD

#### AVOID Over-ventilation!!!

• If patient does not have an advanced airway:

# 30:<u>2</u>

Do you stop compressions for ventilations? YES

• If the patient has an advanced airway:

# 10 breaths / min

(1 breath every 6 seconds) Do you stop compressions for ventilations? NO -2015 BLS/ACLS Guidelines

### AHA Identified Knowledge Gaps:

- The optimal method for ensuring adequate depth of chest compressions during manual CPR
- The optimal chest compression fraction
- Optimal use of CPR feedback devices to increase patient survival
- Are mechanical devices superior to manual compressions in special situations? (moving ambulance, prolonged CPR, angiography suite, etc.)

# Defibrillation

#### Ventricular fibrillation

- Most successful treatment for v-fib is defibrillation!
- For every minute delay, survival decreases by 10%!!!





# 

71.137-14

CLINICAL PAPER

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#### Minimize Pre & Post Shock pauses



Sell et al 2010 Resuscitation

Post-Shock pause < 6 seconds

# Pauses are bad. Very bad.

- OHCA, observational study
   Evaluated pauses in all rhythms including PEA &
- systole
  Survival decreased 11% per 5 second increase in duration
- of longest overall pause • Individual long pauses may be more harmful than multiple short pauses even if the overall CCF is similar



Brouwer, Walker, Chapman, Koster (2015) Circulation 132:1030-37.









- Suggest an initial period of CPR for 30-60 seconds while the defibrillator is being applied
- For manual defibrillators, we suggest that pre & post shock pauses are as short as possible.
   Class I, LOE C-LD



Which of the following medications has been shown to increase survival to discharge from cardiac arrest?

- A. Epinephrine
- B. Vasopressin
- C. Bicarb
- D. Amiodarone
- C E. None of the above

# **Emergency medications - V-fib**

- Epinephrine 1 mg every 3-5 min or
- Vasopressin 40 units instead of the  $1^{\rm st}$  or  $2^{\rm nd}$  Epi
- (Removed from Cardiac Arrest Algorithm!)
- Amiodorone
  - 300 mg IV pulseless 150 mg pulse

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Circulation 2015, AHA ACLS Guidelines

### Studies questioning the use, timing, efficacy of Epinephrine

- Dumas et al (2014) J Amer College of Card\*
- Olasveengen et al (2012) Resuscitation\*
- Hagihara et al (2012) JAMA\*
- Jacobs et al (2011) Resuscitation\*
- Olasveengen et al (2009) JAMA\*
- Ong et al (2007) Ann Emerg Med\*
- Gueugniaud et al (1998) NEJM
- Herlitz et al (1995) Resuscitation\*
- Paradis et al (1991) JAMA

\*Epi associated with worse outcomes

#### VSE Study Mentzelopoulos (2013) JAMA • RCT

- Vasopressin 20 IU + Epi 1mg q 3 min x 5 cycles

+ 40 mg **S**teroid - methylprednisolone (1<sup>st</sup> cycle)



# Is Epinephrine beneficial or does it cause harm?

- Current recommendation: 1 mg Q 3 5 min
- RCT Epi vs. Placebo
- Warwick University
- UK & Wales
- Enrollment started Sept 2014
- 8,000 subjects
- Out-of-Hospital Cardiac Arrest
- Paramedic2 Trial



/ctu/trials/critical/paramedic2/caa

# Amiodorone vs. Placebo





Kudenchuk et al (1999) NEJN

#### **ALP Trial**

- <u>A</u>miodorone vs.
- Lidocaine vs.
- Placebo
- Out of hospital v-fib arrest
- Goal is drug administration < 10 minutes after arrival on scene
- Resuscitation Outcome Consortium (ROC) study group
- Multi-city EMS trial
- Enrolled last patient 10/24/15
- Goal: 3,000 patients

# 2015 ACLS/BLS Guideline Update Recommendations:

- Vasopressin in combination with Epinephrine shows no advantage as a substitute for standard Epinephrine.
- Vasopressin has been removed from the Adult Cardiac Arrest Algorithm.
- In non-shockable rhythms, administer Epinephrine as soon as possible.
- There is inadequate evidence to support the use of Lidocaine after cardiac arrest.

## 2015 ACLS/BLS Guideline Update Recommendations:

- For IHCA we suggest that the combination of methylprednisolone, vasopressin & epinephrine may be considered as an alternative to epinephrine alone during CPR
   Class IIb, LOE C-LD
- Suggest the use of Amiodarone in adult patients who suffer OHCA with refractory VF/pVT to improve rates of ROSC

www.ilcor.org

**Post Cardiac Arrest: Targeted Temperature** Management

### **Post-Arrest Optimal Temperature?**





## Clinical assessment:

- Does mild hypothermia (32 34°C) reduce mortality & improve neurologic outcomes post cardiac arrest? • YES!!!!
- Does 36° C have the same benefit?
  YES!!!
- Does "normothermia" have the same benefit?
- We don't know!!!
- · Is fever bad post-cardiac arrest?
- YES!!!



- Recommend against routine pre-hospital cooling of patients with ROSC with rapid infusion of cold IV fluids
  - Class III, LOE A
- Comatose adult patients with ROSC after CA should have Targeted Temperature Management.
  - Class I, LOE B-R for Vfib/pVT OHCA
- $\,^{\circ}\,$  Class I, LOE C-EO for non Vfib/pVT & IHCA

# 2015 ACLS/BLS Guideline Update Recommendations:

- Maintain temperature 32 36° C
  Class I, LOE B-R
- TTM for a minimum of 24 hours after achieving ROSC
  - Class IIa, LOE C-EO
- It may be reasonable to actively prevent fever in comatose patients after TTM
   Class IIb, LOE C-LD

### System of Care











### In conclusion,

- Resuscitation involves a system of care, all being inter-dependent on improving outcomes
- We need to focus on <u>high quality CPR</u> & early defibrillation
- Capnography & CPR feedback devices should be considered to monitor quality
- Temperature should be managed to 32 36° C in patients resuscitated from cardiac arrest