

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

Greater Kansas City Chapter
Of AACN

2016 Visions Critical Care
Conference

Nicole Kupchik RN, MN, CCNS, CCRN, PCCN, CMC
Independent CNS/Staff Nurse



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-heart-
association/](https://eccguidelines.heart.org/index.php/american-heart-association/)



Figure 1

New AHA Classification System for Classes of Recommendation and Levels of Evidence*

CLASS (STRENGTH) OF RECOMMENDATION	LEVEL (QUALITY) OF EVIDENCE
CLASS I (STRONG) Suggested practice for writing recommendation: • Is recommended • Is indicated (useful/effective/beneficial) • Should be performed/administered/other Comparative (Reference Therapy): • Treatment (strong) is recommended/indicated in preference to treatment B • Treatment A should be chosen over treatment B	LEVEL A • High-quality evidence ¹ from more than 1 RCTs • Meta-analysis of high-quality RCTs • One or more RCTs corroborated by high-quality registry studies
CLASS IIa (MODERATE) Suggested practice for writing recommendation: • Is reasonable • Can be useful/effective/beneficial Comparative (Reference Therapy): • Treatment (strong) is recommended/indicated in preference to treatment B • It is reasonable to choose treatment A over treatment B	LEVEL B • Moderate-quality evidence ¹ from 1 or more RCTs • Meta-analysis of moderate-quality RCTs
CLASS IIb (WEAK) Suggested practice for writing recommendation: • May be useful/effective • May be helpful for treatment • Data/level of effectiveness (unknown) unclear/balanced or not well established	LEVEL B-L • Moderate-quality evidence ¹ from 1 or more well-designed, well-conducted observational studies, observational studies, or registry studies • Meta-analysis of such studies
CLASS III (NO RECOMMENDATION) Suggested practice for writing recommendation: • Is not recommended • Is not indicated (useful/effective/beneficial) • Should not be performed/administered/other	LEVEL C • Rationale or nonrandomized observational or registry studies with limitations of design or execution • Meta-analysis of such studies
CLASS IV (HARM) Suggested practice for writing recommendation: • Is harmful • Is contraindicated (useful/effective/beneficial) • Associated with serious morbidity/mortality • Should not be performed/administered/other	LEVEL C-L • Rationale or nonrandomized observational or registry studies with limitations of design or execution • Meta-analysis of such studies
CLASS III (NO RECOMMENDATION) Suggested practice for writing recommendation: • Is not recommended • Is not indicated (useful/effective/beneficial) • Should not be performed/administered/other	LEVEL C-LP Consensus of expert opinion based on clinical experience
CLASS III (NO RECOMMENDATION) Suggested practice for writing recommendation: • Is not recommended • Is not indicated (useful/effective/beneficial) • Should not be performed/administered/other	LEVEL D Consensus of expert opinion based on clinical experience

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

- A. 5%
- B. 18% 😊
- 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

IHCA



Optimal Rate?

- ROC PRIMED Study
- Prospective observational study
- OHCA
- After adjusting for
 - 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

Compression rate “Push fast, push hard”



Too Slow
(Before 2010)

Too Fast
(current)

100 – 120 /min

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)**



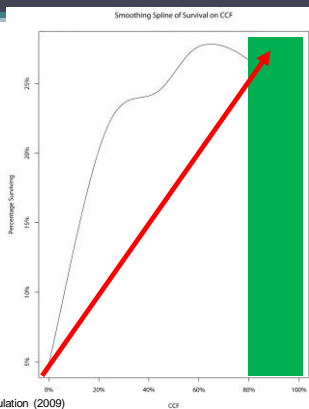
Steil, Brown, Nichol et al (2014) Circulation

Compression Fraction

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

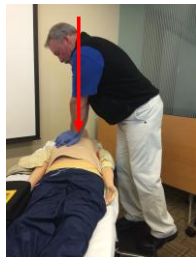
Is it acceptable to be off the chest for 20% of an arrest?





Christenson et al. Circulation (2009)

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?

2015 ACLS/BLS Guideline Update Recommendations:

- Compress 100 – 120 bpm
 - Class IIa, LOE C-LD
- 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 artifact-filtering 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

2015 ACLS/BLS Guideline Update Recommendations:

- 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 non-intubated patients
 - Class III

2015 ACLS/BLS Guideline Update Recommendations:

- 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:

30:2

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

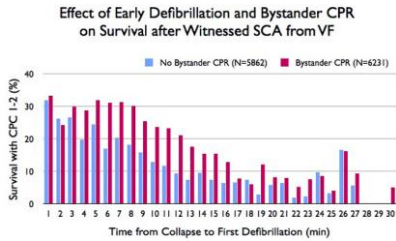
AHA Identified Knowledge Gaps:

- 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%!!!



Metoba et al (2010) Circulation N = 13, 053

Resuscitation (2006) 71, 137-145

CLINICAL PAPER

RESUSCITATION

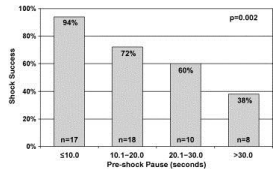
www.elsevier.com/locate/resuscitation

Effects of compression depth and pre-shock pauses predict defibrillation failure during cardiac arrest

Dana P. Edelson^a, Benjamin S. Abella^{b,*}, Jo Kramer-Johansen^{c,d}, Lars Wik^{c,d,e,f}, Helge Myklebust^g, Anne M. Barry^h, Raina M. Merchant^h, Terry L. Vanden Hoek^h, Petter A. Steen^{c,d,f,i,h}, Lance B. Beckerⁱ

The 2nd most cited paper in *Resuscitation* in the 5-year period after it was published!

Conclusion: Pause duration does affect VF termination rate.



Minimize Pre & Post Shock pauses

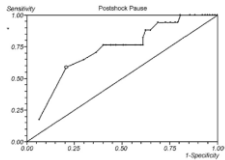


Fig. 3. Receiver-operator curve for pre-shock interval using return of spontaneous circulation (ROSC) as the outcome variable (area under the curve 0.73). The optimal pre-shock interval was defined as 0 s.

Pre-Shock pause < 3 seconds

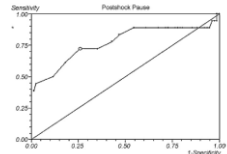


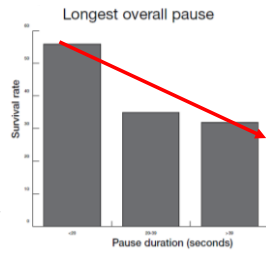
Fig. 4. Receiver-operator curve for post-shock interval using return of spontaneous circulation (ROSC) as the outcome variable (area under the curve 0.73). The optimal post-shock interval was defined as 6 s.

Post-Shock pause < 6 seconds

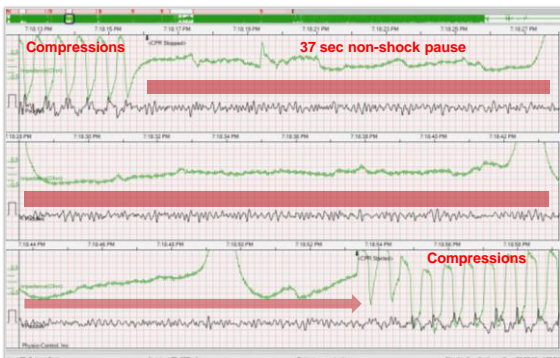
Sell et al 2010 Resuscitation

Pauses are bad. Very bad.

- OHCA, observational study
- Evaluated pauses in all rhythms including PEA & asystole
- 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.





2015 ACLS/BLS Guideline Update Recommendations:

- 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

Drugs

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

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

Emergency medications - V-fib

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



Circulation 2015, AHA ACLS Guidelines

Studies questioning the use, timing, efficacy of Epinephrine

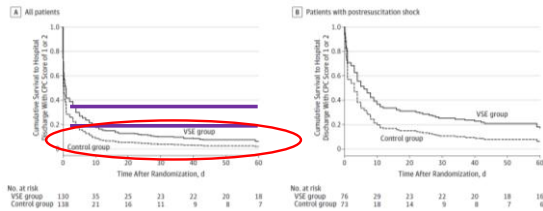
- Dumas et al (2014) J Amer College of Card*
- Olasveengen et al (2012) Resuscitation*
- Hagihara et al (2012) JAMA*
- Jacobs et al (2011) Resuscitation*
- Olasveengen et al (2009) JAMA*
- Ong et al (2007) Ann Emerg Med*
- Gueugniaud et al (1998) NEJM
- Herlitz et al (1995) Resuscitation*
- Paradis et 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 Steroid - methylprednisolone (1st cycle)

Figure 2. Results on Survival Analysis



Is Epinephrine beneficial or does it cause harm?

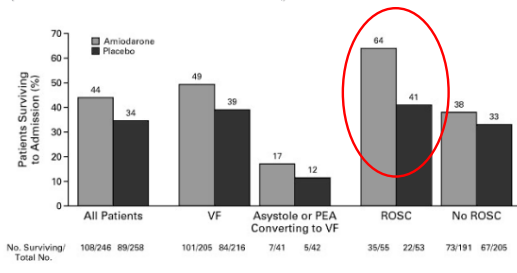
- Current recommendation: 1 mg Q 3 – 5 min
- RCT Epi vs. Placebo
- Warwick University
- UK & Wales
- Enrollment started Sept 2014
- 8,000 subjects
- Out-of-Hospital Cardiac Arrest
- Paramedic2 Trial



<http://www2.warwick.ac.uk/fac/med/research/hscience/ctu/trials/critical/paramedic2/caa/>

Amiodorone vs. Placebo

(after 3 successive shocks in OHCA)



N = 504

Kudenchuk et al (1999) NEJM

ALP Trial

- **A**miodorone vs.
- **L**idocaine vs.
- **P**lacebo
- 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

Post Cardiac Arrest: Targeted Temperature Management

Post-Arrest Optimal Temperature?

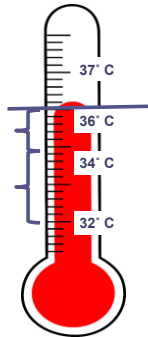
33° C vs. 36° C



Nielsen et al (2013) NEJM

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!!!**



2015 ACLS/BLS Guideline Update Recommendations:

- 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
 - 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 **high quality CPR** & 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
