

**The 2015 BLS & ACLS
Guidelines...
What Does the Future Hold?**

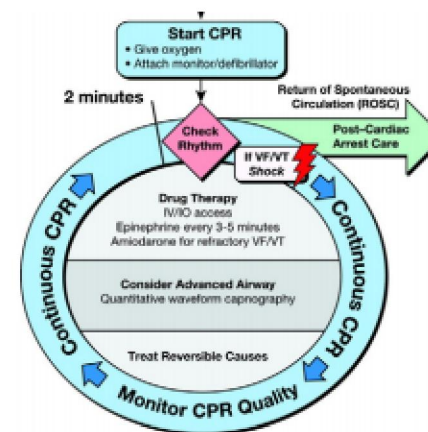


Objectives

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

2010 ACLS Guidelines

- Bigger emphasis on compressions
 - “Push fast, push hard”
- Early defibrillation
- Waveform Capnography
 - Quality of compressions
- Post resuscitation algorithm
 - Temperature management



2010 AHA ACLS Guidelines

Coming October 15, 2015...

New BLS & ACLS Guidelines!!!



2015 ACLS/BLS Guidelines Draft:

www.ilcor.org

The screenshot shows the ILCOR website homepage. At the top left is the ILCOR logo with the text "International Liaison Committee" and "ILCOR In Resuscitation". To the right is a search bar. Below the logo is a navigation menu with links: Home, About Ilcor, Consensus 2010, Publications, News, Links, and Members Only. The main content area is divided into several sections. On the left, under "Members", are logos for the American Heart Association, European Resuscitation Council, Heart & Stroke Foundation, and Australian Resuscitation Council. In the center, a red circle highlights a banner for "SEERS ILCOR Scientific Evidence Evaluation and Review System". Below this is a "Timeline" section with a vertical line and circular markers for various events: 18-20 Apr 2013 (Spark Of Life Conference Melbourne), 21-22 Apr 2013 (Ilcor meeting Melbourne), 23 Apr 2013 (Utstein meeting Melbourne), 29-30 Apr 2014 (ILCOR meeting Canada), 2-5 Feb 2015 (International Consensus Conference), and 15 Oct 2015 (ILCOR CoSTR and Guidelines published). On the right, there is a "Guidelines 2010" section with a list of links: CoSTR ERC, CoSTR AHA, ERC Guidelines, AHA Guidelines, and JRC Guidelines. Below that is a "News" section with links to a tribute to Ian Jacobs, an ILCOR update on Targeted Temperature Management, and a link to submit an application to become an ILCOR member.

CPR Quality

Quality of compressions

Current AHA recommendations:

- Rate = at LEAST 100/min
- Depth 2 inches (50 mm)
- Allow for full recoil of the chest

Compressions provide 25-33%
of normal cardiac output



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!

Compression rate “Push fast, push hard”



Too Slow
(Before 2010)

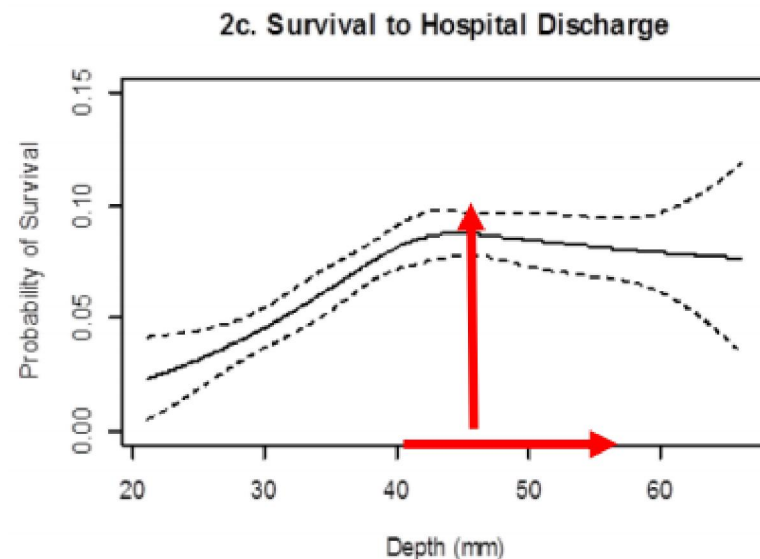
100 – 120 /min

Too Fast
(current)

Optimal chest compression depth?

ROC PRIMED Trial

- Out of hospital cardiac arrest
- Current depth recommendation is 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

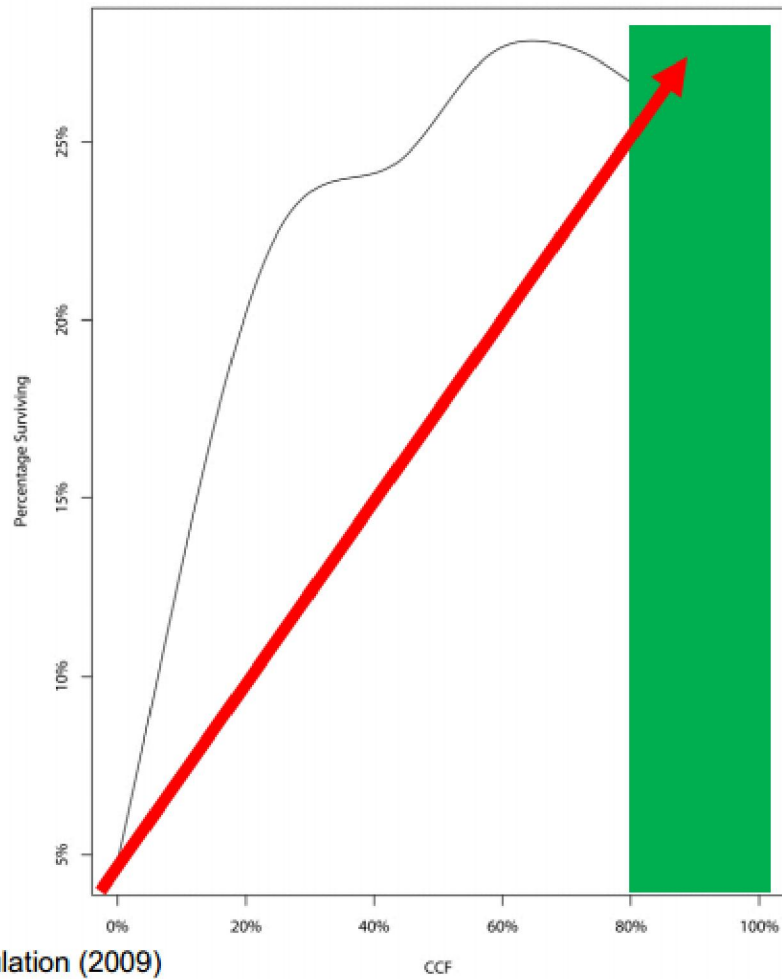
Compression Fraction

- 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?



Smoothing Spline of Survival on CCF



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

 - Plan to enroll 23,600 patients in 8 regions across the US & Canada



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 proposed BLS/ACLS

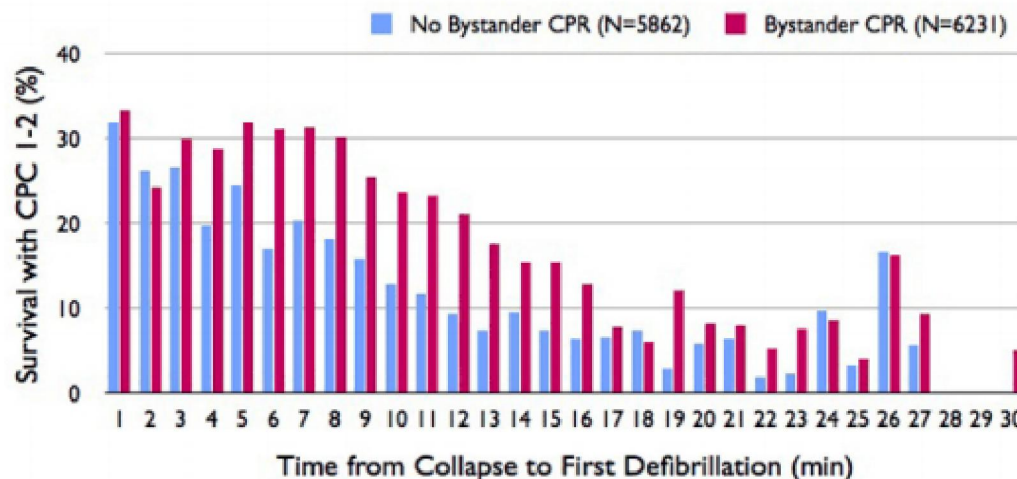
Guidelines

Defibrillation

Ventricular fibrillation

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

Effect of Early Defibrillation and Bystander CPR
on Survival after Witnessed SCA from VF



Metoba et al (2010) Circulation

N = 13, 053

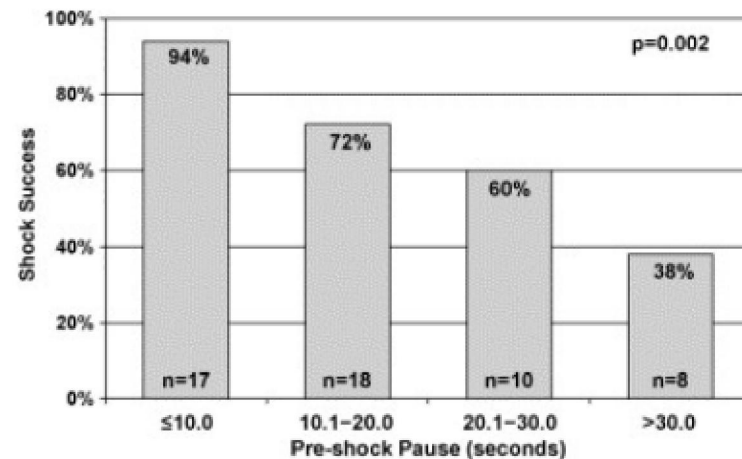


Effects of compression depth and pre-shock pauses predict defibrillation failure during cardiac arrest[☆]

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^b, Raina M. Merchant^b, Terry L. Vanden Hoek^b, Petter A. Steen^{c,d,f,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

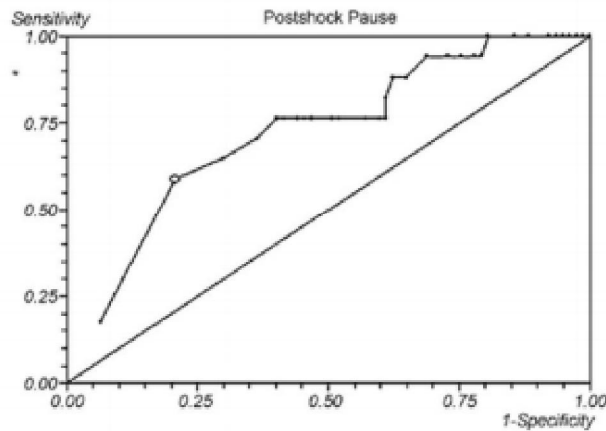


Fig. 3. Receiver-operator curve for pre-shock interval using return of spontaneous circulation (ROSC) as the outcome variable (area under the curve 0.72). The optimal pre-shock interval was defined as <3 s.

Pre-Shock pause < 3 seconds

Sell et al 2010 Resuscitation

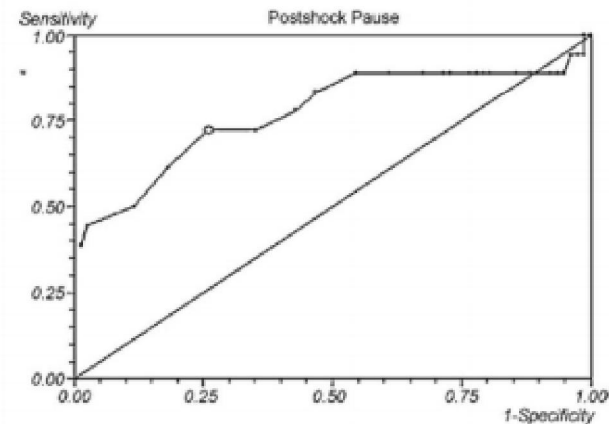


Fig. 4. Receiver-operator curve for post-shock interval using return of spontaneous circulation (ROSC) as the outcome variable (area under the curve 0.77). The optimal post-shock interval was defined as <6 s.

Post-Shock pause < 6 seconds

2015 ACLS/BLS Guideline *DRAFT*

Recommendations:

- Compress 100 – 120 bpm
- Depth 4.5 – 5.5 cm, max 6 cm (1.8 to 2.2 inches)
- Avoid chest wall leaning, allow for full recoil
- Suggest **against** the use of artifact-filtering algorithms for analysis of ECG rhythm during CPR
- Ventilation rate 10 breaths per minute
- Suggest an initial period of CPR for 30-60 seconds while the defibrillator is being applied
- For manual defibrillators, we suggest that pre-shock pauses are ≤ 10 seconds
- We suggest that CCF should be $>60\%$

2015 ACLS/BLS Guideline *DRAFT* Recommendations:

- recommend **against** routine use of Impedance Threshold Devices (ITD) in addition to standard CPR or active Compression-Decompression CPR
- Suggest mechanical chest compression devices should not be considered the standard of care for cardiac arrest patients, but can be considered a reasonable alternative to high quality manual chest compressions in some settings (weak recommendation, moderate quality of evidence).

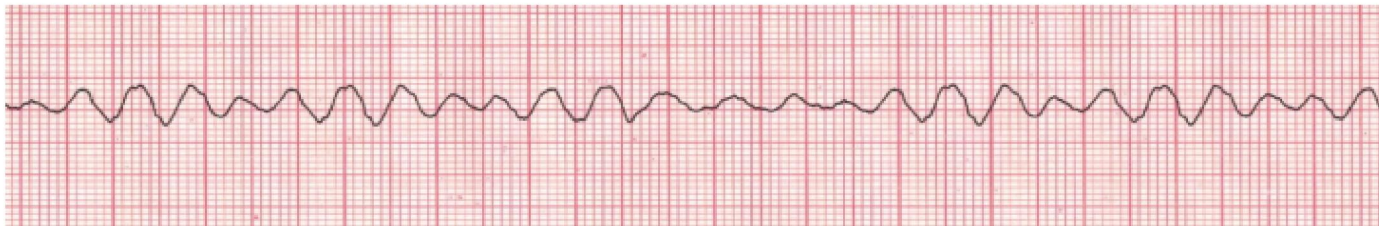
Drugs

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

- A. Epinephrine
- B. Vasopressin
- C. Bicarb
- D. Amiodorone
- 😊 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
- **Amiodorone**
 - 300 mg IV pulseless
 - 150 mg pulse



Circulation 2010, 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

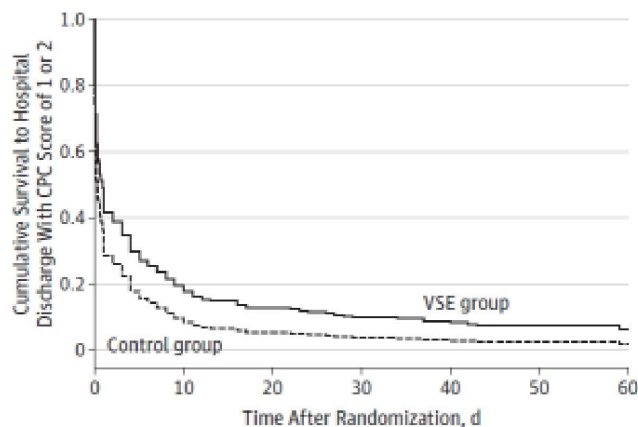
*Epi associated with worse outcomes

VSE Study Mentzelopoulos (2013) JAMA

- RCT
- Vasopressin 20 IU + Epi 1mg q 3 min x 5 cycles + 40 mg Steroid - methylprednisolone (1st cycle)

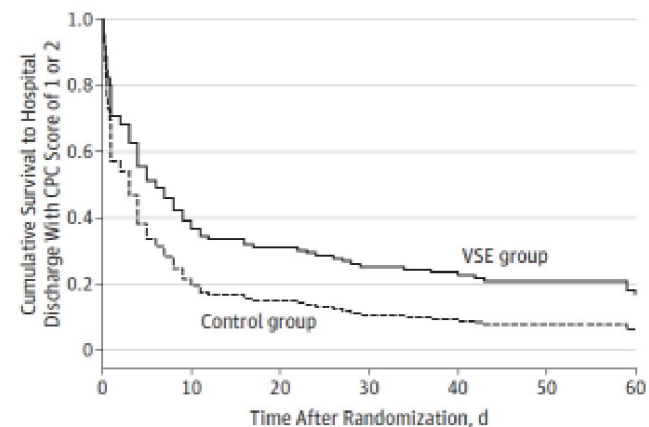
Figure 2. Results on Survival Analysis

A All patients



No. at risk							
VSE group	130	35	25	23	22	20	18
Control group	138	21	16	11	9	8	7

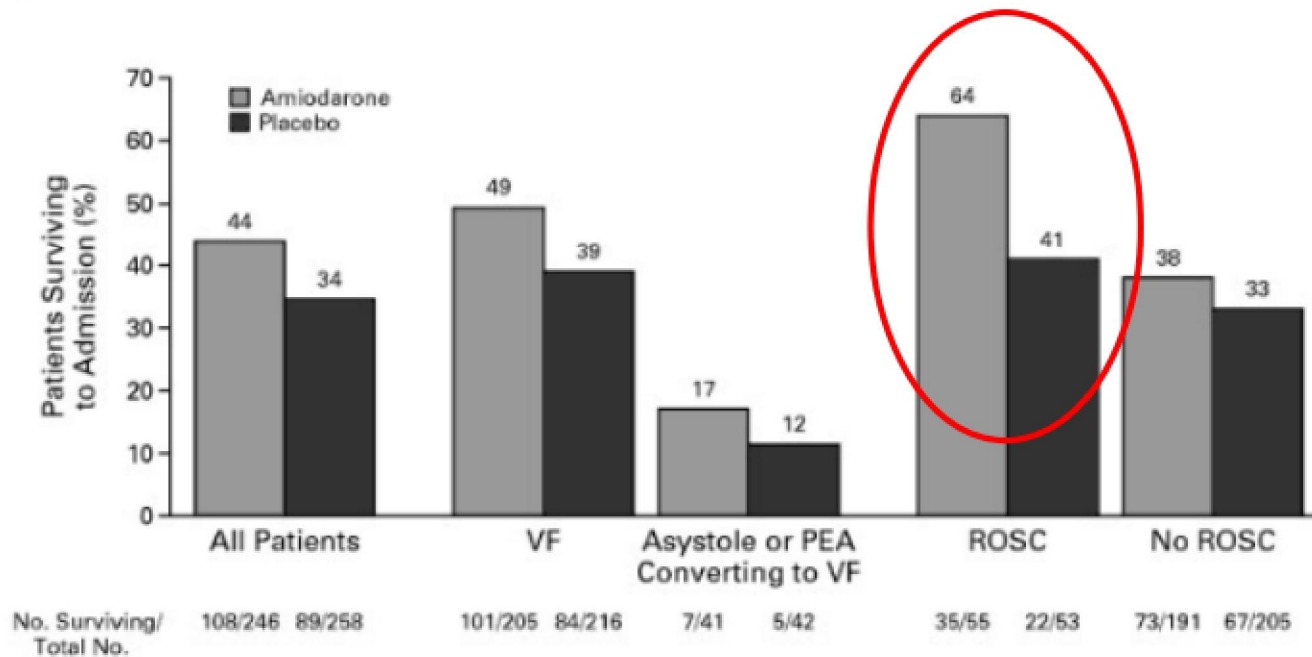
B Patients with postresuscitation shock



No. at risk							
VSE group	76	29	23	22	20	18	16
Control group	73	18	14	9	8	7	6

Amiodorone vs. Placebo

(after 3 successive shocks in OHCA)



N = 504

Kudenchuk et al (1999) NEJM

ALP Trial

- Amiodorone 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
- Still enrolling patients
- Goal: 3,000 patients

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/>

2015 ACLS/BLS Guideline *DRAFT* Recommendations:

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

Weak recommendation; high confidence in effect estimate

Post Cardiac Arrest: Targeted Temperature Management

Post-Arrest Optimal Temperature?

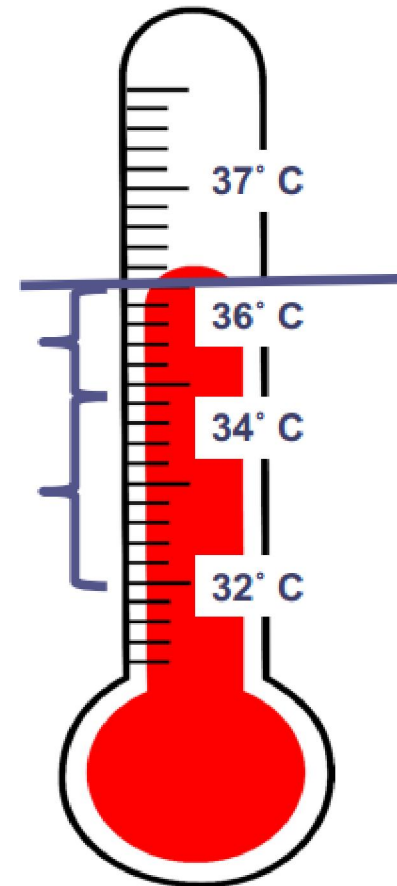
33°C vs. 36°C



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 *DRAFT* Recommendations:

- Recommend selecting and maintaining a constant, target temperature between 32°C and 36°C for those patients in whom temperature control is used

strong recommendation, moderate-quality evidence

- Whether certain subpopulations of cardiac arrest patients may benefit from lower (32-34 °C) or higher (36 °C) temperatures remains unknown, and further research may help elucidate this.



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 out-of-hospital cardiac arrest from Ventricular Fibrillation