

BLS for Infants and Children

This section describes BLS for infants and children. In this course, *infants* are younger than 1 year of age (excluding the newly born), and *children* range from 1 year of age to puberty.

Learning Objectives

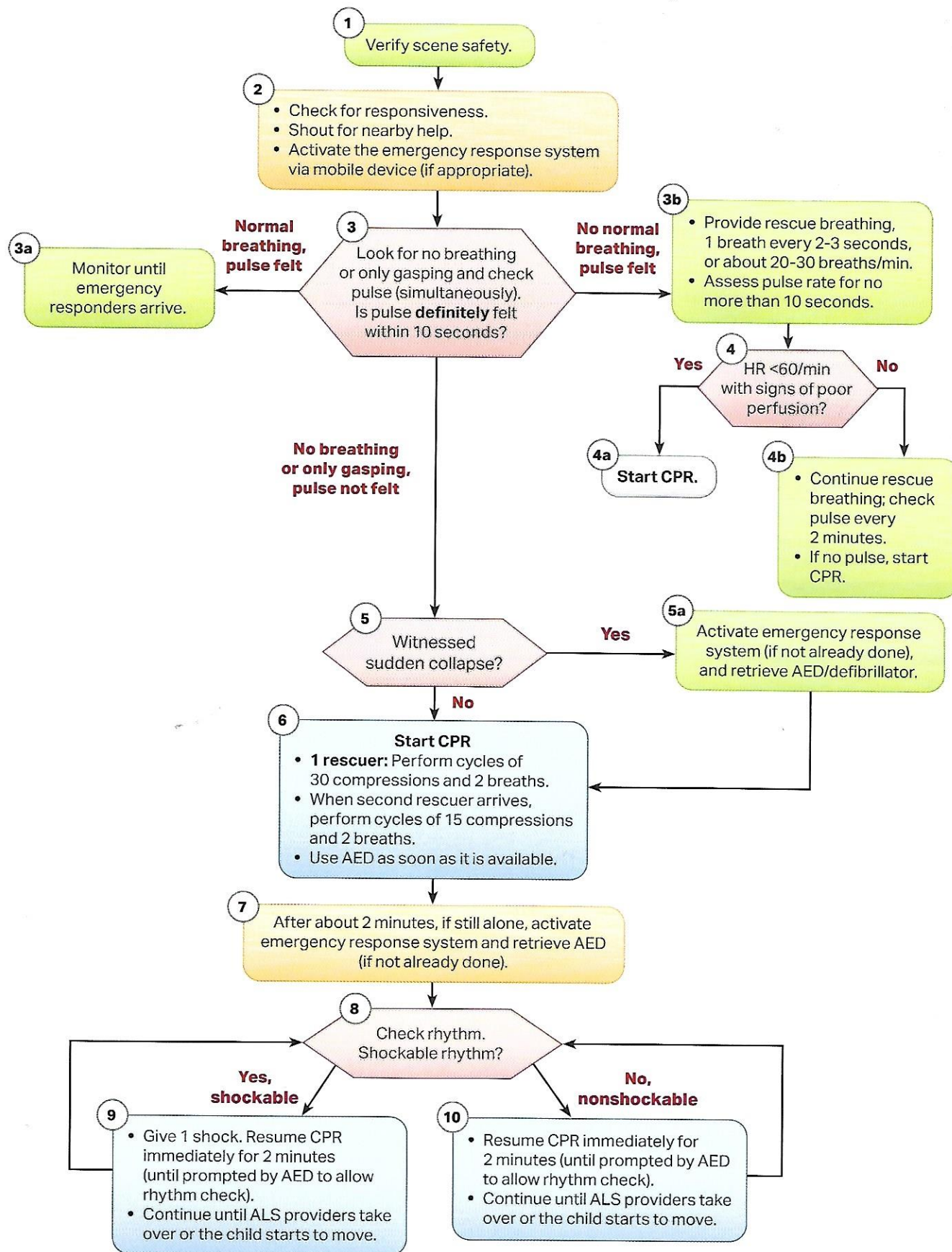
In this Part, you will learn to

- Perform high-quality CPR for a child
- Perform high-quality CPR for an infant

Pediatric BLS Algorithm for Healthcare Providers— Single Rescuer

The Pediatric BLS Algorithm for Healthcare Providers—Single Rescuer outlines the steps for a single rescuer of an unresponsive infant or child (Figure 27). Once you learn the skills presented in this Part, use the algorithm as a quick reference.

Figure 27. Pediatric BLS Algorithm for Healthcare Providers—Single Rescuer.



The first rescuer who arrives at the side of an infant or child who may be in cardiac arrest should follow these sequential steps on the algorithm:

Step 1: Verify scene safety.

Make sure the scene is safe for you and the victim.

Step 2: Check for responsiveness and get help.

Tap the child's shoulders. Shout, "Are you OK?" If the victim is not responsive, shout for help and activate the emergency response system via mobile device if appropriate.

Step 3: Assess for breathing and a pulse. Check for a pulse to determine next actions. To minimize delay in starting CPR, you should assess breathing and pulse at the same time. This should take no more than 10 seconds.

Steps 3a and 3b: Determine next actions based on whether breathing is normal and if a pulse is felt:

- **If the victim is breathing normally and a pulse is felt:**
 - Activate the emergency response system (if not already done).
 - Monitor the victim until emergency responders arrive.
- **If the victim is not breathing normally but a pulse is felt:**
 - Provide rescue breathing, with 1 breath every 2 to 3 seconds, or 20 to 30 breaths per minute.
 - Assess the pulse rate for 10 seconds.

Steps 4, 4a, and 4b: Is the heart rate less than 60/min (fewer than 6 beats in 10 seconds) with signs of poor perfusion?

- If yes, start CPR.
- If no, continue rescue breathing. Check for a pulse about every 2 minutes. If no pulse, start CPR.

Steps 5 and 5a: Was the sudden collapse witnessed?

If yes, activate the emergency response system (if not already done), and get the AED.

Step 6: If the collapse wasn't witnessed:

Start CPR with cycles of 30 compressions and 2 breaths. Use an AED as soon as it is available.

Step 7: After about 2 minutes, if you are still alone, activate the emergency response system and get an AED if not already done.

Step 8: Use the AED as soon as it is available.

Follow the AED directions to check the rhythm.

Step 9: If the AED detects a shockable rhythm, give 1 shock. Resume CPR immediately until prompted by the AED to allow a rhythm check, about every 2 minutes. Continue CPR and using the AED until advanced life support providers take over or the victim begins to breathe, move, or otherwise react.

Step 10: If the AED detects a nonshockable rhythm, resume high-quality CPR until prompted by the AED to allow a rhythm check, about every 2 minutes. Continue CPR and using the AED until advanced life support providers take over or the victim begins to breathe, move, or otherwise react.

For a complete explanation of each step, see the Infant and Child 1-Rescuer BLS Sequence in the Appendix.

High-Quality CPR Skills: Infants and Children

Mastering all the skills outlined in this section will prepare you to provide high-quality CPR to an unresponsive infant or child.

Assess for Breathing and a Pulse

Checking the infant or child for normal breathing and a pulse will help you determine the next appropriate actions. You should assess breathing and pulse at the same time. Take no more than 10 seconds to check both so that you can start CPR quickly, if necessary.

Breathing

To check for breathing, scan the victim's chest for rise and fall for *no more than 10 seconds*.

- **If the victim is breathing:** Monitor the victim until additional help arrives.
- **If the victim is not breathing or is only gasping:** The victim has respiratory arrest or (if no detectable pulse) cardiac arrest. (Gasping is not normal breathing and is a sign of cardiac arrest. See Critical Concepts: Agonal Gasps in Part 3.)

Pulse

Infant: To perform a pulse check in an infant, feel for a brachial pulse (Figure 28A). Here is how to check the brachial artery pulse:

1. Place 2 or 3 fingers on the inside of the upper arm, midway between the infant's elbow and shoulder.
2. Press your fingers down and attempt to feel the pulse for *at least 5 but no more than 10 seconds*.

Child: To perform a pulse check in a child, feel for a carotid or femoral pulse (Figure 28B and Figure 28C). Check the carotid pulse for a child by using the same technique as for an adult (see Part 3). Here is how to check the femoral artery pulse:

1. Place 2 or 3 fingers in the inner thigh, midway between the hip bone and the pubic bone and just below the crease where the leg meets the torso.
2. Feel for a pulse for at least 5 but no more than 10 seconds.

It can be difficult for BLS providers to determine the presence or absence of a pulse in any victim, particularly in an infant or child. If you do not *definitely feel a pulse within 10 seconds*, start high-quality CPR, beginning with chest compressions.

Figure 28. Pulse check. **A,** In an infant, feel for a brachial pulse. **B,** In a child, feel for a carotid pulse, or **C,** a femoral pulse.

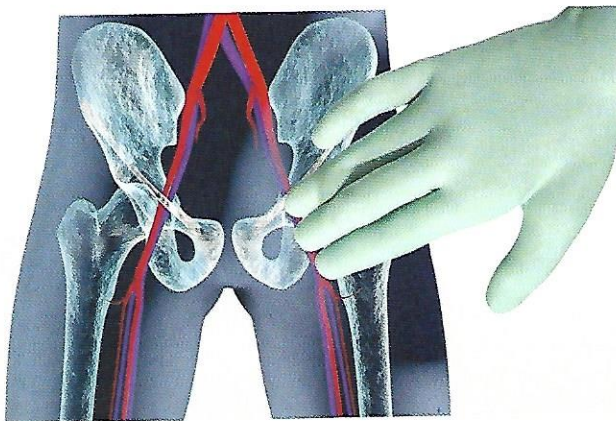
A



B



C



Signs of Poor Perfusion

Perfusion is the flow of oxygenated blood from the heart through the arteries to the body's tissues. To identify signs of poor perfusion, assess the following:

- **Temperature:** Cool extremities
- **Altered mental state:** Continued decline in consciousness/responsiveness
- **Pulses:** Weak pulses
- **Skin:** Paleness, mottling (patchy appearance), and, later, cyanosis (blue lips or skin)

Perform High-Quality Chest Compressions

High-quality chest compressions are the foundation of CPR. Perform compressions as described here to give an infant or child victim of cardiac arrest the best chance of survival.

Compression-to-Ventilation Ratio

The compression-to-ventilation ratio for single rescuers is the same in adults, children, and infants: **30:2**.

However, when 2 rescuers are attempting to resuscitate an infant or child, they should use a compression-to-ventilation ratio of **15:2**.

Compression Rate

The universal rate for compressions in all cardiac arrest victims is 100 to 120/min.

Compression Depth

For an infant, compress at least one third the AP diameter of the infant's chest (approximately 1½ inches, or 4 cm). For a child, compress at least one third the AP diameter of the chest (approximately 2 inches, or 5 cm) with each compression.

Chest Recoil

During CPR, chest recoil (reexpansion of the chest) allows blood to flow into the heart. Incomplete chest recoil reduces the filling of the heart between compressions and reduces the blood flow that chest compressions create. To help ensure complete recoil, avoid leaning on the chest between compressions. Chest compression and chest recoil times should be about equal.

Interruptions in Chest Compressions

Minimize interruptions in chest compressions. Shorter duration of interruptions in chest compressions is associated with better outcomes.

Chest Compression Techniques

For child chest compressions, use 1 or 2 hands. For most children, the compression technique is the same as for an adult: 2 hands (heel of one hand with heel of other hand on top of the first hand). For a small child, 1-handed compressions may be adequate to achieve the desired compression depth. Whether you use one hand or both hands, compress at least one third the AP diameter of the chest (approximately 2 inches, or 5 cm) with each compression.

For infants, single rescuers can use either the 2-finger or 2 thumb–encircling hands technique. If multiple rescuers are present, the 2 thumb–encircling hands technique is preferred. If you cannot compress the necessary depth on an infant with your fingers, you can use the heel of one hand. These techniques are described below.

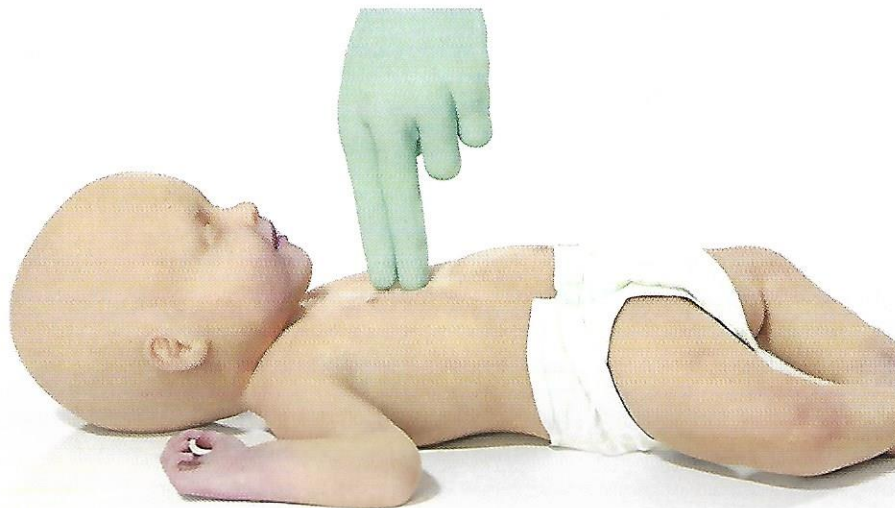
Infant: 2-Finger Technique

Follow these steps to give chest compressions to an infant by using the 2-finger technique:

1. Place the infant on a firm, flat surface.
2. Place 2 fingers in the center of the infant's chest, just below the nipple line, on the lower half of the breastbone. Do not press the tip of the breastbone (Figure 29).
3. Give compressions at a rate of 100 to 120/min.
4. Compress at least one third the AP diameter of the infant's chest (approximately 1½ inches, or 4 cm).
5. At the end of each compression, make sure you allow the chest to completely recoil (reexpand); do not lean on the chest. Chest compression and chest recoil times should be about equal. Minimize interruptions in compressions (eg, to give breaths) to less than 10 seconds.

6. After every 30 compressions, open the airway with a head tilt–chin lift and give 2 breaths, each over 1 second. The chest should rise with each breath.
7. After about 5 cycles or 2 minutes of CPR, if you are alone and no one has activated the emergency response system, leave the infant (or carry the infant with you) and activate the emergency response system and get the AED.
8. Continue compressions and breaths at a ratio of 30 compressions to 2 breaths. Use the AED as soon as it is available. Continue until advanced life support providers take over or the infant begins to breathe, move, or otherwise react.

Figure 29. Two-finger chest compression technique for an infant.



Infant: 2 Thumb–Encircling Hands Technique

The 2 thumb–encircling hands technique is the preferred technique when 2 rescuers provide CPR, but it can be used by 1 rescuer as well. This technique

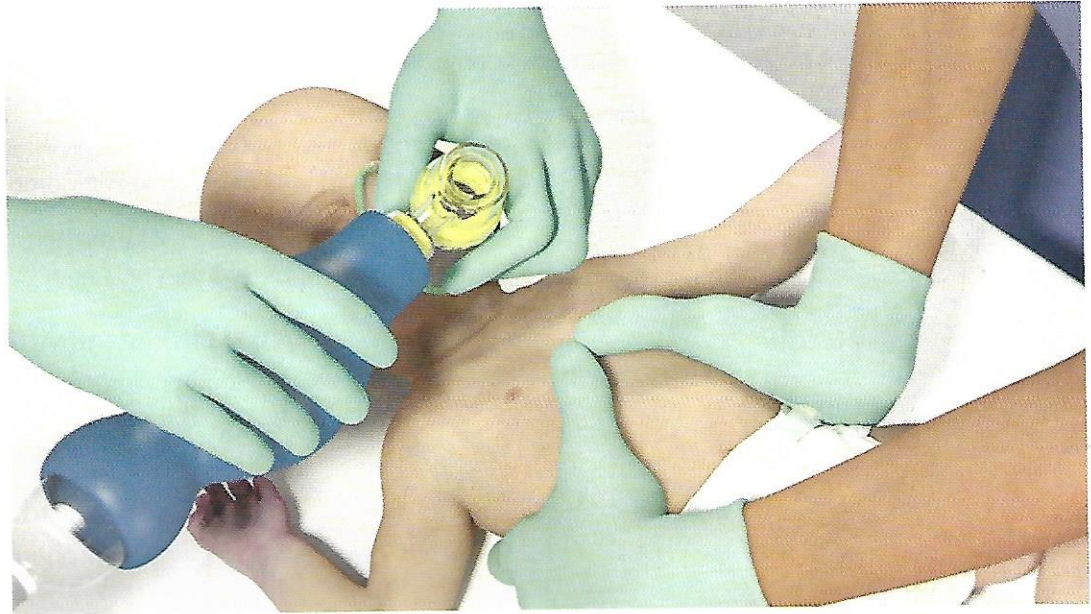
- Produces better blood supply to the heart muscle
- Helps ensure consistent depth and force of chest compressions
- May generate higher blood pressures

Follow these steps to give chest compressions to an infant by using the 2 thumb–encircling hands technique:

1. Place the infant on a firm, flat surface.
2. Place both thumbs side by side in the center of the infant's chest, on the lower half of the breastbone. Your thumbs may overlap on very small infants. With the fingers of both hands, encircle the infant's chest and support the infant's back.
3. With your hands encircling the chest, use both thumbs to depress the breastbone (Figure 30) at a rate of 100 to 120/min.
4. Compress at least one third the AP diameter of the infant's chest (approximately 1½ inches, or 4 cm).
5. After each compression, release all pressure on the breastbone and allow the chest to recoil completely.
6. After every 15 compressions, pause briefly for the second rescuer to open the airway with a head tilt–chin lift and give 2 breaths, each over 1 second. The chest should rise with each breath. Minimize interruptions in compressions (eg, to give breaths) to less than 10 seconds.
7. Continue compressions and breaths at a ratio of 15 compressions to 2 breaths (for 2 rescuers). The rescuer providing chest compressions should switch roles with another provider about every 5 cycles or 2 minutes to avoid fatigue so that chest compressions remain effective. Continue CPR until the AED arrives, advanced life support providers take over, or the infant begins to breathe, move, or otherwise respond.

An additional alternative for compressions on an infant or child is to use the heel of one hand. This technique may be useful for larger infants or if the rescuer has difficulty compressing to the appropriate depth with their fingers or thumbs.

Figure 30. Two thumb-encircling hands technique for an infant (2 rescuers).



Critical Concepts:
Compression Depth in Infants and Children vs Adults and Adolescents

- *Infants: At least one third the AP diameter of the chest, or approximately 1½ inches (4 cm)*
- *Children: At least one third the AP diameter of the chest, or approximately 2 inches (5 cm)*
- *Adults and adolescents: At least 2 inches, or 5 cm*