

## BLS for Infants and Children

### General Concepts

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#### Overview

This section describes BLS for infants and children. The following age definitions are used in BLS:

- *Infants* are less than 1 year of age (excluding the newly born).
- *Children* are from 1 year of age to puberty. Signs of puberty include chest or underarm hair on males and any breast development in females.

#### Learning Objectives

At the end of this part, you will be able to

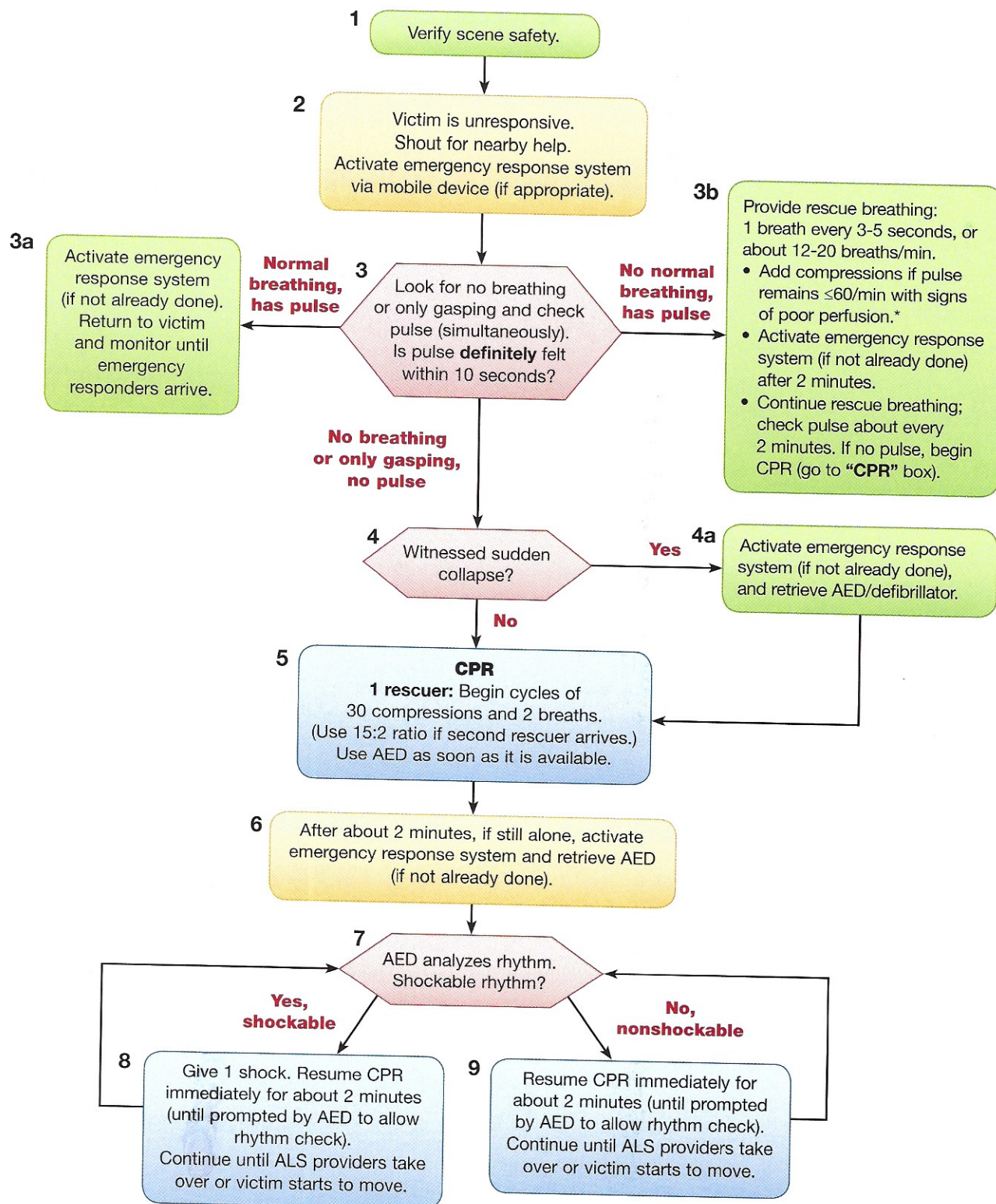
- Perform high-quality CPR for a child
- Perform high-quality CPR for an infant

### BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for the Single Rescuer

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The BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for the Single Rescuer outlines steps for a single rescuer of an unresponsive infant or child (Figure 28). Refer to this algorithm as you read the steps below.

# BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for the Single Rescuer—2015 Update



\*Signs of poor perfusion may include cool extremities, decrease in responsiveness, weak pulses, paleness, mottling (patchy skin appearance), and cyanosis (turning blue).

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**Figure 28.** BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for the Single Rescuer.



## Infant and Child 1-Rescuer BLS Sequence

### Introduction

If the rescuer is alone and encounters an unresponsive infant or child, follow the steps outlined in the BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for the Single Rescuer (Figure 28).

### Verify Scene Safety, Check for Responsiveness, and Get Help (Algorithm Boxes 1, 2, 4)

The first rescuer who arrives at the side of an unresponsive infant or child should quickly perform the following steps:

Step	Action
1	Verify that the scene is safe for you and the victim. You do not want to become a victim yourself.
2	Check for responsiveness. Tap the child's shoulder or the heel of the infant's foot and shout, "Are you OK?"
3	If the victim is not responsive, shout for nearby help. Activate the emergency response system via mobile device (if possible).

### Assess for Breathing and Pulse (Box 3)

Next, assess the infant or child for normal breathing and a pulse. This will help you determine the next appropriate actions.

*To minimize delay in starting CPR, you may assess breathing at the same time as you check the pulse. This should take no more than 10 seconds.*

#### Breathing

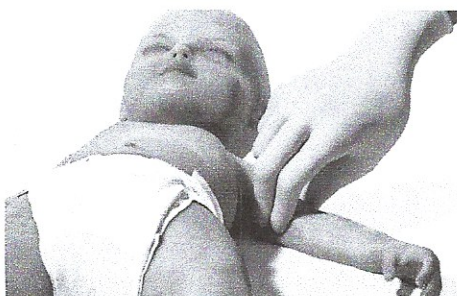
To check for breathing, scan the victim's chest for rise and fall for no more than 10 seconds.

- 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 or (if no pulse is felt) cardiac arrest. (Gasping is not considered normal breathing and is a sign of cardiac arrest. See Caution: Agonal Gasps in Part 2.)

#### Check Pulse

- *Infant:* To perform a pulse check in an infant, palpate a brachial pulse (Figure 29A).
- *Child:* To perform a pulse check in a child, palpate a carotid or femoral pulse (Figures 29B and C).

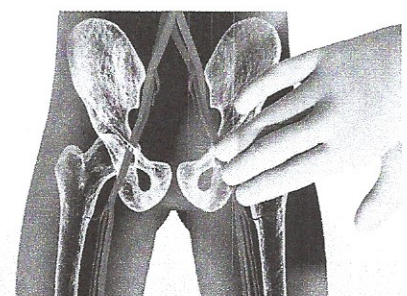
It can be difficult for BLS providers to determine the presence or absence of a pulse in any victim, particularly in an infant or child. So if you do not definitely feel a pulse within 10 seconds, start CPR, beginning with chest compressions.



A



B



C

**Figure 29.** Pulse check. To perform a pulse check in an infant, palpate a brachial pulse (A). To perform a pulse check in a child, palpate a carotid (B) or femoral (C) pulse.



### Infant: Locating the Brachial Artery Pulse

To perform a pulse check in an infant, palpate for a brachial pulse. Follow the steps below to locate the brachial artery and palpate the pulse. If you do not definitely feel a pulse within 10 seconds, begin high-quality CPR, starting with chest compressions.

Step	Action
1	Place 2 or 3 fingers on the inside of the upper arm, midway between the infant's elbow and shoulder.
2	Then press the fingers to attempt to feel the pulse for <i>at least 5 but no more than 10 seconds</i> (Figure 29A).

### Child: Locating the Femoral Artery Pulse

To perform a pulse check in a child, palpate a carotid or femoral pulse. If you do not definitely feel a pulse within 10 seconds, begin high-quality CPR, starting with chest compressions.

Follow these steps to locate the femoral artery pulse:

Step	Action
1	Place 2 fingers in the inner thigh, midway between the hipbone and the pubic bone and just below the crease where the leg meets the torso (Figure 29C).
2	Feel for a pulse for <i>at least 5 but no more than 10 seconds</i> . If you do not definitely feel a pulse, begin high-quality CPR, starting with chest compressions.

### Determine Next Actions (Boxes 3a, 3b)

Determine next actions based on the presence or absence of normal breathing and pulse:

If	Then
If the victim is breathing normally and a pulse is present	Monitor the victim.
If the victim <i>is not</i> breathing normally but a pulse <i>is</i> present	<p>Provide rescue breathing (see Rescue Breathing in Part 7).</p> <ul style="list-style-type: none"> <li>Add compressions if pulse remains 60/min or less with signs of poor perfusion (see Foundational Facts: Signs of Poor Perfusion later in Part 5).</li> <li>Confirm that the emergency response system has been activated.</li> <li>Continue rescue breathing and check pulse about every 2 minutes. Be ready to perform high-quality CPR if you do not feel a pulse or if there is a heart rate less than 60/min with signs of poor perfusion.</li> </ul>
If the victim is not breathing normally or is only gasping and has no pulse	<p><i>If you are alone and the arrest was sudden and witnessed:</i></p> <ul style="list-style-type: none"> <li>Leave the victim to activate the emergency response system in your setting. For example, call 9-1-1 from your phone, mobilize the code team, or notify advanced life support.</li> <li>Get the AED and emergency equipment. If someone else is available, send that person to get it.</li> </ul> <p><i>If you are alone and the arrest was not sudden and witnessed:</i></p> <ul style="list-style-type: none"> <li>Continue to the next step: Begin high-quality CPR for 2 minutes.</li> </ul>



### **Was the Collapse Sudden?** (Boxes 4 and 4a)

If the victim is not breathing or only gasping and has no pulse, and the collapse was sudden and witnessed, leave the victim to activate the emergency response system (unless you have already done so by mobile device) and retrieve the AED. If others arrive, send them to activate the system (if not already done) and retrieve the AED while you remain with the child to begin CPR.

### **Begin High-Quality CPR, Starting With Chest Compressions** (Boxes 5, 6)

If the victim is not breathing normally or is only gasping and has no pulse, begin high-quality CPR, starting with chest compressions (see Critical Concepts: High-Quality CPR in Part 1). Remove or move the clothing covering the victim's chest so that you can locate appropriate hand or finger placement for compression. This will also allow placement of AED pads when the AED arrives.

Single rescuers should use the following compression techniques (see Infant/Child Chest Compressions later in Part 5 for complete details):

- Infant: 2-finger chest compressions
- Child: 1 or 2 hands (whatever is needed to provide compressions of adequate depth)

After about 2 minutes of CPR, if you are still alone and were unable to activate the emergency response system (no mobile phone), leave the victim to activate the emergency response system and get the AED. Use the AED as soon as it is available.

### **Attempt Defibrillation With the AED** (Boxes 7, 8, 9)

Use the AED as soon as it is available and follow the prompts.

### **Resume High-Quality CPR** (Boxes 8, 9)

After shock delivery or if no shock is advised, immediately resume high-quality CPR, starting with chest compressions, when advised by the AED. Continue to provide CPR and follow the AED prompts until advanced life support providers take over or the child begins to breathe, move, or otherwise react.

### **Foundational Facts**



### **Signs of Poor Perfusion**

Assess the following to determine signs of poor perfusion:

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

## **Infant/Child Chest Compressions**

### **Compression Rate and Compression-to-Ventilation Ratio**

The *universal* rate for compressions in all cardiac arrest victims is 100 to 120/min. The compression-to-ventilation ratio for single rescuers is the same (30:2) in adults, children, and infants.

If 2 rescuers are present for the resuscitation attempt of an infant or child, use a compression-to-ventilation ratio of 15:2.



## Chest Compression Technique

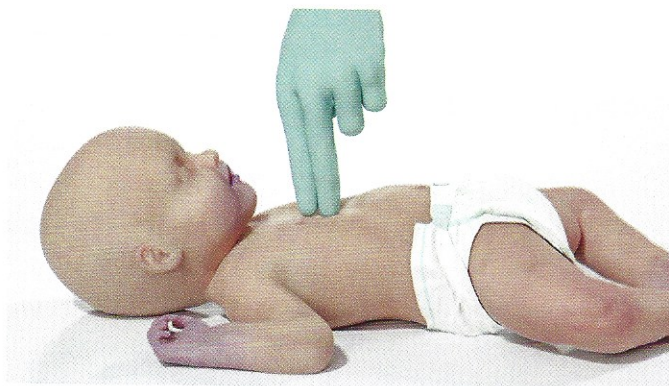
For most children, either 1 or 2 hands can be used to compress the chest. For most children, the compression technique will be the same as for an adult: 2 hands (heel of one hand with heel of other hand on top of the first hand). For a very small child, 1-handed compressions may be adequate to achieve the desired compression depth. Compress the chest at least one third the anteroposterior (AP) diameter of the chest (about 2 inches, or 5 cm) with each compression.

For infants, single rescuers should use the 2-finger technique. If multiple rescuers are present, the 2 thumb-encircling hands technique is preferred. These techniques are described below.

### Infant (1 Rescuer): 2-Finger Technique

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

Step	Action
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 30).
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 (about 1½ inches [4 cm]).
5	At the end of each compression, make sure you allow the chest to fully recoil (reexpand); do not lean on the chest. Chest compression and chest recoil/relaxation 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 the emergency response system has not been activated, leave the infant (or carry the infant with you) to activate the emergency response system and retrieve the AED.
8	Continue compressions and breaths in a ratio of 30:2, and use the AED as soon as it is available. Continue until advanced providers take over or the infant begins to breathe, move, or otherwise react.



**Figure 30.** Two-finger chest compression technique for an infant.



**Foundational Facts****Chest Recoil**

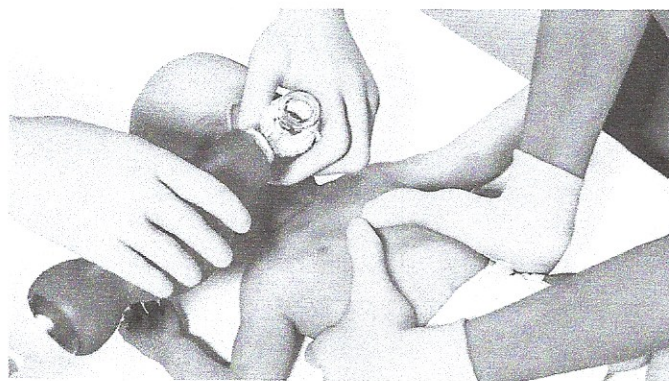
Chest recoil allows blood to flow into the heart. Incomplete chest recoil reduces the filling of the heart between compressions and reduces the blood flow created by chest compressions.

**Infant: 2 Thumb-  
Encircling Hands  
Technique**

The 2 thumb-encircling hands technique is the preferred 2-rescuer chest compression technique because it produces improved blood flow.

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

Step	Action
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. The thumbs may overlap in very small infants. Encircle the infant's chest and support the infant's back with the fingers of both hands.
3	With your hands encircling the chest, use both thumbs to depress the breastbone (Figure 31) at a rate of 100 to 120/min.
4	Compress at least one third the AP diameter of the infant's chest (about 1½ inches [4 cm]).
5	After each compression, completely release the 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 in a ratio of 15:2 (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 providers take over, or the infant begins to breathe, move, or otherwise respond.



**Figure 31.** Two thumb-encircling hands technique for an infant (2 rescuers).



**Critical Concepts****The 2 Thumb–Encircling Hands Technique**

The 2 thumb–encircling hands technique is recommended when CPR is provided by 2 rescuers. This technique is preferred over the 2-finger technique because it

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

**Foundational Facts****Compression Depth in Adults vs Children and Infants**

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

**Infant/Child Breaths****Opening the Airway**

As discussed in Opening the Airway in “Part 2: BLS for Adults,” for rescue breaths to be effective, the airway must be open. Two methods for opening the airway are the head tilt–chin lift and jaw-thrust maneuvers.

As with adults, if a head or neck injury is suspected, use the jaw-thrust maneuver. If the jaw thrust does not open the airway, use the head tilt–chin lift.

**Caution****Keep Head in Neutral Position**

If you tilt (extend) an infant’s head beyond the neutral (sniffing) position, the infant’s airway may become blocked. Maximize airway patency by positioning the infant with the neck in a neutral position so that the external ear canal is level with the top of the infant’s shoulder.

**Why Breaths Are Important for Infants and Children in Cardiac Arrest**

When *sudden* cardiac arrest occurs, the oxygen content of the blood is typically adequate to meet oxygen demands of the body for the first few minutes after arrest. So delivering chest compressions is an effective way of distributing oxygen to the heart and brain.

In contrast, infants and children who develop cardiac arrest often have respiratory failure or shock that reduces the oxygen content in the blood even before the onset of arrest. As a result, for most infants and children in cardiac arrest, chest compressions alone are not as effective as compressions and breaths for delivering oxygenated blood to the heart and brain. *For this reason, it is very important to give both compressions and breaths for infants and children during high-quality CPR.*

**Ventilation for an Infant or Child With a Barrier Device**

Use a barrier device (eg, pocket mask) or a bag-mask device for delivering breaths to an infant or child. See Barrier Devices and Bag-Mask Ventilation in “Part 2: BLS for Adults” for detailed instructions.



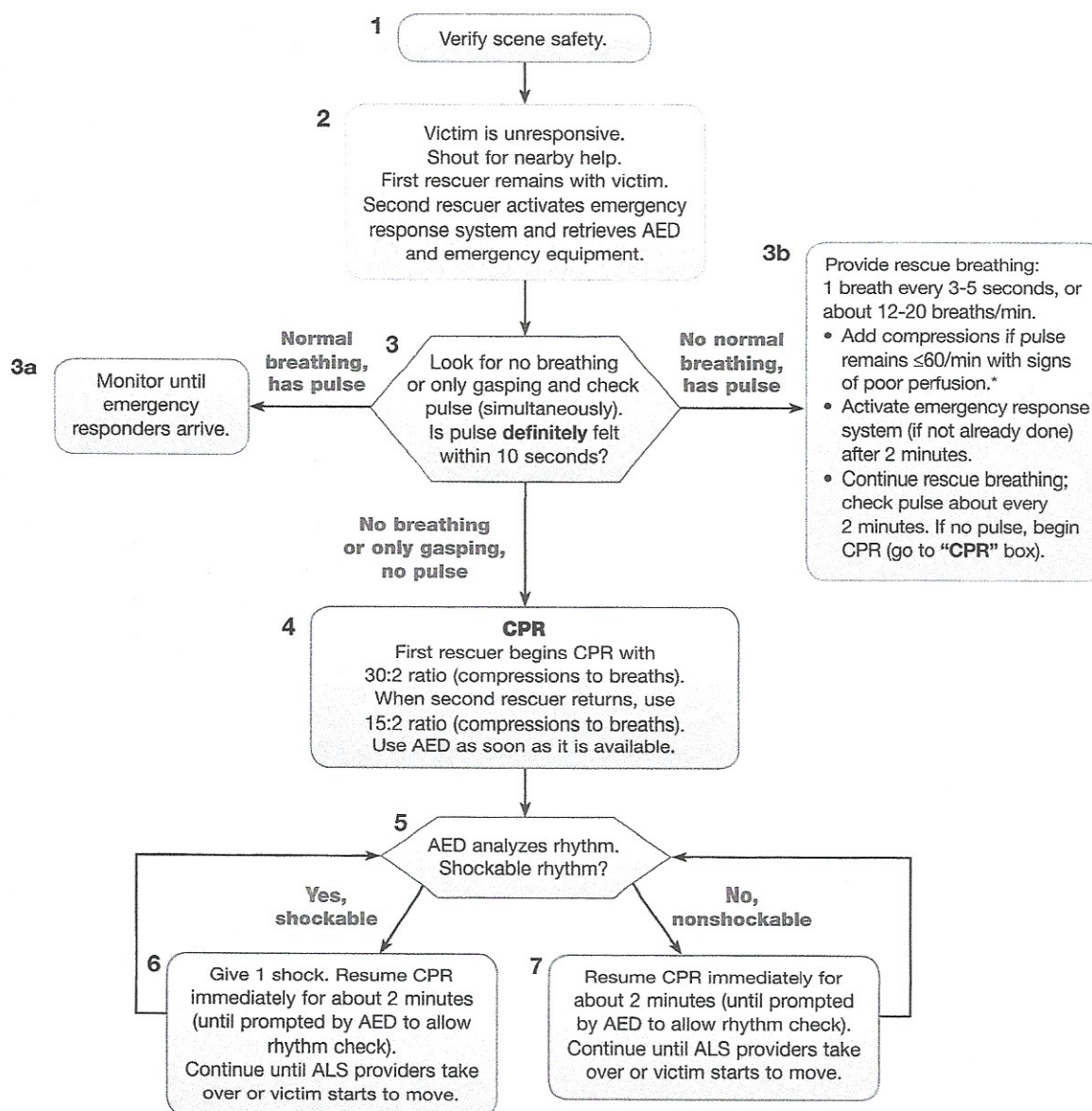
When providing bag-mask ventilation for an infant or child, do the following:

- Select a bag and mask of appropriate size. The mask must cover the victim's mouth and nose completely without covering the eyes or overlapping the chin.
- Perform a head tilt–chin lift to open the victim's airway. Press the mask to the face as you lift the jaw, making a seal between the child's face and the mask.
- Connect supplementary oxygen when available.

## BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers

Refer to the BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers as you read the steps below (Figure 32).

### BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers—2015 Update



\*Signs of poor perfusion may include cool extremities, decrease in responsiveness, weak pulses, paleness, mottling (patchy skin appearance), and cyanosis (turning blue).

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**Figure 32.** BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers.



## Infant and Child 2-Rescuer BLS Sequence

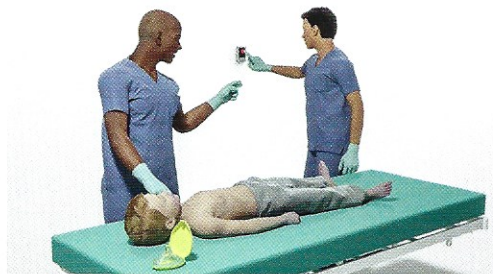
### Introduction

If the rescuer encounters an unresponsive infant or child and other rescuers are available, follow the steps outlined in the BLS Healthcare Provider Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers (Figure 32).

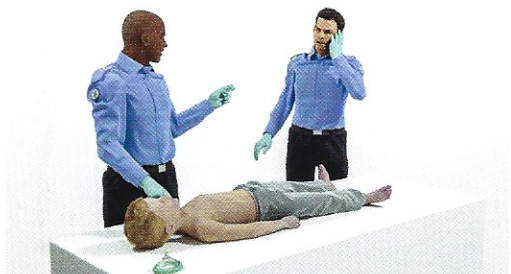
### Verify Scene Safety, Check for Responsiveness, and Get Help (Algorithm Boxes 1, 2)

The first rescuer who arrives at the side of an unresponsive infant or child should quickly perform the following steps. As more rescuers arrive, assign roles and responsibilities. When more rescuers are available for a resuscitation attempt, more tasks can be performed simultaneously.

Step	Action
1	Verify that the scene is safe for you and the victim.
2	Check for responsiveness. Tap the child's shoulder or the heel of the infant's foot and shout, "Are you OK?"
3	If the victim is not responsive: <ul style="list-style-type: none"> <li>The first rescuer initiates the resuscitation attempt.</li> <li>The second rescuer activates the emergency response system (Figure 33), retrieves the AED and emergency equipment, and returns to the victim to help with CPR and the use of the AED.</li> </ul>



**A**



**B**

**Figure 33.** If the arrest of an infant or child was sudden and witnessed, activate the emergency response system in your setting. **A**, In-facility setting. **B**, Prehospital setting.

### Assess for Breathing and Pulse (Box 3)

For details on assessing the victim for normal breathing and a pulse, see Infant and Child 1-Rescuer BLS Sequence section earlier in Part 5.

### Determine Next Actions (Boxes 3a, 3b)

For details on determining next actions based on the presence or absence of breathing and pulse, see Infant and Child 1-Rescuer BLS Sequence earlier in Part 5. If CPR is indicated when the second rescuer is available to assist, use a compression-to-ventilation ratio of **15:2**.



## **Begin High-Quality CPR, Starting With Chest Compressions (Box 4)**

If the victim is not breathing normally or is only gasping and has no pulse, immediately do the following:

- The first rescuer begins high-quality CPR, starting with chest compressions (see Infant/Child Chest Compressions earlier in Part 5 for complete details). Remove or move the clothing covering the victim's chest so that you can locate appropriate hand or finger placement for compression. This will also allow placement of the AED pads when the AED arrives.
  - For an infant, use the 2-finger technique until the second rescuer returns to provide 2-rescuer CPR. During 2-rescuer CPR, use the 2 thumb-encircling hands technique.
  - For a child, use 1 or 2 hands (1 hand for a very small child).
- When the second rescuer returns, that rescuer gives breaths.
- Rescuers should switch compressors about every 5 cycles or 2 minutes (or earlier if needed), so that CPR quality is not reduced because of fatigue (see Critical Concepts: High-Performance Teams in Part 2).

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## **Attempt Defibrillation With the AED (Boxes 5, 6, 7)**

Use the AED as soon as it is available and follow the prompts.

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## **Resume High-Quality CPR (Boxes 6, 7)**

After shock delivery or if no shock is advised, immediately resume high-quality CPR, starting with chest compressions, when advised by the AED. Continue to provide CPR and follow the AED prompts until advanced life support providers take over or the victim starts to move.

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## **Review**

1. What is the correct compression-to-ventilation ratio for a single rescuer of a 3-year-old child?
  - a. 15 compressions to 1 breath
  - b. 15 compressions to 2 breaths
  - c. 20 compressions to 2 breaths
  - d. 30 compressions to 2 breaths
2. What is the correct compression-to-ventilation ratio for a 7-year-old child when 2 or more rescuers are present?
  - a. 15 compressions to 1 breath
  - b. 15 compressions to 2 breaths
  - c. 20 compressions to 2 breaths
  - d. 30 compressions to 2 breaths
3. For what age victim is the 2 thumb-encircling hands technique recommended when 2 or more rescuers are present?
  - a. A child younger than 3 years
  - b. A child older than 3 years
  - c. An infant older than 1 year
  - d. An infant younger than 1 year



4. What is the correct chest compression depth for a child?
- a. At least one fourth the depth of the chest, or about 1 inch
  - b. At least one third the depth of the chest, or about  $1\frac{1}{2}$  inches
  - c. At least one third the depth of the chest, or about 2 inches
  - d. At least one half the depth of the chest, or about 3 inches
5. What is the correct chest compression depth for an infant?
- a. At least one fourth the depth of the chest, or about 1 inch
  - b. At least one third the depth of the chest, or about  $1\frac{1}{2}$  inches
  - c. At least one third the depth of the chest, or about 2 inches
  - d. At least one half the depth of the chest, or about  $2\frac{1}{2}$  inches

See Answers to Review Questions in the Appendix.

## Student Notes

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# Automated External Defibrillator for Infants and Children Less Than 8 Years of Age

## AED for Infants and Children

### Overview

This part discusses use of an AED in infants and children less than 8 years of age.

### Learning Objectives

At the end of this part, you will be able to

- Describe the importance of early use of an AED for infants and children less than 8 years of age
- Demonstrate the appropriate use of an AED for infants and children less than 8 years of age

### Be Familiar With the AED Equipment in Your Setting

Although all AEDs operate in basically the same way, AED equipment varies according to model and manufacturer. You must be familiar with the AED used in your particular setting.

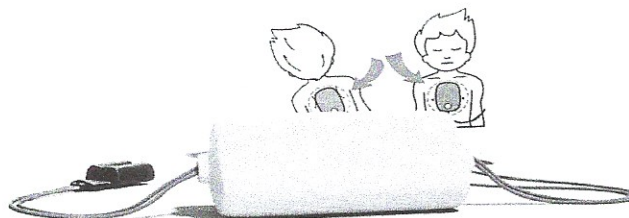
See “Part 3: Automated External Defibrillator for Adults and Children 8 Years of Age and Older” for the universal steps for operating an AED.

### Pediatric-Capable AEDs

Some AED models are designed for both pediatric and adult use. These AEDs deliver a reduced shock dose when pediatric pads are used.

### Delivering a Pediatric Shock Dose

The AED shock dose may be reduced by pediatric cables, an attenuator, or preprogramming in the device. One commonly used method for reducing a shock dose is a pediatric dose attenuator (Figure 34). When attached to an AED, it reduces the shock dose by about two thirds. Typically, child pads are used to deliver the reduced shock dose.



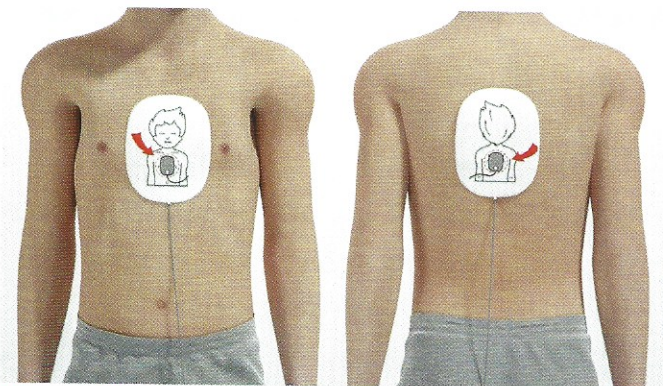
**Figure 34.** Example of a pediatric dose attenuator, which reduces the shock dose delivered by an AED. Child pads are also used with this attenuator.



## Choosing and Placing the AED Pads

Use child pads, if available, for infants and for children less than 8 years of age. If child pads are not available, use adult pads. Make sure the pads do not touch each other or overlap. Adult pads deliver a higher shock dose, but a higher shock dose is preferred to no shock.

Follow the instructions for pad placement provided by the AED manufacturer and the illustrations on the AED pads. Some AEDs require that child pads be placed in a front and back (anteroposterior [AP]) position (Figure 35), while others require right-left (anterolateral) placement. AP pad placement is commonly used for infants. See Critical Concepts: AED Pad Placement Options in Part 3.



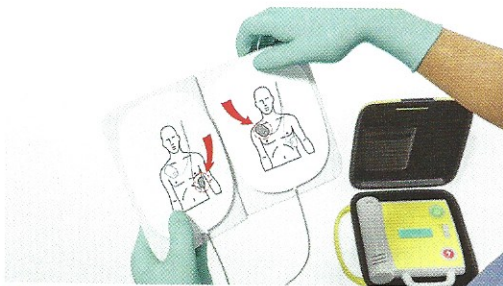
**Figure 35.** Anteroposterior AED pad placement on a child victim.

### Victims 8 Years of Age and Older

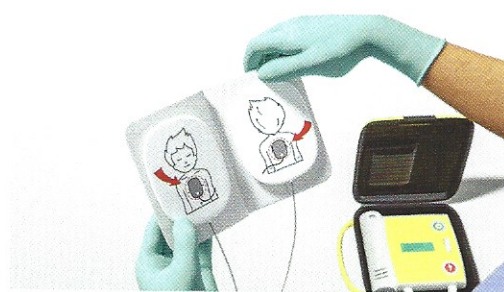
- Use the AED as soon as it is available.
- Use adult pads (Figure 36). Do not use child pads—they will likely give a shock dose that is too low.
- Place the pads as illustrated on the pads.

### Victims Less Than 8 Years of Age

- Use the AED as soon as it is available.
- Use child pads (Figure 37) if available. If you do not have child pads, you may use adult pads. Place the pads so that they do not touch each other.
- If the AED has a key or switch that will deliver a child shock dose, turn the key or switch.
- Place the pads as illustrated on the pads.



**Figure 36.** Adult AED pads.



**Figure 37.** Child AED pads.



## **Use of an AED for Infants**

For infants, a manual defibrillator is preferred to an AED for defibrillation. A manual defibrillator has more capabilities than an AED and can provide lower energy doses that are often needed in infants. Advanced training is required to use a manual defibrillator and will not be covered in this course.

- If a manual defibrillator is not available, an AED equipped with a pediatric dose attenuator is preferred.
- If neither is available, you may use an AED without a pediatric dose attenuator.

### **Foundational Facts**



### **Using Adult Pads or Adult Shock Dose Is Better Than No Attempt at Defibrillation for an Infant or Child**

#### **AED Pads**

If you are using an AED for an infant or for a child less than 8 years of age and the AED does not have child pads, you may use adult pads. Pads may need to be placed anterior and posterior so that they do not touch each other or overlap.

#### **Shock Dose**

If the AED you are using doesn't have the capability of delivering a pediatric dose, use the adult dose.

## **Review**

1. What should you do when using an AED on an infant or a child less than 8 years of age?
  - a. Never use adult AED pads
  - b. Use adult AED pads
  - c. Use adult AED pads if the AED does not have child pads
  - d. Use adult AED pads, but cut them in half
2. If a manual defibrillator is not available for an infant victim, which action should you take?
  - a. Perform high-quality CPR
  - b. Use an AED equipped with a pediatric dose attenuator
  - c. Use an AED without a pediatric dose attenuator
  - d. Wait for advanced care to arrive
3. What is important to remember about AED pad placement on infants?
  - a. Ensure that pads overlap each other in very small infants
  - b. Place 1 adult pad on the chest
  - c. You may need to place 1 pad on the chest and 1 on the back, according to the diagrams on the pads
  - d. If child AED pads are not available, do not use the AED

See Answers to Review Questions in the Appendix.



## Student Notes

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## Ventilation Techniques

### Learning Objectives

At the end of this part, you will be able to

- Describe modifications to compressions and breaths with an advanced airway in place
- Provide rescue breathing for respiratory arrest victims
- Describe techniques for giving breaths without a barrier device for adults, children, and infants

### CPR and Breaths With an Advanced Airway

This section explains modifications to compressions and breaths after an advanced airway is placed during a resuscitation attempt. Advanced airways prevent airway obstruction and can provide a route for more effective oxygenation and ventilation. Examples of advanced airways include laryngeal mask airway, supraglottic airway device, and endotracheal tube.

Table 5 summarizes the compression-to-ventilation ratio with and without an advanced airway for adults, children, and infants.

**Table 5. Comparison of Compression-to-Ventilation Ratio During CPR With and Without an Advanced Airway**

Ventilation Technique	Compressions to Breaths (Adult)	Compressions to Breaths (Child and Infant)
<b>No advanced airway in place</b> (eg, mouth-to-mouth, bag-mask device, pocket mask)	<ul style="list-style-type: none"> <li>• Compression rate of 100 to 120/min</li> <li>• 30 compressions to 2 breaths</li> </ul>	<ul style="list-style-type: none"> <li>• Compression rate of 100 to 120/min</li> <li>• 30 compressions to 2 breaths (1 rescuer)</li> <li>• 15 compressions to 2 breaths (2 rescuers)</li> </ul>
<b>Advanced airway in place</b> (eg, laryngeal mask airway, supraglottic airway device, endotracheal intubation)	<ul style="list-style-type: none"> <li>• Compression rate of 100 to 120/min</li> <li>• Continuous compressions without pauses for breaths</li> <li>• 1 breath every 6 seconds (10 breaths per minute) for adults, children, and infants</li> </ul>	



## Rescue Breathing

*Rescue breathing* is giving breaths to an unresponsive victim who has a pulse but is not breathing. You may provide rescue breathing by using a barrier device (eg, pocket mask) or bag-mask device. If emergency equipment is not available, the rescuer may provide breaths by using the mouth-to-mouth or mouth-to-mouth-and-nose technique.

Table 6 outlines how to provide rescue breathing for adults, children, and infants.

**Table 6. Rescue Breathing for Adults, Children, and Infants**

Rescue Breathing for Adults	Rescue Breathing for Infants and Children
<ul style="list-style-type: none"> <li>Give 1 breath every 5 to 6 seconds (about 10 to 12 breaths per minute).</li> </ul>	<ul style="list-style-type: none"> <li>Give 1 breath every 3 to 5 seconds (12 to 20 breaths per minute).</li> </ul>
<ul style="list-style-type: none"> <li>Give each breath in 1 second.</li> <li>Each breath should result in visible chest rise.</li> <li>Check the pulse about every 2 minutes.</li> </ul>	

### Caution



### When to Start CPR in an Infant or a Child When Providing Rescue Breathing

If you notice signs of poor perfusion in an infant despite adequate rescue breathing (that is, despite effective oxygenation and ventilation) and the heart rate is 60/min or less, start CPR (compressions and breaths).

### Critical Concepts



### Respiratory Arrest

Respiratory arrest occurs when normal breathing stops, preventing essential oxygen supply and carbon dioxide exchange. Lack of oxygen to the brain eventually causes a person to become unresponsive. If not treated immediately, this can result in brain injury, cardiac arrest, and death. Respiratory arrest is an emergency that, in certain situations, is potentially reversible if treated early. For example, opioid overdose can cause unresponsiveness, respiratory depression, and respiratory arrest (see “Part 8: Opioid-Associated Life-Threatening Emergencies”).

Respiratory arrest can be identified when the victim is found to be unresponsive, not breathing or only gasping, but still has a pulse. BLS providers should be able to quickly identify respiratory arrest, activate the emergency response system, and begin rescue breathing. Quick action can prevent the development of cardiac arrest.

## Techniques for Giving Breaths Without a Barrier Device

### Overview

Many cardiac arrests happen at home or other settings where rescue equipment is not available. This section describes techniques for giving breaths when you do not have a barrier device, such as a pocket mask or bag-mask device.



## Mouth-to-Mouth Breathing for Adults and Children

Mouth-to-mouth breathing is a quick, effective technique used to provide oxygen to an unresponsive adult or child. Follow these steps to give mouth-to-mouth breaths to adults and children:

Step	Action
1	Hold the victim's airway open with a head tilt–chin lift.
2	Pinch the nose closed with your thumb and index finger (using the hand on the forehead).
3	Take a regular (not deep) breath and seal your lips around the victim's mouth, creating an airtight seal (Figure 38).
4	Deliver 1 breath over 1 second. Watch for the chest to rise as you give the breath.
5	If the chest does not rise, repeat the head tilt–chin lift.
6	Give a second breath (blow for about 1 second). Watch for the chest to rise.
7	If you are unable to ventilate the victim after 2 attempts, promptly return to chest compressions.



Figure 38. Mouth-to-mouth breaths.

## Breathing Techniques for Infants

The following techniques are used to give breaths in infants (Table 7):

- Mouth-to-mouth-and-nose
- Mouth-to-mouth

The mouth-to-mouth-and-nose technique is preferred for infants. However, if you can't cover the infant's nose and mouth with your mouth, use the mouth-to-mouth technique instead.

Table 7. Techniques for Giving Breaths to Infants

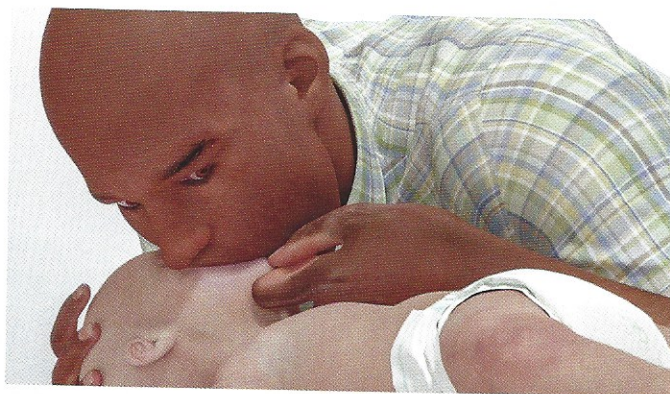
Technique	Technique
Mouth-to-mouth-and-nose	<ul style="list-style-type: none"> <li>• Maintain a head tilt–chin lift to keep the airway open.</li> <li>• Place your mouth over the infant's mouth and nose and create an airtight seal (Figure 39).</li> </ul>

(continued)



(continued)

Technique	Actions
	<ul style="list-style-type: none"> <li>• Blow into the infant's nose and mouth (pausing to inhale between breaths), just enough to make the chest rise with each breath.</li> <li>• If the chest does not rise, repeat the head tilt–chin lift to reopen the airway and try to give a breath that makes the chest rise. It may be necessary to move the infant's head through a range of positions to provide effective breaths. When the airway is open, give breaths that make the chest rise.</li> </ul>
Mouth-to-mouth	<ul style="list-style-type: none"> <li>• Maintain a head tilt–chin lift to keep the airway open.</li> <li>• Pinch the victim's nose tightly with thumb and forefinger.</li> <li>• Make a mouth-to-mouth seal.</li> <li>• Deliver each mouth-to-mouth breath, making sure the chest rises with each breath.</li> <li>• If the chest does not rise, repeat the head tilt–chin lift to reopen the airway. It may be necessary to move the infant's head through a range of positions to provide effective breaths. When the airway is open, give breaths that make the chest rise.</li> </ul>



**Figure 39.** Mouth-to-mouth-and-nose breaths for an infant victim.

### Caution



### Risk of Gastric Inflation

If you give breaths too quickly or with too much force, air is likely to enter the stomach rather than the lungs. This can cause gastric inflation (filling of the stomach with air).

Gastric inflation frequently develops during mouth-to-mouth, mouth-to-mask, or bag-mask ventilation. It can result in serious complications. Rescuers can reduce the risk of gastric inflation by avoiding giving breaths too rapidly, too forcefully, or with too much volume. During high-quality CPR, however, gastric inflation may still develop even when rescuers give breaths correctly.

To reduce the risk of gastric inflation:

- Deliver each breath over 1 second.
- Deliver just enough air to make the victim's chest rise.

## Review

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1. Which victim would need only rescue breathing?
  - a. Agonal gasping with no pulse
  - b. Breathing with a weak pulse
  - c. No breathing and a pulse
  - d. No breathing and no pulse
  
2. How often should rescue breaths be given in infants and children when a pulse is present?
  - a. 1 breath every 2 to 3 seconds
  - b. 1 breath every 3 to 5 seconds
  - c. 1 breath every 5 to 6 seconds
  - d. 1 breath every 8 to 10 seconds
  
3. Which action can rescuers perform to potentially reduce the risk of gastric inflation?
  - a. Delivering each breath over 1 second
  - b. Giving rapid, shallow breaths
  - c. Using a bag-mask device for delivering ventilation
  - d. Using the mouth-to-mask breathing technique
  
4. Which is the preferred technique for giving rescue breaths to an infant?
  - a. Mouth-to-mouth
  - b. Mouth-to-mouth-and-nose
  - c. Mouth-to-nose
  - d. Any method is acceptable

See Answers to Review Questions in the Appendix.

## Student Notes

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# Opioid-Associated Life-Threatening Emergencies

## General Concepts

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### Overview

This section describes what to do if you suspect an opioid-associated life-threatening emergency (opioid drug overdose) in an unresponsive adult victim.

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### Learning Objectives

At the end of this part, you will be able to

- Recognize an opioid-associated life-threatening emergency
  - Describe the importance of administering naloxone in opioid-associated life-threatening emergencies
  - Describe the steps in the opioid-associated life-threatening emergency response sequence
- 

### What Are Opioids?

*Opioids* are medications used primarily for pain relief. Common examples are hydrocodone and morphine. Heroin is an example of an opioid that is illegal in the United States. Addiction to opioids is a growing problem; the United Nations Office on Drugs and Crime has reported that as many as 36 million people may be addicted to opioids worldwide.

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### Adverse Effects

Opioids in high doses can cause central nervous system and respiratory depression that can cause respiratory and cardiac arrest. If opioids are taken with other central nervous system depressants such as alcohol, tranquilizers, or sleeping pills, the risk of respiratory depression is increased. This combination can be fatal. In the United States, opioid overdose is now responsible for killing more adults annually than motor vehicle collisions.

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### Antidote to Opioid Overdose

*Naloxone* is an agent that can reverse the effects of respiratory depression caused by opioids. It should be given quickly. Naloxone may be given by intramuscular, intranasal, and intravenous routes.

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### Naloxone Autoinjector

Naloxone handheld autoinjectors can be used in opioid-associated life-threatening emergencies. The device delivers a single dose, which can be given as an intramuscular injection.

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## Intranasal Naloxone

Intranasal naloxone delivers the drug into the nose by using an atomizer device, a dispenser that releases the drug into the nose. No needle is required. This type of device eliminates the risk of needle-stick injuries and is easy to use.

Medications delivered into the nose are quickly absorbed into the bloodstream. This is because the nasal cavity has a relatively large surface of mucous membranes, which are rich in capillaries and allow fast absorption.

### Critical Concepts



### Assessment of Scene That Suggests Potential Opioid Overdose

Scene assessment is an important tool for identifying whether or not opioid use may be involved in a life-threatening emergency. Do not delay life-saving actions. After confirming safety, the following scene assessment steps may be performed simultaneously with the resuscitation attempt.

- **Direct communication with bystanders:** Ask open questions, such as, “Does anyone have any information about what happened?”
- **Direct observation of the victim:** Look for signs of injection on the skin or other signs of opioid use.
- **Observation of the surroundings:** Look for medication bottles or other signs of opioid use.

### Critical Concepts



### Opioid-Associated Life-Threatening Emergency

The following are recommendations for unresponsive victims if an opioid-associated life-threatening emergency is suspected:

- In patients who have a definite pulse, in addition to providing conventional BLS care, it is reasonable for appropriately trained BLS healthcare providers (per protocol) to give naloxone to patients with an opioid-associated life-threatening emergency.
- If an opioid-associated life-threatening emergency is suspected in a victim of cardiac arrest, consider giving naloxone per local protocol *after* starting CPR. Note that the effect of naloxone administration for victims in cardiac arrest from opioid overdose is unknown.

## Opioid-Associated Life-Threatening Emergency (Adult) Sequence

### Opioid-Associated Life-Threatening Emergency Response Sequence

The first rescuer who arrives at the side of an unresponsive victim where opioid use may be suspected should quickly perform the following:

- Scene assessment
- Steps summarized in Table 8

*As with any life-threatening emergency, do not delay lifesaving actions.*

**Table 8. Opioid-Associated Life-Threatening Emergency Response Sequence Summary**

Step	Action
Scene assessment	<p><b>Verify scene safety.</b></p> <p>Do you suspect an opioid-associated life-threatening emergency?</p>
1	<p><b>Check for responsiveness and get help.</b></p> <ul style="list-style-type: none"> <li>• Check for unresponsiveness and call for nearby help.</li> <li>• Send someone to activate the emergency response system and get the AED and naloxone.</li> </ul>
2	<p><b>Assess breathing and pulse.</b></p>
3	<p><b>Determine next actions based on breathing and pulse.</b></p> <p><b>A.</b> If the victim <i>is</i> breathing normally and a pulse <i>is</i> present:</p> <ul style="list-style-type: none"> <li>• Monitor responsiveness, breathing, and pulse.</li> </ul> <p><b>B.</b> If the victim <i>is not</i> breathing normally but a pulse <i>is</i> present:</p> <ul style="list-style-type: none"> <li>• Provide rescue breathing (see Rescue Breathing section in Part 7).</li> <li>• Confirm that the emergency response system has been activated.</li> <li>• If opioid overdose is suspected, administer naloxone per local protocols and monitor for response.</li> <li>• Continue rescue breathing and check the pulse about every 2 minutes. Be ready to perform high-quality CPR if you do not feel a pulse.</li> </ul> <p><b>C.</b> If the victim <i>is not</i> breathing normally and <i>no</i> pulse is present:</p> <ul style="list-style-type: none"> <li>• Provide high-quality CPR and use the AED as soon as it is available.</li> <li>• If opioid overdose is suspected, administer naloxone per local protocols and monitor for response.</li> <li>• Continue until the advanced care team takes over or the victim starts to move.</li> </ul>



## Review

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1. What is *not* an example of an opioid?
  - a. Heroin
  - b. Hydrocodone
  - c. Morphine
  - d. Naloxone
  
2. Your 27-year-old roommate uses opioids. You find him unresponsive with no breathing, but a strong pulse. You suspect an opioid-associated life-threatening emergency. A friend is phoning 9-1-1 and is looking for the naloxone autoinjector. What action should you take?
  - a. Remain with your roommate until the naloxone arrives and administer it immediately
  - b. Begin CPR, starting with chest compressions
  - c. Provide rescue breathing: 1 breath every 5 to 6 seconds
  - d. Provide rapid defibrillation with an AED
  
3. You encounter an unresponsive 56-year-old man who has been taking hydrocodone after a surgical procedure. He is not breathing and has no pulse. You notice that his medication bottle is empty. You suspect an opioid-associated life-threatening emergency. A colleague activates the emergency response system and is retrieving the AED and naloxone. What is the most appropriate action for you to take next?
  - a. Wait for the naloxone to arrive before doing anything
  - b. Begin CPR, starting with chest compressions
  - c. Provide 1 rescue breath every 5 to 6 seconds until naloxone arrives
  - d. Provide rapid defibrillation with the AED

See Answers to Review Questions in the Appendix.

## Student Notes

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## Choking Relief for Adults, Children, and Infants

### General Concepts

#### Overview

This section discusses choking (foreign-body airway obstruction). You will learn to recognize choking and perform maneuvers to relieve choking. Choking relief maneuvers are the same for adults and children (1 year and older). A different technique is used to relieve choking for infants (less than 1 year).

#### Learning Objectives

At the end of this part, you will be able to

- Describe the technique for relief of foreign-body airway obstruction for an adult or child
- Describe the technique for relief of foreign-body airway obstruction for an infant

#### Signs of Choking

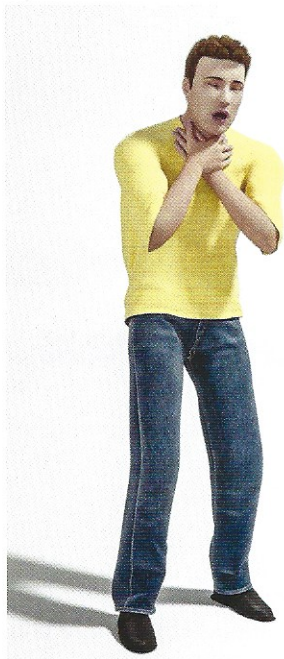
Early recognition of foreign-body airway obstruction is the key to successful outcome. It is important to distinguish this emergency from fainting, stroke, heart attack, seizure, drug overdose, or other conditions that may cause sudden respiratory distress but require different treatment.

Foreign bodies may cause a range of signs from *mild* to *severe* airway obstruction (Table 9).

**Table 9. Signs of a Foreign-Body Airway Obstruction and Rescuer Actions**

	Signs	Rescuer Actions
<b>Mild airway obstruction</b>	<ul style="list-style-type: none"> <li>• Good air exchange</li> <li>• Can cough forcefully</li> <li>• May wheeze between coughs</li> </ul>	<ul style="list-style-type: none"> <li>• As long as good air exchange continues, encourage the victim to continue coughing.</li> <li>• Do not interfere with the victim's own attempts to relieve the obstruction, but stay with the victim and monitor the condition.</li> <li>• If mild airway obstruction continues or progresses to signs of severe airway obstruction, activate the emergency response system.</li> </ul>
<b>Severe airway obstruction</b>	<ul style="list-style-type: none"> <li>• Clutching the throat with the thumb and fingers, making the universal choking sign (Figure 40)</li> <li>• Unable to speak or cry</li> <li>• Poor or no air exchange</li> <li>• Weak, ineffective cough or no cough at all</li> <li>• High-pitched noise while inhaling or no noise at all</li> <li>• Increased respiratory difficulty</li> <li>• Possible cyanosis (turning blue)</li> </ul>	<ul style="list-style-type: none"> <li>• If the victim is an adult or child, ask him if he is choking. If the victim nods "yes" and cannot talk, severe airway obstruction is present. (An infant can't respond to questions.)</li> <li>• Take steps immediately to relieve the obstruction.</li> <li>• If severe airway obstruction continues and the victim becomes unresponsive, start CPR.</li> <li>• If you are not alone, send someone to activate the emergency response system. If you are alone, provide about 2 minutes of CPR before leaving to activate the emergency response system.</li> </ul>





**Figure 40.** The universal choking sign indicates the need for help when a victim is choking.

## Choking Relief in a Responsive Adult or Child

### **Abdominal Thrusts**

Use abdominal thrusts (the Heimlich maneuver) to relieve choking in a responsive adult or child. Do not use abdominal thrusts to relieve choking in an infant.

Give each individual thrust with the intention of relieving the obstruction. It may be necessary to repeat the thrust several times to clear the airway.

### **Abdominal Thrusts With Victim Standing or Sitting**

Follow these steps to perform abdominal thrusts on a responsive adult or child who is standing or sitting:

Step	Action
1	Stand or kneel behind the victim and wrap your arms around the victim's waist (Figure 41).
2	Make a fist with one hand.
3	Place the thumb side of your fist against the victim's abdomen, in the midline, slightly above the navel and well below the breastbone.
4	Grasp your fist with your other hand and press your fist into the victim's abdomen with a quick, forceful upward thrust.
5	Repeat thrusts until the object is expelled from the airway or the victim becomes unresponsive.
6	Give each new thrust with a separate, distinct movement to relieve the obstruction.



**Figure 41.** Abdominal thrusts with the victim standing.

**Caution**



**Pregnant and Obese Victims**

If the victim is pregnant or obese, perform chest thrusts instead of abdominal thrusts (Figure 42).



**Figure 42.** Perform chest thrusts instead of abdominal thrusts in a pregnant or obese choking victim.

## Choking Relief in an Unresponsive Adult or Child

### Choking Relief in an Unresponsive Adult or Child

A choking victim's condition may worsen, and he may become unresponsive. If you are aware that the victim's condition is caused by a foreign-body airway obstruction, you will know to look for a foreign body in the throat.

Step	Action
1	Shout for help. If someone else is available, send that person to activate the emergency response system.
2	Gently lower the victim to the ground if you see that he is becoming unresponsive.
3	Begin CPR, starting with chest compressions. Do not check for a pulse.

(continued)



(continued)

Step	Action
4	Each time you open the airway to give breaths, open the victim's mouth wide. Look for the object. <ul style="list-style-type: none"> <li>• If you see an object that can be easily removed, remove it with your fingers.</li> <li>• If you do not see an object, continue CPR.</li> </ul>
5	After about 5 cycles or 2 minutes of CPR, activate the emergency response system if someone has not already done so.

Sometimes the choking victim may already be unresponsive when you first encounter him. In this situation you probably will not know that a foreign-body airway obstruction exists. Activate the emergency response system and start high-quality CPR.

### Foundational Facts



### Giving Effective Breaths When There Is an Airway Obstruction

When a choking victim loses consciousness, the muscles in the larynx may relax. This could convert a complete/severe airway obstruction to a partial obstruction. In addition, chest compressions may create at least as much force as abdominal thrusts, so they may help expel the object. Giving 30 compressions and then removing any object seen in the mouth may allow you to eventually give effective breaths.

### Actions After Choking Relief

You can tell if you have successfully removed an airway obstruction in an unresponsive victim if you

- Feel air movement and see the chest rise when you give breaths
- See and remove a foreign body from the victim's mouth

After you relieve choking in an unresponsive victim, treat him as you would any unresponsive victim. Check for responsiveness, check for breathing and pulse, confirm that the emergency response system has been activated, and provide high-quality CPR or rescue breathing as needed.

If the victim is responsive, encourage the victim to seek immediate medical attention. Potential complications from abdominal thrusts should be evaluated.

## Choking Relief in Infants

### Choking Relief in a Responsive Infant

Use back slaps and chest thrusts for choking relief in an infant. Do not use abdominal thrusts.

Follow these steps to relieve choking in a responsive infant:

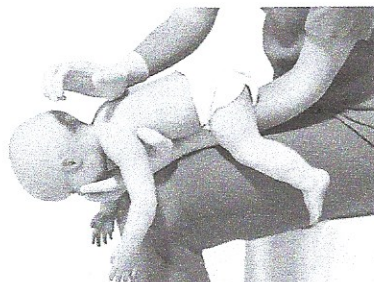
Step	Action
1	Kneel or sit with the infant in your lap.
2	If it is easy to do, remove clothing from the infant's chest.
3	Hold the infant facedown with the head slightly lower than the chest, resting on your forearm. Support the infant's head and jaw with your hand. Take care to avoid compressing the soft tissues of the infant's throat. Rest your forearm on your lap or thigh to support the infant.

(continued)

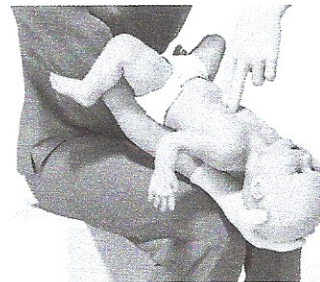


(continued)

Step	Action
4	Deliver up to 5 back slaps (Figure 43A) forcefully between the infant's shoulder blades, using the heel of your hand. Deliver each slap with sufficient force to attempt to dislodge the foreign body.
5	After delivering up to 5 back slaps, place your free hand on the infant's back, supporting the back of the infant's head with the palm of your hand. The infant will be adequately cradled between your 2 forearms, with the palm of one hand supporting the face and jaw while the palm of the other hand supports the back of the infant's head.
6	Turn the infant as a unit while carefully supporting the head and neck. Hold the infant faceup, with your forearm resting on your thigh. Keep the infant's head lower than the trunk.
7	Provide up to 5 quick downward chest thrusts (Figure 43B) in the middle of the chest, over the lower half of the breastbone (the same location as for chest compressions during CPR). Deliver chest thrusts at a rate of about 1 per second, each with the intention of creating enough force to dislodge the foreign body.
8	Repeat the sequence of up to 5 back slaps and up to 5 chest thrusts until the object is removed or the infant becomes unresponsive.



A



B

**Figure 43.** Relief of choking in an infant. **A**, Back slaps. **B**, Chest thrusts.

## Choking Relief in an Unresponsive Infant

If the infant victim becomes unresponsive, stop giving back slaps and begin CPR, starting with chest compressions.

To relieve choking in an unresponsive infant, perform the following steps:

Step	Action
1	Shout for help. If someone responds, send that person to activate the emergency response system. Place the infant on a firm, flat surface.
2	Begin CPR (starting with compressions) with 1 extra step: each time you open the airway, look for the object in the back of the throat. If you see an object and can easily remove it, remove it. Note that you do not check for a pulse before beginning CPR.
3	After about 2 minutes of CPR, activate the emergency response system (if no one has done so).



**Caution****Blind Finger Sweeps**

Do not perform a blind finger sweep, because it may push the foreign body back into the airway, causing further obstruction or injury.

**Life Is Why****Life Is Why**

At the American Heart Association, we want people to experience more of life's precious moments. What you learn in this course can help build healthier, longer lives for everyone.

**Review**

1. Which is an example of a mild foreign-body airway obstruction?
  - a. Cyanosis (turning blue)
  - b. High-pitched noise while inhaling
  - c. Inability to speak or cry
  - d. Wheezing between coughs
2. Which victim of a severe airway obstruction should receive abdominal thrusts?
  - a. An average-size 27-year-old man
  - b. A woman who is obviously pregnant
  - c. An obese 50-year-old man
  - d. An average-size 9-month-old infant
3. You are performing abdominal thrusts on a 9-year-old child when he suddenly becomes unresponsive. After you shout for nearby help, what is the most appropriate action to take next?
  - a. Begin high-quality CPR, starting with chest compressions
  - b. Check for a pulse
  - c. Continue performing abdominal thrusts
  - d. Provide 5 back slaps followed by 5 chest thrusts

See Answers to Review Questions in the Appendix.

**Student Notes**


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# Appendix





## Summary of High-Quality CPR Components for BLS Providers

Component	Adults and Adolescents	Children (Age 1 Year to Puberty)	Infants (Age Less Than 1 Year, Excluding Newborns)
Scene safety	Make sure the environment is safe for rescuers and victim		
Recognition of cardiac arrest	Check for responsiveness No breathing or only gasping (ie, no normal breathing) No definite pulse felt within 10 seconds (Breathing and pulse check can be performed simultaneously in less than 10 seconds)		
Activation of emergency response system	If you are alone with no mobile phone, leave the victim to activate the emergency response system and get the AED before beginning CPR  Otherwise, send someone and begin CPR immediately; use the AED as soon as it is available	<b>Witnessed collapse</b> Follow steps for adults and adolescents on the left  <b>Unwitnessed collapse</b> Give 2 minutes of CPR  Leave the victim to activate the emergency response system and get the AED  Return to the child or infant and resume CPR; use the AED as soon as it is available	
Compression-ventilation ratio without advanced airway	<b>1 or 2 rescuers</b> 30:2	<b>1 rescuer</b> 30:2  <b>2 or more rescuers</b> 15:2	
Compression-ventilation ratio with advanced airway	Continuous compressions at a rate of 100-120/min Give 1 breath every 6 seconds (10 breaths/min)		
Compression rate	100-120/min		
Compression depth	At least 2 inches (5 cm)*	At least one third AP diameter of chest  About 2 inches (5 cm)	At least one third AP diameter of chest  About 1½ inches (4 cm)
Hand placement	2 hands on the lower half of the breastbone (sternum)	2 hands or 1 hand (optional for very small child) on the lower half of the breastbone (sternum)	<b>1 rescuer</b> 2 fingers in the center of the chest, just below the nipple line  <b>2 or more rescuers</b> 2 thumb-encircling hands in the center of the chest, just below the nipple line
Chest recoil	Allow full recoil of chest after each compression; do not lean on the chest after each compression		
Minimizing interruptions	Limit interruptions in chest compressions to less than 10 seconds		

\*Compression depth should be no more than 2.4 inches (6 cm).

Abbreviations: AED, automated external defibrillator; AP, anteroposterior; CPR, cardiopulmonary resuscitation.



## Adult CPR and AED Skills Testing Checklist



Student Name \_\_\_\_\_ Date of Test \_\_\_\_\_

Hospital Scenario: "You are working in a hospital or clinic, and you see a person who has suddenly collapsed in the hallway. You check that the scene is safe and then approach the patient. Demonstrate what you would do next."

Prehospital Scenario: "You arrive on the scene for a suspected cardiac arrest. No bystander CPR has been provided. You approach the scene and ensure that it is safe. Demonstrate what you would do next."

### Assessment and Activation

- ☐ Checks responsiveness    ☐ Shouts for help/Activates emergency response system/Sends for AED  
☐ Checks breathing    ☐ Checks pulse

Once student shouts for help, instructor says, "Here's the barrier device. I am going to get the AED."

### Cycle 1 of CPR (30:2) \*CPR feedback devices preferred for accuracy

#### Adult Compressions

- ☐ Performs high-quality compressions\*:
- Hand placement on lower half of sternum
  - 30 compressions in no less than 15 and no more than 18 seconds
  - Compresses at least 2 inches (5 cm)
  - Complete recoil after each compression

#### Adult Breaths

- ☐ Gives 2 breaths with a barrier device:
- Each breath given over 1 second
  - Visible chest rise with each breath
  - Resumes compressions in less than 10 seconds

### Cycle 2 of CPR (repeats steps in Cycle 1) Only check box if step is successfully performed

- ☐ Compressions    ☐ Breaths    ☐ Resumes compressions in less than 10 seconds

Rescuer 2 says, "Here is the AED. I'll take over compressions, and you use the AED."

### AED (follows prompts of AED)

- ☐ Powers on AED    ☐ Correctly attaches pads    ☐ Clears for analysis    ☐ Clears to safely deliver a shock  
☐ Safely delivers a shock

### Resumes Compressions

- ☐ Ensures compressions are resumed immediately after shock delivery
- Student directs instructor to resume compressions or
  - Student resumes compressions

**STOP TEST**

#### Instructor Notes

- Place a ✓ in the box next to each step the student completes successfully.
- If the student does not complete all steps successfully (as indicated by at least 1 blank check box), the student must receive remediation. Make a note here of which skills require remediation (refer to Instructor Manual for information about remediation).

**Test Results** Circle **PASS** or **NR** to indicate pass or needs remediation:

**PASS**    **NR**

Instructor Initials \_\_\_\_\_ Instructor Number \_\_\_\_\_ Date \_\_\_\_\_



## Adult CPR and AED

### Skills Testing Critical Skills Descriptors

1. **Assesses victim and activates emergency response system (this *must* precede starting compressions) within a maximum of 30 seconds. After determining that the scene is safe:**
  - Checks for responsiveness by tapping and shouting
  - Shouts for help/directs someone to call for help *and* get AED/defibrillator
  - Checks for no breathing or no normal breathing (only gasping)
    - Scans from the head to the chest for a minimum of 5 seconds and no more than 10 seconds
  - Checks carotid pulse
    - Can be done simultaneously with check for breathing
    - Checks for a minimum of 5 seconds and no more than 10 seconds
2. **Performs high-quality chest compressions (initiates compressions immediately after recognition of cardiac arrest)**
  - Correct hand placement
    - Lower half of sternum
    - 2-handed (second hand on top of the first or grasping the wrist of the first hand)
  - Compression rate of 100 to 120/min
    - Delivers 30 compressions in 15 to 18 seconds
  - Compression depth and recoil—at least 2 inches (5 cm) and avoid compressing more than 2.4 inches (6 cm)
    - Use of a commercial feedback device or high-fidelity manikin is highly recommended
    - Complete chest recoil after each compression
  - Minimizes interruptions in compressions
    - Delivers 2 breaths so less than 10 seconds elapses between last compression of one cycle and first compression of next cycle
    - Compressions resumed immediately after shock/no shock indicated
3. **Provides 2 breaths by using a barrier device**
  - Opens airway adequately
    - Uses a head tilt–chin lift maneuver or jaw thrust
  - Delivers each breath over 1 second
  - Delivers breaths that produce visible chest rise
  - Avoids excessive ventilation
  - Resumes chest compressions in less than 10 seconds
4. **Performs same steps for compressions and breaths for Cycle 2**
5. **AED use**
  - Powers on AED
    - Turns AED on by pushing button or lifting lid as soon as it arrives
  - Correctly attaches pads
    - Places proper-sized (adult) pads for victim's age in correct location
  - Clears for analysis
    - Clears rescuers from victim for AED to analyze rhythm (pushes analyze button if required by device)
    - Communicates clearly to all other rescuers to stop touching victim
  - Clears to safely deliver shock
    - Communicates clearly to all other rescuers to stop touching victim
  - Delivers a shock
    - Resumes chest compressions immediately after shock delivery
    - Does *not* turn off AED during CPR
6. **Resumes compressions**
  - Ensures that high-quality chest compressions are resumed immediately after shock delivery
    - Performs same steps for compressions



## Infant CPR Skills Testing Checklist (1 of 2)



Student Name \_\_\_\_\_ Date of Test \_\_\_\_\_

Hospital Scenario: "You are working in a hospital or clinic when a woman runs through the door, carrying an infant. She shouts, 'Help me! My baby's not breathing.' You have gloves and a pocket mask. You send your coworker to activate the emergency response system and to get the emergency equipment."

Prehospital Scenario: "You arrive on the scene for an infant who is not breathing. No bystander CPR has been provided. You approach the scene and ensure that it is safe. Demonstrate what you would do next."

### Assessment and Activation

- ☐ Checks responsiveness   ☐ Shouts for help/Activates emergency response system   ☐ Checks breathing  
☐ Checks pulse

Once student shouts for help, instructor says, "Here's the barrier device."

### Cycle 1 of CPR (30:2) \*CPR feedback devices preferred for accuracy

#### Infant Compressions

- ☐ Performs high-quality compressions\*:
- Placement of 2 fingers in the center of the chest, just below the nipple line
  - 30 compressions in no less than 15 and no more than 18 seconds
  - Compresses at least one third the depth of the chest, about 1½ inches (4 cm)
  - Complete recoil after each compression

#### Infant Breaths

- ☐ Gives 2 breaths with a barrier device:
- Each breath given over 1 second
  - Visible chest rise with each breath
  - Resumes compressions in less than 10 seconds

### Cycle 2 of CPR (repeats steps in Cycle 1) Only check box if step is successfully performed

- ☐ Compressions   ☐ Breaths   ☐ Resumes compressions in less than 10 seconds

Rescuer 2 arrives with bag-mask device and begins ventilation while Rescuer 1 continues compressions with 2 thumb-encircling hands technique.

### Cycle 3 of CPR

#### Rescuer 1: Infant Compressions

- ☐ Performs high-quality compressions\*:
- 15 compressions with 2 thumb-encircling hands technique
  - 15 compressions in no less than 7 and no more than 9 seconds
  - Compresses at least one third the depth of the chest, about 1½ inches (4 cm)
  - Complete recoil after each compression

#### Rescuer 2: Infant Breaths

*This rescuer is not evaluated.*

(continued)



# Infant CPR Skills Testing Checklist (2 of 2)



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Date of Test \_\_\_\_\_

## Cycle 4 of CPR

### Rescuer 2: Infant Compressions

*This rescuer is not evaluated.*

### Rescuer 1: Infant Breaths

- ☐ Gives 2 breaths with a bag-mask device:
- Each breath given over 1 second
  - Visible chest rise with each breath
  - Resumes compressions in less than 10 seconds

## STOP TEST

### Instructor Notes

- Place a ✓ in the box next to each step the student completes successfully.
- If the student does not complete all steps successfully (as indicated by at least 1 blank check box), the student must receive remediation. Make a note here of which skills require remediation (refer to Instructor Manual for information about remediation).

**Test Results** Circle **PASS** or **NR** to indicate pass or needs remediation:

**PASS** **NR**

Instructor Initials \_\_\_\_\_ Instructor Number \_\_\_\_\_ Date \_\_\_\_\_



## Infant CPR

### Skills Testing Critical Skills Descriptors

1. **Assesses victim and activates emergency response system (this *must* precede starting compressions) within a maximum of 30 seconds. After determining that the scene is safe:**
  - Checks for responsiveness by tapping and shouting
  - Shouts for help/directs someone to call for help *and* get emergency equipment
  - Checks for no breathing or no normal breathing (only gasping)
    - Scans from the head to the chest for a minimum of 5 seconds and no more than 10 seconds
  - Checks brachial pulse
    - Can be done simultaneously with check for breathing
    - Checks for a minimum of 5 seconds and no more than 10 seconds
2. **Performs high-quality chest compressions during 1-rescuer CPR (initiates compressions within 10 seconds of identifying cardiac arrest)**
  - Correct placement of hands/fingers in center of chest
    - 1 rescuer: 2 fingers just below the nipple line
  - Compression rate of 100 to 120/min
    - Delivers 30 compressions in 15 to 18 seconds
  - Adequate depth for age
    - Infant: at least one third the depth of the chest (about 1½ inches [4 cm])
    - Use of a commercial feedback device or high-fidelity manikin is highly recommended
  - Complete chest recoil after each compression
  - Appropriate ratio for age and number of rescuers
    - 1 rescuer: 30 compressions to 2 breaths
  - Minimizes interruptions in compressions
    - Delivers 2 breaths so less than 10 seconds elapses between last compression of one cycle and first compression of next cycle
3. **Provides effective breaths with bag-mask device during 2-rescuer CPR**
  - Opens airway adequately
  - Delivers each breath over 1 second
  - Delivers breaths that produce visible chest rise
  - Avoids excessive ventilation
  - Resumes chest compressions in less than 10 seconds
4. **Switches compression technique at appropriate interval as prompted by the instructor (for purposes of this evaluation). Switch should take no more than 5 seconds.**
5. **Performs high-quality chest compressions during 2-rescuer CPR**
  - Correct placement of hands/fingers in center of chest
    - 2 rescuers: 2 thumb-encircling hands just below the nipple line
  - Compression rate of 100 to 120/min
    - Delivers 15 compressions in 7 to 9 seconds
  - Adequate depth for age
    - Infant: at least one third the depth of the chest (about 1½ inches [4 cm])
  - Complete chest recoil after each compression
  - Appropriate ratio for age and number of rescuers
    - 2 rescuers: 15 compressions to 2 breaths
  - Minimizes interruptions in compressions
    - Delivers 2 breaths so less than 10 seconds elapses between last compression of one cycle and first compression of next cycle

## Answers to Review Questions

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**Part 1:** 1.b, 2.c, 3.d, 4.d

**Part 2:** 1.d, 2.d, 3.a, 4.c, 5.d, 6.a, 7.b

**Part 3:** 1.a, 2.a, 3.a, 4.d

**Part 4:** 1.c, 2.c, 3.a

**Part 5:** 1.d, 2.b, 3.d, 4.c, 5.b

**Part 6:** 1.c, 2.b, 3.c

**Part 7:** 1.c, 2.b, 3.a, 4.b

**Part 8:** 1.d, 2.c, 3.b

**Part 9:** 1.d, 2.a, 3.a

## Recommended Reading

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*2015 Handbook of Emergency Cardiovascular Care for Healthcare Providers.* Dallas, TX: American Heart Association; 2015.

American Heart Association. American Heart Association Guidelines for CPR & ECC. Web-based integrated guidelines site. [ECCguidelines.heart.org](http://ECCguidelines.heart.org). Originally published October 15, 2015.

Hazinski MF, Nolan J, Aicken R, et al. Part 1: executive summary: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Circulation*. 2015;132(16)(suppl 1):S2-S39.

*Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC.* Dallas, TX: American Heart Association; 2015. [2015ECCguidelines.heart.org](http://2015ECCguidelines.heart.org).

Neumar RW, Shuster M, Callaway CW, et al. Part 1: executive summary: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2015;132(18)(suppl 2):S315-S367.





