Part 8

Alternate Ventilation Techniques

As a BLS provider, you may be called on to help provide CPR in situations that require alternate ventilation techniques. If you are assisting advanced life support providers, you will need to know modifications to compressions and breaths once an advanced airway is placed. If a victim is unresponsive and not breathing but has a pulse, you will need to know how to perform rescue breathing. If a bag-mask device is not available, you may need to give mouth-to-mouth or mouth-to-nose breaths.

Learning Objectives

In this Part, you will learn about

- Modifications to compressions and breaths with an advanced airway in place
- Rescue breathing for respiratory arrest victims
- Techniques for giving breaths without a barrier device for adults, children, and infants

CPR and Breaths With an Advanced Airway

This section explains the modifications to compressions and breaths that rescuers must make when an advanced airway is in place. Advanced airways prevent airway obstruction and can provide a route for more effective oxygenation and ventilation. Examples of advanced airways are laryngeal mask airway, supraglottic airway device, and endotracheal tube.

Table 2 summarizes the compression-to-ventilation ratio with and without an advanced airway for adults, children, and infants.

Table 2. Compression-to-Ventilation Ratio During CPR With and Without an Advanced Airway

Ventilation technique	Compressions to breaths (adult)	Compressions to breaths (infant and child)
No advanced airway in place (eg, mouth-to-mouth, bag-mask device, pocket mask)	• Compression rate of 100-120/min • 30 compressions to 2 breaths	• Compression rate of 100-120/min • 30 compressions to 2 breaths (1 rescuer) • 15 compressions to 2 breaths (2 rescuers)
Advanced airway in place (eg, laryngeal mask airway, supraglottic airway device, endotracheal tube)	• Compression rate of 100-120/min • Continuous compressions without pauses for breaths • Ventilation: – Adult: 1 breath every 6 seconds – Infant and child: 1 breath every 2-3 seconds	

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, a pocket mask or face shield) or a bag-mask device. If emergency equipment is not available, you may provide breaths by using the mouth-to-mouth technique or the mouth-to-mouth-and-nose technique.

How to Provide Rescue Breathing for Adults, Infants, and Children

- **For adults:**
  - Give **1 breath every 6 seconds.**
  - Give each breath over 1 second.
  - Each breath should result in visible chest rise.
  - Check for a pulse about every 2 minutes.
- **For infants and children:**
  - Give **1 breath every 2 to 3 seconds.**
  - Give each breath over 1 second.
  - Each breath should result in visible chest rise.
  - Check for a pulse about every 2 minutes.

When to Switch From Only Rescue Breathing to CPR in an Infant or a Child

When you are providing rescue breathing only, start CPR (compressions *and* breaths) if you see the following:

- Signs of poor perfusion in an infant despite effective oxygenation and ventilation provided by rescue breathing
- The infant's or child's heart rate is less than 60/min with signs of poor perfusion
- When a pulse is no longer felt

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.*
- *Rescuers can identify respiratory arrest if all of the following signs are present:*
  - *The victim is unresponsive*
  - *The victim is not breathing or is only gasping*
  - *The victim still has a pulse*
- *Respiratory arrest is an emergency. Without immediate treatment, it can result in brain injury, cardiac arrest, and death.*
- *In certain situations, including opioid-associated life-threatening emergencies, respiratory arrest is potentially reversible if rescuers treat it early. (See Part 9 for more about opioids.)*
- *BLS providers must 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

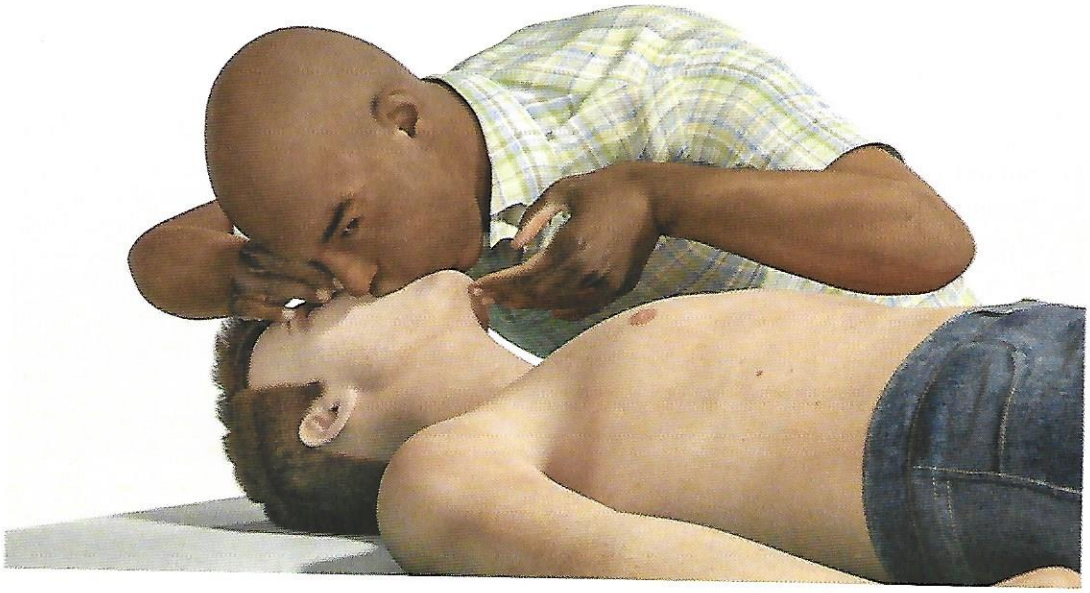
Many cardiac arrests happen in settings where rescue equipment is not available. This section describes techniques for giving breaths when you do not have a barrier device, such as a pocket mask or a bag-mask device.

Mouth-to-Mouth Breathing for Adults and Children

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

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 36).
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 36. Mouth-to-mouth breaths.



Breathing Techniques for Infants

Use one of the following techniques to give breaths in infants:

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

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

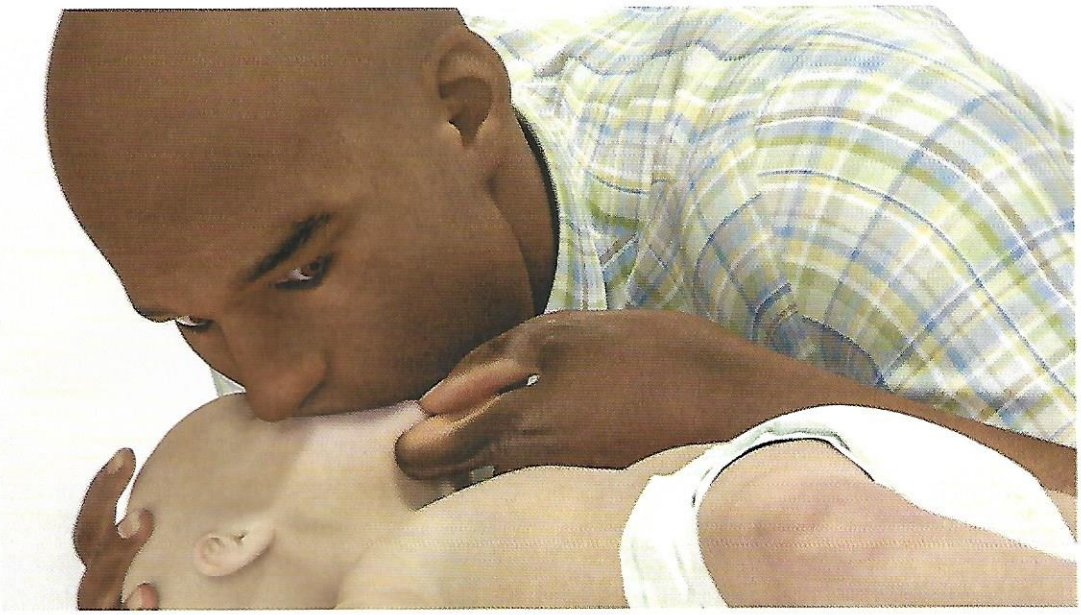
Mouth-to-Mouth-and-Nose Technique

1. Maintain a head tilt–chin lift to keep the airway open.
2. Place your mouth over the infant's mouth and nose and create an airtight seal (Figure 37).
3. Blow into the infant's nose and mouth (pausing to inhale between breaths), just enough to make the chest rise with each breath.
4. If the chest does not rise, repeat the head tilt–chin lift to reopen the airway, and then try again 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.

Mouth-to-Mouth Technique

1. Maintain a head tilt–chin lift to keep the airway open.
2. Pinch the victim's nose tightly with your thumb and forefinger.
3. Make a mouth-to-mouth seal.
4. Deliver each mouth-to-mouth breath, making sure the chest rises with each breath.
5. 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.

Figure 37. 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. To reduce the risk of gastric inflation, avoid giving breaths too quickly, too forcefully, or with too much volume. But even if you give breaths correctly during high-quality CPR, gastric inflation may still develop.

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 Questions

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 felt?
   - **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