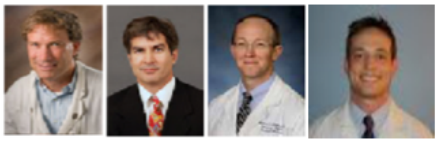
critical care perspectives in emergency medicine



2020 AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Key Article

Panchal AR, et al. Part 3: Adult Basic and Advanced Life Support. 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2020; 142: S366-S468.

Background

- In 2015, approximately350,000 adults in the US experienced non-traumatic OHCA.
- Approximately 10% of patients with OHCA survive to hospital admission, with approximately 8% surviving to hospital DC with good neurologic status.
- Unfortunately, survival from OHCA has plateaued since 2012.
- The current paper is an update to the 2015 AHA Guidelines and is designed primarily for healthcare providers in North America
- Guidelines are based on extensive evidence evaluation performed in conjunction with ILCOR and affiliated ILCOR member councils.
- Based on systematic reviews, scoping reviews, and evidence updates
- AHA assigns a Class of Recommendation (COR) based on strength and consistency of evidence and impact to patients; Level of Evidence (LOE) based on quantity, quality, relevance, and consistency of available evidence
    - COR
        - 1 – strong
        - 2a – moderate
        - 2b – weak
        - 3 – no benefit
    - LOE
        - A – high quality evidence from more than 1 RCT; meta-analysis of high-quality RCTs; 1 or more RCTs corroborated by high-quality registry studies
        - B –R: moderate-quality evidence from 1 or more RCTs; meta-analysis of moderate quality RCTs
        - B – NR: moderate quality evidence from 1 or more well designed, well executed nonrandomized studies, observational studies, or registry studies
        - C – LD: randomized or nonrandomized observational or registry studies with limitations of design or execution
        - C – EO: consensus of expert opinion based on clinical experience
- 250 recommendations
    - 2 supported by Level A evidence

    - 37 supported by Level B evidence
    - 57 supported by Level B nonrandomized evidence
    - 154 supported by Level C evidence (limited data and expert opinion)

Overview Concepts of Adult Cardiac Arrest

- Main focus remains rapid recognition, prompt initiation of CPR, defibrillation of shockable rhythms, and post-ROSC supportive care and treatment of underlying cause.

Adult Chain of Survival

- The Chains of Survival has been updated to now include the critical role of recovery and survivorship.
- The Recovery Link highlights the recovery and survivorship journey from acute treatment of critical illness through rehabilitation for survivors and their families after cardiac arrest.

Initiation of Resuscitation - CPR

- CPR remains the single-most important intervention for patients in cardiac arrest.
    - At least 2 inches (5 cm); Avoid excessive depths (2.4 inches or 6 cm)
    - Fast: 100-120/min
    - Allow complete chest recoil
    - Avoid leaning on the chest between compressions
    - Minimize interruptions (no more than 10 seconds during a pulse or rhythm check; immediately resume after shock delivery)
    - Avoid excessive ventilations
    - Change compressors every 2 minutes
    - If no advanced airway, 30:2 compressions to ventilation ratio
    - Use quantitative waveform capnography
    - Reasonable to target a chest compression fraction of at least 60%
- Additional
    - Perform CPR over the lower third of the sternum
    - Effectiveness maximized in the supine position
    - Efficacy of CPR in the prone position is not established, but may be better than no CPR
    - May be reasonable to use physiological parameters such as arterial blood pressure or ETCO2 to monitor and optimize CPR quality (COR 2b; LOE C – LD)
        - One analysis of the Get with the Guidelines data showed higher likelihood of ROSC when CPR was monitored using ETCO2 or diastolic BP
        - Inadequate human data to support a specific diastolic BP target
        - Validity of ETCO2 in nonintubated patients is not well established
        - In general, ETCO2 values < 10 associated with poor outcomes and > 20 mm Hg associated with ROSC but there is variability in the literature

Opening the Airway

- No high-quality evidence favoring one technique over another for establishment of the patient's airway.
- A healthcare provider should use the head tilt-chin lift maneuver to open the airway of a patient when no cervical spine injury is suspected (COR 1; LOE C – EO)
- In cases of suspected cervical spine injury, a healthcare provider should open the airway with a jaw thrust without head extension (COR 1; LOE C – EO)
- Use of airway adjuncts (oropharyngeal/nasopharyngeal airway) may be reasonable in unconscious patients without a cough or gag reflex to facilitate BMV (COR 2b; LOE C – EO)
- Routine use of cricoid pressure in adult cardiac arrest is not recommended (COR 3; LOE C-EO)
    - May impede ventilation and placement of an SGA or intubation
    - Increases risk of airway trauma during intubation

Ventilation Ratio

- For adults in cardiac arrest, tidal volumes of approximately 500-600 mL or enough to provide a visible chest rise are reasonable (COR 2a; LOE C – LD)
- Avoid excessive ventilation during CPR
    - May be reasonable for providers to use a rate of 10 breaths/min to provide asynchronous ventilation during continuous chest compressions before placement of an advanced airway (COR 2b; LOE B – R)
    - If an advanced airway is in place, may be reasonable for the provider to deliver 1 breath every 6 seconds during continuous chest compressions (COR 2b; LOE C – LD)

Defibrillation

- Early defibrillation is critical to survival in VF or pulseless VT
- No shock waveform is superior in achieving higher rates of ROSC or survival
- Biphasic and monophasic shock waveforms are likely equivalent in terms of outcome
- However, biphasic waveform defibrillators expose patients to a much lower peak electric current
    - Defibrillators are with biphasic waveforms are preferred over monophasic defibrillators in the treatment of tachyarrhythmias (COR 2a; LOE B – R)
- A single shock is reasonable in preference to stacked shocks for defibrillation (COR 2a; LOE B – NR)
- Anterolateral, anteroposterior, anterior-left infrascapular, and anterior-right infrascapular pad placement all have comparable efficacy.
- The usefulness of double sequential defibrillation for refractory shockable rhythm has not been established (COR 2b; LOE C – LD)
    - Case reports are subject to publication bias
    - Observational studies have not demonstrated a difference in outcome
    - A 2020 ILCOR systematic review found no evidence to support double sequential defibrillation and recommended against routine use

Vascular Access

- The efficacy of IV vs. IO drug administration in cardiac arrest remains to be elucidated
- A 2020 ILCOR systematic review found the IV route was associated with better clinical outcomes compared with IO in 5 retrospective studies (significant concerns for bias)
- It is reasonable for providers to first attempt establishing IV access for drug administration (COR 2a; LOE B – NR)
- IO access may be considered if attempts at IV access are unsuccessful (COR 2b; LOE B – NR)

Vasopressor Medications

- A systematic review concluded that epi increased ROSC and survival to hospital discharge, but did not increase survival with favorable or unfavorable neurologic outcome at 3 months
- Observational data suggest better outcomes when epi is given sooner
- Existing trials have used a protocol of 1 mg of epi every 3 to 5 min
- In a recent systematic review on timing, earlier epi in nonshockable rhythms was associated with increased ROSC
- Recommend that epi be given in cardiac arrest (COR 1; LOE B – R)
- Reasonable to administer epi 1 mg every 3 to 5 min (COR 2a; LOE B –R)
- For nonshockable rhythms, it is reasonable to give epi as soon as feasible (COE 2a; LOE C – LD)
- For shockable rhythms, it may be reasonable to administer epi after initial defibrillation attempts have failed (COR 2b; LOE C – LD)

Nonvasopressor Medications

- Amiodarone or lidocaine may be considered for VF/pVT that is unresponsive to defibrillation (COR 2b; LOE B – R)
    - Last formally reviewed in 2018 – demonstrated improved survival to hospital admission but no change in overall survival to DC or survival with good neurologic outcome. However, did demonstrate improved survival to DC in subgroup of patients who received bystander CPR in witnessed arrest
    - Role of prophylactic antiarrhythmic medications on ROSC after successful defibrillation is uncertain
- Routine administration of calcium for treatment of cardiac arrest is not recommended (COR 3; LOE B – NR)
- Routine use of sodium bicarbonate is not recommended for patients in cardiac arrest (COR 3; LOE B – R)
- Routine use of magnesium for cardiac arrest is not recommended (COR 3; LOR B – R)
- Calcium and bicarbonate can be considered in special circumstances such as hyperkalemia and drug overdose

Adjuncts to CPR

- If an experienced sonographer is present and use of US does not interfere with standard cardiac arrest treatments, then US may be considered as an adjunct to standard patient evaluation. Usefulness of US has not been established. (COR 2b; LOE C – LD)
    - POCUS can identify potentially reversible causes of cardiac arrest in PEA. However, US is also associated with longer interruptions in CPR.
- Routine ABGs during CPR has uncertain value
- An abrupt increase in ETCO2 may be used to detect ROSC during compressions or when a rhythm check reveals an organized rhythm (COR 2b; LOE C – LD)
    - Studies have found that increases in ETCO2 of > 10 mm Hg may indicate ROSC, although no special cutoff value indicative of ROSC has been identified

Advanced Airway Placement

- Either BVM or advanced airway may be considered during CPR for adult cardiac arrest in any setting depending on the skill set and situation of the provider. (COR 2b; LOE B – R)
- If advanced airway placement will interrupt chest compressions, providers may consider deferring insertion of the airway until the patient fails to respond to initial CPR and defibrillation attempts or obtains ROSC. (COR 1; LOE C – LD)

Alternative CPR Techniques

- The routine use of mechanical CPR devices is not recommended (COR 3; LOE B – R)
- The use of mechanical CPR devices may be considered in specific settings where the delivery of high-quality manual CPR may be challenging or dangerous to the provider, as long as the rescuer strictly limits interruption in CPR during deployment and removal of the device. (COR 2b; LOE C – LD)

E-CPR

- There is insufficient evidence to recommend the routine use of ECPR for patients with cardiac arrest. ECPR may be considered for select cardiac arrest patients for whom the suspected cause of the cardiac arrest is potentially reversible during a limited period of mechanical cardiorespiratory support. (COR 2b; LOE C – LD)
    - There are no RCTs on the use of ECPR for OHCA or IHCA
    - 15 observational studies were identified for OHCA that varied in inclusion criteria, ECPR settings and study design, with many studies reporting improved neurologic outcomes
    - Vast majority of studies are from single centers
    - Decision to perform ECPR should be made on a case-by-case basis