American Resuscitation Council

Pediatric Advanced Life Support

Provider Manual

Table of Contents

List of Figures

List of Tables

Unit One: General Concepts

In the pediatric population, cardiac arrest usually results from one of these three problems:

- Progressive respiratory distress and failure (the most common cause)
- Progressive shock (second most common)
- Sudden cardiac death from ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT) (5-15% of all pediatric cardiac arrest cases).

Pediatric Advanced Life Support (PALS) Preparation

Prior to attending a PALS course, the student must familiarize themselves with the key concepts that will be used during the course:

- ECG rhythm recognition
- Infant and child basic life support (BLS)
- Pediatric pharmacology
- PALS algorithms and treatments.

Organization of the PALS Course

In the PALS course, the student will demonstrate competency in four key skills stations that include simulations that stress the role of the team in the pediatric resuscitation process:

- One- and two-rescuer BLS for both infants and children
- Management of respiratory emergencies
- Rhythm disturbances and electrical therapies
- Vascular access.

The student will be asked to participate as team leader and team member in the skills stations. After successful completion of the skills, the student must successfully complete and pass a written exam testing the cognitive skills associated with pediatric resuscitation.

Delivering the Most Up-to-Date Guidelines Available

The International Liaison Committee on Resuscitation (ILCOR) has been the definitive source for resuscitation guidelines for decades. ILCOR recommendations are based on cutting edge biomedical and clinical research. Organizations such as the American Heart Association (AHA) and the European Resuscitation Council (ERC) contribute to Consensus on Science and Treatment Recommendations (CoSTR) and then publish their findings in the journals *Circulation* and *Resuscitation*, respectively.

For decades, ILCOR conducted a scientific review process every five years (i.e. 2005, 2010, 2015) and published their results. These results were made into provider training manuals, student training manuals, and other resources. In fact, *American Resuscitation Council* used these peer-reviewed publications to create our learning materials, provider manuals, and exam questions. In 2016, however, ILCOR decided to update and publish their guidance every year to keep up with advancements in the field of resuscitation research. We, too, are dedicated to staying at the forefront of science. As such, we will update all of our education materials as ILCOR publishes new guidelines each year.

2015 PALS Guideline Changes

The last time ILCOR published 5-year guidance was in 2015. These PALS guidelines replaced 2010 guidelines and older. Any 2015 guidelines that have been updated since 2015 are crossed out.

Guideline	Old Guideline	2015 Guideline
Sequence	CAB (compressions, airway, breathing)	Confirmed in the 2015 guidelines
Compression depth	Used "at least" without a maximum depth	Infants to children up to puberty: compress the chest up to 1/3 of the chest diameter; Puberty and adolescence: use adult compression depth between 2 and 2.4 inches (5 to 6 cm)
Frequency	At least 100 compressions per minute	Between 100 and 120 compressions per minute
Compression-only CPR	Infants and children require compressions and respirations, but compressions are better than nothing	Infants and children still require *compressions and respirations* for optimal CPR since most pediatric emergencies affect respiration primarily; Compression-only CPR is useful in infants/children in cardiac arrest
Fluid resuscitation	Aggressive fluids	Treat septic shock with isotonic IV fluids at a dose of 20 mL/kg, though use with caution in resource-limited settings (i.e. no critical care)
Atropine premedication	Use a minimum atropine dose of 0.1 mg to prevent paradoxical bradycardia	Do not routinely use atropine as premedication for endotracheal intubation; atropine can be used in patients at increased risk of bradycardia
Vasopressors	Use epinephrine for cardiac arrest	*Consider* using epinephrine during cardiac arrest
Extracorporeal CPR	Consider extracorporeal CPR only for children in standard resuscitation-refractory cardiac arrest	~~Extracorporeal CPR may be considered in at-risk children who have a cardiac arrest within a hospital with proper protocols, personnel, and equipment available~~
Amiodarone and lidocaine	Amiodarone preferred to lidocaine for pulseless VT/VF unresponsive to shock	Amiodarone and lidocaine equally effective for pulseless VT or VF unresponsive to shock

Guideline	Old Guideline	2015 Guideline
Post-cardiac arrest	Comatose patients should be cooled to between 32°C and 34°C for 12-24 hours	~~Comatose patients with cardiac arrest outside of the hospital should be cooled to 32°C to 34°C for 2 days followed by 3 days of normothermia or a total 5 days of normothermia; no recs for in-hospital cardiac arrest; treat fever aggressively~~
Post-cardiac arrest	New recommendation for 2015	Maintain systolic BP above the fifth percentile by age, use intra-arterial pressure monitoring
Post-cardiac arrest	No recommendations about $PaCO_2$	Titrate oxygen to achieve PaO_2 between 94% and 99%; keep $PaCO_2$ within normal range

Table 1: Comparison of PALS Guidelines

Changes to Pediatric BLS in 2015

Pediatric BLS was changed in 2015 to incorporate the use of cell phones into the algorithm. In an out-of-hospital cardiac arrest (OHCA), the lone rescuer may call 911 before providing CPR if that rescuer has a cell phone available. When others are nearby, they should be instructed to call 911 using an available cell phone, then get an automated external defibrillator (AED).

When a **lone rescuer** finds an **infant or child up to the age of puberty** who is the victim of an **unwitnessed** collapse, the rescuer should give 2 minutes of CPR before leaving the victim to go get help/call 911/get AED. If the lone rescuer has a working cell phone, 911 should be called first.

When a **lone rescuer** finds an **infant or child up to the age of puberty** who is the victim of a **witnessed** collapse, the rescuer should leave the victim to go get help/call 911/get AED. If the lone rescuer has a cell phone, call 911 first.

When a **lone rescuer** finds an **adolescent (puberty and older)** who is the victim of a **witnessed** or **unwitnessed** collapse, the rescuer should leave the victim to go get help/call 911/get AED. If the lone rescuer has a cell phone, call 911 first.

PALS Guideline Changes since 2015

ILCOR has published guideline updates each year since 2017. The changes are shown in Table 2 below.

2017 PALS Guidelines (BLS Update) [1-3]
Bystanders should provide CPR with ventilation for infants and children less than 18 years of age with OHCA
Bystanders who cannot provide rescue breaths as part of CPR for infants and children less than 18 years of age with OHCA, should at least provide chest compressions.
2018 ACLS Guidelines [4,5]
PALS Pediatric Cardiac Arrest Algorithm was unchanged
Amiodarone or lidocaine may be used for ventricular fibrillation/pulseless ventricular tachycardia that does not respond to defibrillation.

2017 PALS Guidelines (BLS Update) [1-3]
2019 PALS Guidelines [6-11]
EMS dispatchers should offer dispatcher-assisted CPR instructions for presumed pediatric cardiac arrest
EMS dispatchers should offer dispatcher-assisted CPR instructions for pediatric cardiac arrest when no bystander CPR is in progress
Bag-mask ventilation is a reasonable alternative to endotracheal intubation or supraglottic airway in the management of children during OHCA
Extracorporeal CPR may be considered for pediatric in-hospital cardiac arrest for cardiac diagnoses if it can be implemented competently and efficiently
It is unclear whether extracorporeal CPR is beneficial for pediatric OHCA
Continuous measurement of core temperature during targeted temperature management is recommended.
For infants and children between 24 hours and 18 years of age who remain comatose after out-of-hospital or in-hospital cardiac arrest, it is reasonable to use either targeted temperature management 32°C to 34°C followed by targeted temperature management 36°C to 37.5°C or to use targeted temperature management 36°C to 37.5°C. There is insufficient evidence to support a recommendation about treatment duration.
2020 PALS Guidelines
Awaiting peer-reviewed publication of 2020 ILCOR updates

Table 2: PALS Guideline Changes Since 2015

Pediatric Chain of Survival

Figure 1: Pediatric Chain of Survival

In infants and children, it is better to monitor for signs of respiratory distress before overt respiratory failure occurs, requiring resuscitation. If resuscitation is required, it should include high-quality CPR and activation of EMS (e.g., call 911). Qualified providers should perform PALS followed by post-arrest care following return of spontaneous circulation (ROSC).

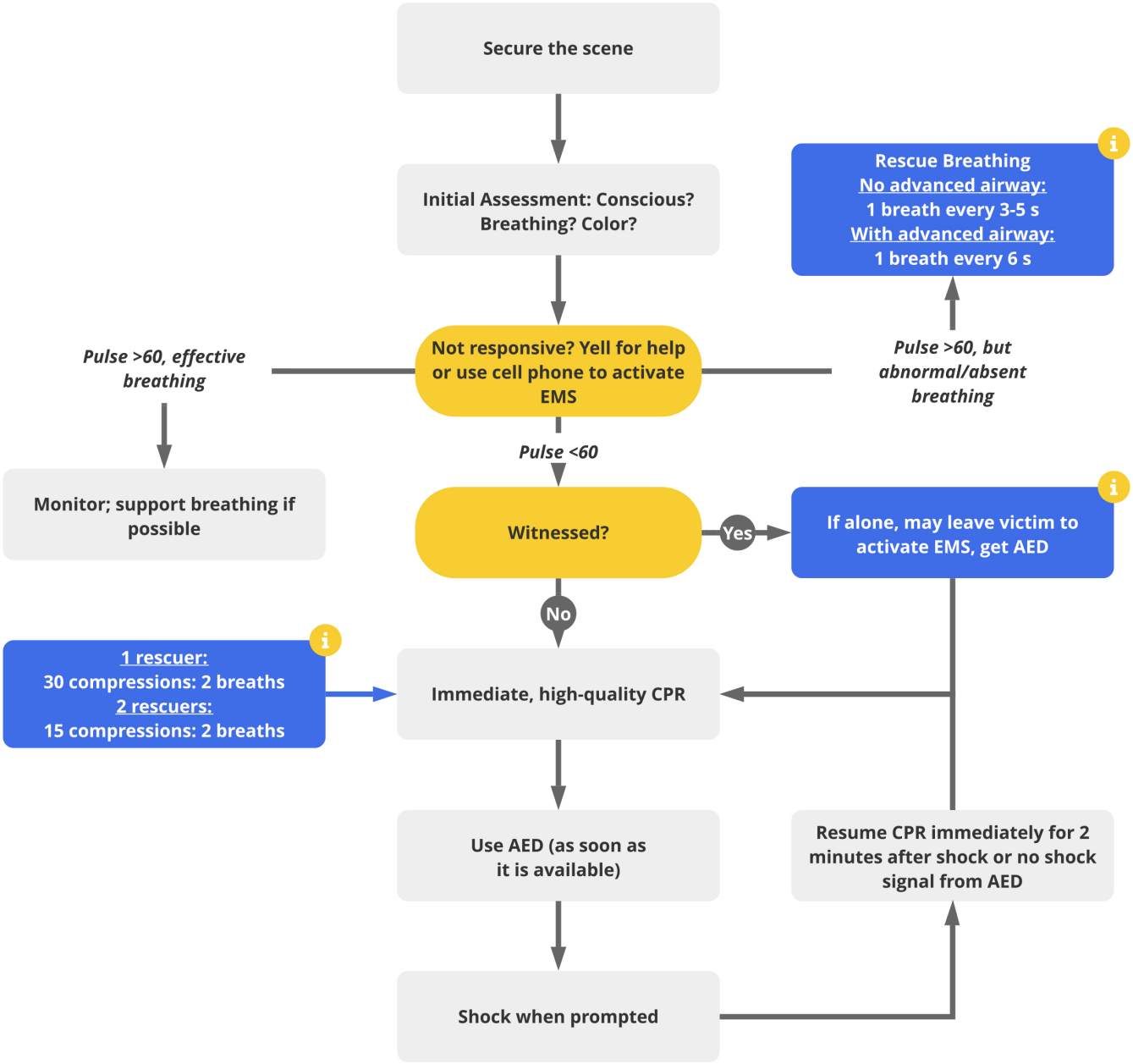

Figure 2: BLS Infant and Child Algorithm