What you need to know from the updates in resuscitation

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Disclosure

- No relevant conflicts of interest

What is ILCOR

- International Liaison Committee on Resuscitation
- Includes Representatives from
  - AHA
  - ERC
  - HSFC
  - ANZCOR
  - IAHF
  - RCA
- Goal is to prevent premature cardiovascular death
- 2010 evidence evaluation of published science around cardiac arrest, pericardiac arrest, ACS and periarrest in all age groups.

Updates in Adult BLS

- No pulse check first
- CPR is to begin in a unresponsive person who is not breathing normally

Circulation. 2010;122:S298-S324
The reason that the pulse check was removed from the guidelines

1. More important to initiate compression
2. Lack of ability for lay people to check a pulse
3. No one was doing it
4. A and B

But how confident are you in your ability to feel a pulse?

- In adult and pediatric patients with cardiac arrest (out-of-hospital and in-hospital) (P), does the interruption of CPR to check circulation (I) as opposed to no interruption of CPR (C), improve outcome (O) (eg. ROSC, survival)?

Updates in Adult BLS

- No study has shown that lay people can adequately assess the pulse
- 6 studies suggest that healthcare providers can’t assess the pulse and 3 suggested that they could

CPR is as easy as

C - Compressions
A - Airway
B - Breathing

Circulation. 2010;122:S298-S324
Can I check now?

- A study in manikins confirmed
  - a low ability (<50%) of EMS providers to correctly identify the presence of a carotid pulse.
  - A palpable pulse is usually absent immediately after defibrillation during OHCA.
- AED algorithms that recommend that rescuers check for a pulse immediately
  - after a shock delivery are not useful
  - will lead to delay in resumption of chest compressions.

Treatment Recommendation

- For lay rescuers, interrupting chest compressions to perform a pulse check is not recommended.
- For healthcare professionals, it is reasonable to check a pulse if an organized rhythm is visible on the monitor at the next rhythm check.

Staying Alive

- Chest compressions first
  - Don’t give a rescue breath
  - New ABC is CAB
- 2 inches deep (adults) at a rate of 100 compressions per minute
- Place your hands on the lower half of the sternum
  - Internipple line does not locate the area over the left ventricle

Circulation. 2010;122:S298-S324
You are taking care of a 75 yo M with Unstable ventricular fibrillation.

Assuming you use a biphasic defibrillator. How many joules do you start with?

1. 150 J
2. 200 J
3. Do not use a biphasic machine
4. 100 J

In adult cardiac arrest (prehospital [OHCA], in-hospital [IHCA]) (P), does the use of an escalating defibrillation energy protocol (I) when compared with a fixed energy protocol (C) increase outcome (eg. return of spontaneous circulation) (O)?
Defibrillation

- All new defibrillators give biphasic shocks
- Biphasic waveforms had higher shock-success rates compared with monophasic defibrillation.
- No randomized trial has shown a improvement in patient outcomes with biphasic
- Studies have reported greater first shock success with biphasic shocks

How many joules should I start with?

- Evidence from 2 trials BTE waveforms suggested that higher energy levels are associated with higher shock-success rates.
  - 150 J = 200 J
- In one study using pulsed biphasic waveforms at 130 J the first-shock success rate was 90%.

Go big or go home?

- Animal study of biphasic 360 J shocks did not appear to cause more cardiac damage than biphasic 150 J shocks
- Human studies involving BTE waveforms ≤ 360 J have not shown harm as indicated by biomarker levels, ECG findings, and ejection fractions.
- Escalating defibrillation energy protocols are reasonable to use.

CPR fatigue......

- 85 yo M arrests in CT
  - CPR is initiated and the patient is brought back to the ED
  - How long can a single person perform CPR before there is a decrease in depth of compression?
What is the value of CPR assist devices?

- In adult cardiac arrest (prehospital [OHCA], in-hospital [IHCA]) (P), does the use of load distributing band (eg. Autopulse) (I) compared with manual CPR (C), improve any outcomes (eg. ROSC, survival) (O)?

- In adult cardiac arrest (prehospital [OHCA], in-hospital [IHCA]) (P), does the use of mechanical compression full (eg. Lucas) or partial decompression (eg. US version) (I) compared with manual CPR (C), improve any outcomes (eg. ROSC, survival) (O)?

Can’t a machine just perform CPR?

- The load distributing band (LDB) and mechanical piston devices are devices that perform compressions.
- Studies have varied in outcome:
  - 1000 adults study showed no improvement in 4-hour survival and significantly worse neurologic outcome with LDB-CPR.
  - LDB-CPR was associated with lower odds of 30-day survival (OR 0.4).
- Studies have reported increased rates of sustained ROSC.
- Improved hemodynamics following failed resuscitation from in-hospital cardiac arrest.

Treatment Recommendation

- There are insufficient data to support or refute the routine use of LDB-CPR or mechanical piston devices instead of manual CPR. It may be reasonable to consider LDB to maintain continuous chest compression while undergoing CT scan or similar diagnostic studies, when provision of manual CPR would be difficult.
Have you used a CPR assist device

1. Yes
2. No
3. Never heard of it

CPR interruptions

- Continuous video and chest compression data with the Physiocontrol CodeStat Suite 7.0 for resuscitations
- The median no-flow time, manual CPR 85 seconds (interquartile range [IQR] 45 to 112 seconds)
  - load-distributing band 104 seconds (IQR 69 to 151 seconds).
- 5 to 10 minutes into the resuscitation,
  - median no-flow time was manual 85 seconds (IQR 59 to 151 seconds)
  - load-distributing band 52 seconds (IQR 34 to 82 seconds)
- The average time to apply load-distributing band CPR during this period was 152 seconds.

A 37 yo F presents to the ED in respiratory arrest. You make the decision to intubate her. As part of your routine practice:

1. You always use cricoid pressure
2. You sometimes use cricoid pressure
3. You rarely use cricoid pressure
Cricoid Pressure

- The question
  “In adults and children during ventilation and intubation, does the application and maintenance of cricoid pressure, compared to no cricoid pressure, reduce the incidence of aspiration?”

Come on we all do it…there must be data

- 4 studies - Less gastric inflation with cricoid pressure
- 9 studies - Impairs ventilation, increases peak inspiratory pressure, and causes complete obstruction in up to 50% of patients depending on the amount of pressure
- May or may not make intubation more difficult
- 21 studies report providers apply less pressure than needed.

Cricoid Pressure

“The routine use of cricoid pressure to prevent aspiration in cardiac arrest is not recommended. If cricoid pressure is used during cardiac arrest, the pressure should be adjusted, relaxed, or released if it impedes ventilation or placement of an advanced airway.”

Circulation. 2010;122:S345-S421

- 450 lb woman presents in cardiac arrest. You are unable to feel pulses with CPR due to her body habitus.

- Is there anything you can use to assess CPR or return of spontaneous circulation?
Capnography

- The use of capnography to confirm and continually monitor tracheal tube placement and quality of cardiopulmonary resuscitation (CPR).

- May give prognostic information
  - <10mm Hg try to improve CPR
  - >40mm Hg usually associated with ROSC

Capnography

Is there a right way to do this?

- 67 yo M presents in atrial fibrillation. SBP 86/40. You make a decision to cardiovert.
  - Where do you place the pads?
  - What joules do you start with?

Arrhythmia

- In adult patients in a shockable non-arrest rhythm requiring cardioversion (prehospital or in-hospital) (P), does the any specific cardioversion strategy (I) compared with standard management (or other cardioversion strategy) (C), improve outcomes (eg. termination of rhythm).
Arrhythmia

- AP or AL locations of pad are acceptable
  - Try to avoid putting pads over implantable devices, but not mandatory.
  - Got rid of the suggestion to place at least 1 inch away

- Atrial Fibrillation
  - New J recommendations
    - 120J-200J for biphasic
    - 200J for monophasic

Circulation. 2010;122:S345-S421

Atrial Fibrillation

- Cardioversion is more successful when cardiologists use higher initial energy settings
  - 360 J for monophasic waveform cardioversion and 200 J for biphasic
  - Three fair LOE 1 studies
- There are insufficient data to support or refute any different cardioversion strategy for ventricular dysrhythmias versus atrial dysrhythmias.

You are handed an EKG with a wide complex tachycardia?

*What can you do to make the help make the diagnosis?*

ACLS

- In adult patients with undifferentiated stable wide complex tachycardia (prehospital and in-hospital) (P), does the use of any drug or combination of drugs (I) compared with not using drugs (or a standard drug regimen)(C), improve outcomes (eg, reversion rates)(O)?
ACLS

- Adenosine recommended as safe and potentially effective for treatment and diagnosis in initial management of undifferentiated regular monomorphic wide-complex tachycardia.

The data

- Case series (Marill 2009, 2512)
  - 197 patients who presented to the Emergency Department with wide QRS complex tachycardia.
  - Adenosine converted 106 of these patients to sinus rhythm
  - Only 2 of whom converted were later found to have ventricular tachycardia.

Updates in treatment for PEA

- Atropine: deleted from pulseless arrest algorithm
- Epinephrine: dose, interval unchanged
- Vasopressin: dose, use unchanged
- Amiodarone: dose, indications unchanged
- Lidocaine: dose, indications unchanged
- Sodium Bicarbonate: Routine use not recommended (Class III, LOE B).
- Calcium: Routine administration for treatment of cardiac arrest not recommended (Class III, LOE B).

EMS brings in a neonate under CPR

- You wish you weren’t the MD on tonight

*Can the adjuncts we use in adults help us in neonatal resuscitation?*
Neonatal Resuscitation

- For neonates requiring resuscitation (P), is any adjunct measure (e.g. CO2 detection, pulse oximeter) as effective as the usual clinical findings (e.g., heart rate, chest movement) effective to improve outcome (O)?

Heart rate is the primary vital sign
- Auscultation
- May underestimate the HR if use the umbilical artery
- Pulse oximetry
  - Right hand or wrist location
  - Reliable after 90 seconds
    - Better than change in color as that can take a while to achieve

Put your hands around them

- Studies support the current practice of favoring the 2 thumb–encircling hands technique of chest compressions when compared with the 2-finger technique.
  - Higher blood pressure
  - Better quality
  - More accurate depth
  - 1/3 the depth of the AP diameter of the chest

Neonatal medications

- Epinephrine
  - HR >60 dose of 0.01-0.03mg/kg IV
  - ETT 0.05-0.1mg/kg
- No Naloxone
EMS brings in a woman in labor and she is not going to make it to labor and delivery.

PALS

- In depressed neonates with clear amniotic fluid (P), does suctioning of the mouth and nose (I) versus none (C) improve outcome (O)?

Suctioning

- Routine intrapartum oropharyngeal and nasopharyngeal suctioning for infants born with clear or meconium-stained amniotic fluid is no longer recommended.

Circulation. 2010;122:S516-S538
The data

- No studies
- Studies have looked at oro-nasopharyngeal suctioning in non-depressed neonates
  - oro-nasopharyngeal suctioning is associated with bradycardia, apnea and delays in achieving normal oxygenation.

Are we any good at feeling a pulse in children?

Pediatric Basic and Advanced Life Support

- For infants and children in cardiac arrest, does the use of a pulse check (I) vs. assessment for signs of life (C) improve the accuracy of diagnosis of pediatric CPA (O)?

Feel for a pulse

- **Forget it in kids**
  - Studies conducted in infants and children with nonpulsatile circulation during extracorporeal membrane oxygenation (ECMO)
    - demonstrated that doctors and nurses in a pediatric tertiary care institution
    - blinded to whether the child was receiving ECMO support or not,
    - took longer than 10 seconds to assess the pulse
    - Healthcare professionals were able to accurately detect a pulse by palpation only 80% of the time.
    - They mistakenly perceived a pulse when it was nonexistent 14% to 24% of the time and failed to detect a pulse when present in 21% to 36% of the assessments.

Circulation. 2010;122:S298-S324
Still can’t find a pulse

- Healthcare professionals were able to accurately detect a pulse by palpation only 80% of the time.
  - Mistakenly perceived a pulse when it was nonexistent 14% to 24% of the time.
  - Failed to detect a pulse when present in 21% to 36% of the assessments.
  - The average time to detect an actual pulse was approximately 15 seconds.
  - Average time to confirm the absence of a pulse was 30 seconds.
  - The sensitivity of the pulse check was 0.86 and the specificity 0.64; overall accuracy was 78%.

Resus 2009;80(1):61-4

Should parents be present during a pediatric resuscitation?

- During cardiac arrest in infants or children (P), does the presence of family members during the resuscitation (I) compared to their absence (C) improve patient or family outcome measures (O)?

Parental Presence

- Data confirms that most parents want to be present (21% do not).
- Relatives believe their presence is beneficial.
- Studies have reporting mental harm aren’t consistent.
- 39% to 66% of emergency medical services (EMS) providers reported feeling threatened by family members.
Focused Echocardiography

- Case series
  - Cardiac activity can be visualized
- Case report
  - Useful in diagnosing tamponade

Acute Coronary Syndrome

- Top 4 Pearls from ILCOR

# 1 A single marker and go

- History and physical examination, initial ECG, and initial serum biomarkers, even when used in combination, cannot be used to reliably exclude ACS
  - Serial markers with a second one >6 hours after symptoms
  - Little data on the incorporation of new generation troponin tests

# 2 Let the clock begin

- Need for time targets for reperfusion beginning from the time of first medical contact (FMC).
  - Nineteen studies demonstrated significantly reduced time to treatment when fibrinolytics were given to patients with STEMI in the prehospital setting by either physicians, nurses, or paramedics
#3 The Beginning of Cardiac Arrest Centers

- Angiography and percutaneous coronary intervention (PCI) may be considered in patients with out-of-hospital cardiac arrest (OHCA) and return of spontaneous circulation (ROSC).

Circulation. 2010;122:S422-S465

#4 Primary PCI after Cardiac Arrest

- 435 patients with a cardiac arrest underwent immediate coronary angiography, followed by PCI if indicated.
- At least one significant coronary artery lesion was found:
  - 128 (96%) of 134 patients with STEMI on the ECG
  - 176 (58%) of 301 patients without STEMI.
- Hospital survival was 40%.
- Successful PCI to be an independent predictor of survival, (odds ratio 2.06; 95% CI 1.16–3.66).


Summary of the Guidelines

- Many resuscitation systems and communities have documented improved survival from cardiac arrest.
- Too few victims of cardiac arrest receive bystander CPR.
- CPR quality must be high.
- Victims require excellent post–cardiac arrest care by organized, integrated teams.
- Education and frequent refresher training key to improving resuscitation performance.
- We must rededicate ourselves to improving the frequency of bystander CPR, the quality of all CPR and the quality of post–cardiac arrest care.