Basic Life Support for Healthcare Providers

HANDBOOK

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Basic Life Support for Healthcare Providers

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The *Basic Life Support for Healthcare Providers Handbook* is part of the American Red Cross Basic Life Support for Healthcare Providers program. The emergency care procedures outlined in the program materials reflect the standard of knowledge and accepted emergency practices in the United States at the time this manual was published. **It is the reader's responsibility to stay informed of changes in emergency care procedures.**

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The care steps outlined within this handbook are consistent with the International Liaison Committee on Resuscitation (ILCOR) 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (CoSTR) and the 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.

Acknowledgments

This handbook is dedicated to the thousands of employees and volunteers of the American Red Cross who contribute their time and talent to supporting and teaching lifesaving skills worldwide and to the thousands of course participants who have decided to be prepared to take action when an emergency strikes.

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American Red Cross Scientific Advisory Council

Guidance for the Basic Life Support for Healthcare Providers program was provided by members of the American Red Cross Scientific Advisory Council.

The Council is a panel of nationally recognized experts drawn from a wide variety of scientific, medical and academic disciplines. The Council provides authoritative guidance on first aid, CPR, emergency treatments, rescue practices, emergency preparedness, aquatics, disaster health, nursing, education and training.

For more information on the Scientific Advisory Council, visit redcross.org/science.

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SECTION 1

Basic Life Support

1 INTRODUCTION

When a patient experiences a respiratory arrest, cardiac arrest or obstructed airway, you need to act swiftly and promptly starting with basic life support skills.

Basic Life Support

Basic Life Support (BLS) refers to the care healthcare providers and public safety professionals provide to patients who are experiencing respiratory arrest, cardiac arrest or airway obstruction. BLS includes psychomotor skills for performing high-quality CPR, using an automated external defibrillator (AED) and relieving an obstructed airway for patients of all ages. BLS also focuses on the integration of the following key skills to help responders achieve optimal patient outcomes:

- Critical thinking: Clear and rational thinking based on facts presented and the provider's experience and expertise
- Problem solving: Identifying solutions to issues that arise using readily available resources
- Communication: A closed-loop process involving a sender, message and receiver
- Team dynamics: Integration and coordination of all responders working together toward a common goal

For more information about these key skills, see Section 3: Additional Topics, page 43.

The technical content within *Basic Life Support for Healthcare Providers Handbook* is consistent with the most current science and treatment recommendations from the International Liaison Committee on Resuscitation (ILCOR) 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (CoSTR), the 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, and the American Red Cross Scientific Advisory Council (SAC), a panel of nationally recognized experts in fields that include emergency medicine, emergency medical services (EMS), nursing, occupational health, sports medicine, school and public health, aquatics, emergency preparedness and disaster mobilization. More information on the science of the course content can be found at the following websites:

- www.ilcor.org
- www.redcross.org/take-a-class/scientific-advisory-council

2 ARRIVING ON SCENE

When you arrive on the scene, you need to recognize that an emergency exists, size up the scene, form an initial impression of the patient(s) and complete a primary assessment. The information gathered from these steps is used to determine your immediate course of action.

Scene Size-Up

As a healthcare or public safety professional, you have a duty to respond in an emergency. Your actions during emergency situations are often critical and may determine whether a seriously ill or injured patient survives. To learn more about your duty to respond and legal considerations, see Section 3: Additional Topics.

When called to emergencies, you must keep in mind a few critical steps for your safety and the safety of your team in addition to the safety of patients and bystanders. As part of your duty to respond, you must size up the scene to determine if the situation is safe; use appropriate standard precautions; determine how many patients are involved; determine the nature of the illness/mechanism of injury; gather an initial impression of the patient(s); and call for additional resources including any additional equipment and providers as needed.

Scene Safety

Recognizing an emergency requires you to size up the scene using your senses such as hearing, sight and smell to acquire a complete picture of the situation. Using your senses can give you clues to what happened and any potential dangers that may exist such as the smell of gas or the sound of a downed electrical wire sparking on the roadway. It takes more than just a quick look around to appropriately size up the scene. Safety is paramount. Before you can help an ill or injured patient, make sure that the scene is safe for you and any bystanders, and gather an initial impression of the situation:

- Check for anything unsafe, such as traffic, fire, escaping steam, downed electrical lines, smoke, extreme weather or even overly emotional bystanders that could become a threat.
- Check for immediate danger. Do not move an ill or seriously injured patient unless there is an immediate danger, such as fire, flood or poisonous gas; you have to reach another patient who may have a more serious illness or injury; or you need to move the ill or injured patient to give proper care and you are able to do so without putting yourself in harm's way.
- If you must move the patient, do it as quickly and carefully as possible with your available resources.

Standard Precautions

It is essential that you wear appropriate personal protective equipment (PPE) and follow standard precautions for the particular situation. For more information about PPE, see Section 3, Additional Topics.

Number of Patients

It is important to determine how many patients are involved in the situation:

- Never assume there is just one patient.
- Ask bystanders if anyone else was involved in the incident.
- Take a complete 360-degree view of the scene.

Nature of Illness or Mechanism of Injury

An important component of the scene size up is to determine what happened; to determine the nature of the illness or mechanism of injury:

- Look for clues to what may have caused the emergency and how the patient became ill or injured, for example, a fallen ladder, broken glass or a spilled bottle of medication.
- Critically think about the situation and ask yourself if what you see makes sense. Are there other less obvious explanations to explain the current situation? For example, a single vehicle has crashed. There is minimal damage but the patient is slumped over the wheel. Is this a traumatic situation or could this crash have been caused by a medical emergency while the patient was driving?
- Quickly ask bystanders what happened and use the information in determining what happened.
- Keep in mind that an ill or injured patient may have moved him- or herself or been moved before you arrived.

Initial Impression

Gathering an initial impression involves looking for signs and symptoms that indicate a life-threatening emergency. Before you reach the patient, continue to use your senses to obtain an initial impression about the illness or injury and identify what may be wrong. The information you gather helps to determine your immediate course of action. Ask yourself these questions:

- Does the patient look sick?
- Is he or she awake or moving?

Look for signs that may indicate a life-threatening emergency such as unconsciousness, abnormal skin color or severe life-threatening bleeding. If you see severe life-threatening bleeding, use any available resources to control the hemorrhage including a tourniquet or hemostatic dressing if one is available and you are trained.

Need for Additional Resources

Determining right away what additional resources you need or may need in the situation is very important. Ask yourself the following questions:

- Is anyone else available to help?
- Are there additional resources such as an advanced life support unit or code team available to respond?
- Do you need any additional equipment brought to the scene such as an AED or a stretcher?

Primary Assessment of the Unresponsive Adult Patient

After completing the scene size-up and determining that it is safe to approach the patient, you need to conduct a primary assessment. This assessment involves three major areas: assessing the level of consciousness, breathing and circulation.

Level of Consciousness (LOC)

First, check to see if the patient is responsive. This may be obvious from your scene size-up and initial impression. For example, the patient may be able to speak to you, or he or she may be moaning, crying, making some other noise or moving around. If the patient is responsive, obtain the patient's consent, reassure him or her and try to find out what happened. For more information about consent, see Section 3: Additional Topics.

If the person is silent and not moving, he or she may be unresponsive. To check for responsiveness, shout, "Are you okay?" (use the person's name if you know it) then tap the patient on the shoulder and shout again in a "shout-tap-shout" sequence in order to obtain a response to a verbal or painful stimulus. In addition, use the mnemonic AVPU to help you determine the patient's level of consciousness. See **AVPU** below for more information. Remember that a response to verbal or painful stimuli may be subtle, such as some slight patient movement or momentary eye opening that occurs as you speak to the patient or apply a painful stimulus such as a tap to the shoulder.

If the patient is not awake, alert and oriented or does not respond, summon additional resources if needed and if you have not already done so.

AVPU

- **A** Alert—fully awake, but may still be confused
- **V** Verbal—responds to verbal stimuli
- **P** Painful—responds to painful stimuli
- **U** Unresponsive—does not respond

Airway

Once you have assessed the patient's level of consciousness, evaluate the patient's airway. Remember, if the patient is alert and talking, the airway is open. For a patient who is unresponsive, make sure that he or she is in a supine (face-up) position to effectively evaluate the airway. If the patient is face-down, you must roll the patient onto his or her back, taking care not to create or worsen an injury.

If the patient is unresponsive and his or her airway is not open, you need to open the airway. Two methods may be used:

- Head-tilt/chin-lift technique
- Modified jaw-thrust maneuver, if a head, neck or spinal injury is suspected

Head-Tilt/Chin-Lift Technique

To perform the head-tilt/chin lift technique on an adult:

- Press down on the forehead while pulling up on the bony part of the chin with two to three fingers of the other hand.
- For adults, tilt the head past a neutral position to open the airway while avoiding hyperextension of the neck.

Modified Jaw-Thrust Maneuver

The modified jaw-thrust maneuver is used to open the airway when a patient is suspected of having a head, neck or spinal injury. To perform this maneuver on an adult, kneel above the patient's head and:

- Put one hand on each side of the patient's head with the thumbs near the corners of the mouth pointed toward the chin, using the elbows for support.
- Slide the fingers into position under the angles of the patient's jawbone without moving the head or neck.
- Thrust the jaw upward without moving the head or neck to lift the jaw and open the airway.

Simultaneous Breathing and Pulse Check

Once the airway is open, simultaneously check for breathing and a carotid pulse, for at least 5 but no more than 10 seconds.

When checking for breathing, **look** to see if the patient's chest rises and falls, **listen** for escaping air and **feel** for breathing against the side of your cheek. Normal breathing is quiet, regular and effortless. Isolated or infrequent gasping in the absence of other breathing in a patient who is unresponsive may be agonal breaths. See **Agonal Breaths** for more information.

When checking the pulse on an adult patient, palpate the carotid artery by sliding two fingers into the groove of the patient's neck, being careful not to reach across the neck and obstruct the airway. As an alternative, you may check the femoral artery for a pulse by palpating the area between the hip and groin. This is particularly useful when there are multiple responders caring for the patient simultaneously and access to the carotid artery is obscured.

Agonal Breaths

Agonal breaths are isolated or infrequent gasping that occur in the absence of normal breathing in an unconscious patient. These breaths can occur after the heart has stopped beating and are considered a sign of cardiac arrest. Agonal breaths are NOT normal breathing. If the patient is demonstrating agonal breaths, you need to care for the patient as if he or she is not breathing at all.

Primary Assessment Results

Throughout the primary assessment, you are gathering information about the patient and the situation. The results of your primary assessment determine your immediate course of action.

Respiratory Arrest

If the patient is not breathing but has a definitive pulse, the patient is in respiratory arrest. To care for a patient experiencing respiratory arrest, you must give ventilations.

Giving ventilations is a technique to supply oxygen to a patient who is in respiratory arrest. Give 1 ventilation every 5 to 6 seconds for an adult patient, with each ventilation lasting about 1 second and making the chest rise. See pages 13–16 for more information about how to give ventilations and how to avoid overventilation/ hyperventilation of a patient.

Continue giving ventilations until:

- The patient begins to breathe normally on his or her own.
- Another trained responder takes over.
- The patient has no pulse, in which case you should begin CPR or use an AED if one is available and ready to use.
- The scene becomes unsafe.

See **Opioid Overdose** below for information about opioid overdose as a potential cause of respiratory arrest.

Opioid Overdose

With a growing epidemic of opioid (commonly heroin and oxycodone) overdoses in the United States, local and state departments of health have increased access to the medication naloxone, which can counteract the effects of an opioid overdose including respiratory arrest. Naloxone (also referred to by its trade name Narcan™) has few side effects and can be administered intranasally. Trained responders should administer the drug when the patient is in respiratory arrest and an opioid overdose is suspected. Responders should follow local medical protocols and regulations to determine dosing and timing of naloxone administration.

Cardiac Arrest

If there is no breathing or only gasping and no pulse and the patient is unresponsive, the patient is in cardiac arrest. Cardiac arrest is a life-threatening situation in which the electrical and/or mechanical system of the heart malfunctions resulting in complete cessation of the heart's ability to function and circulate blood efficiently.

Remember: Cardiac arrest is different from myocardial infarction (or heart attack); however, a myocardial infarction can lead to cardiac arrest. See **Myocardial Infarction** below for more information.

Myocardial Infarction

A myocardial infarction (MI) or heart attack refers to the necrosis (death) of heart tissue as a result of a loss of oxygenated blood. The sooner the signs and symptoms are recognized and treated, the lower the risk of morbidity and mortality. Even patients who have had a myocardial infarction before may not recognize the signs because each myocardial infarction may present differently.

Signs and Symptoms of MI

- Chest discomfort or pain that is severe, lasts longer than 3 to 5 minutes, goes away and comes back, or persists even during rest
- Discomfort, pressure or pain that is persistent and ranges from discomfort to an unbearable crushing sensation in the chest, possibly spreading to the shoulder, arm, neck, jaw, stomach or back, and usually not relieved by resting, changing position or taking medication
- Pain that comes and goes (such as angina pectoris)
- Difficulty breathing, such as at a faster rate than normal or noisy breathing
- Pale or ashen skin, especially around the face
- Sweating, especially on the face
- Dizziness or light-headedness
- Possible loss of consciousness
- Nausea or vomiting

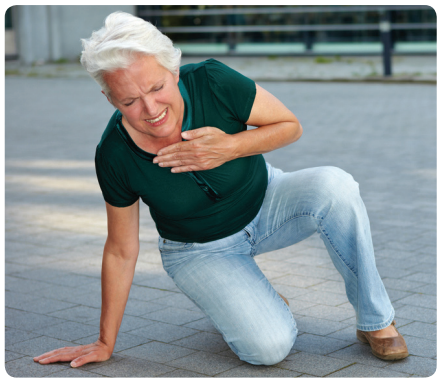
(*Continued*)

Myocardial Infarction (continued)

Although women may experience the most common signs and symptoms, such as chest pain, discomfort, nausea or vomiting, they may also experience common atypical warning signs, such as:

- Shortness of breath.
- Stomach, back or jaw pain.
- Unexplained fatigue or malaise.

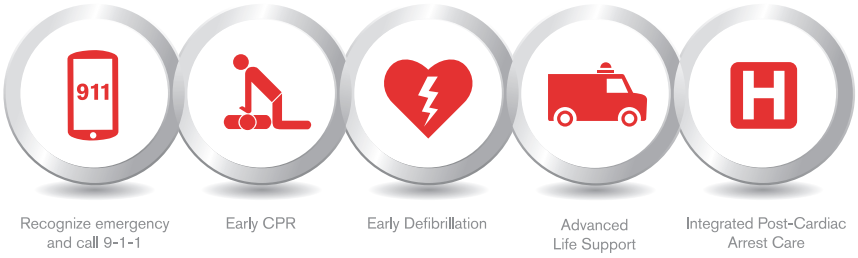
These warning signs may occur with or without chest pain. When women do experience chest pain, it may be atypical—sudden, sharp but short-lived pain outside the breastbone. Like women, other individuals such as those with diabetes or older adults may present with atypical signs and symptoms.



The key to the patient's survival is ensuring the Cardiac Chain of Survival. Following the links in the Cardiac Chain of Survival gives a patient in cardiac arrest the greatest chance of survival. See **Cardiac Chain of Survival** below for more information.

Cardiac Chain of Survival

Adult Cardiac Chain of Survival



The Cardiac Chain of Survival for adults consists of five links:

1. Recognition of a cardiac emergency and activation of the emergency response system
2. Early CPR to keep oxygen-rich blood flowing and to help delay brain damage and death
3. Early defibrillation to help restore an effective heart rhythm and significantly increase the patient's chance for survival
4. Advanced life support using advanced medical personnel who can provide the proper tools and medication needed to continue the lifesaving care
5. Integrated post-cardiac arrest care to optimize ventilation and oxygenation and treat hypotension immediately after the return of spontaneous circulation

(*Continued*)

Pediatric Cardiac Chain of Survival

The pediatric Cardiac Chain of Survival is similar to the adult Cardiac Chain of Survival. The five links include the following:

- Prevention of arrest
- Early, high-quality CPR
- Rapid activation of the emergency medical services (EMS) system or response team to get help on the way quickly—no matter the patient's age
- Effective, advanced life support
- Integrated post-cardiac arrest care

When you determine that a patient is in cardiac arrest (unresponsive, no normal breathing or only gasping, and no definitive pulse), you need to begin CPR that starts with the immediate delivery of chest compressions followed by ventilations.

3 PROVIDING CPR/AED FOR ADULTS

CPR circulates blood that contains oxygen to the vital organs of a patient in cardiac arrest when the heart and normal breathing have stopped. CPR includes chest compressions and ventilations as well as the use of an AED.

Compressions

One component of CPR is chest compressions. To ensure optimal patient outcomes, high-quality CPR must be performed. You can ensure high-quality CPR by providing high-quality chest compressions, making sure that the:

- Patient is on a firm, flat surface to allow for adequate compression. In a non-healthcare setting this would typically be on the floor or ground, while in a healthcare setting this may be on a stretcher or bed with a CPR board or CPR feature applied.
- Chest is exposed to ensure proper hand placement and the ability to visualize chest recoil.
- Hands are correctly positioned, with the heel of one hand in the center of the chest on the lower half of the sternum with the other hand on top. Most responders find that interlacing their fingers makes it easier to provide compressions while keeping the fingers off the chest.
- Arms are as straight as possible, with the shoulders directly over the hands to promote effective compressions. Locking elbows will help maintain straight arms.
- Compressions are given at the correct rate of at least 100 per minute to a maximum of 120 per minute, and at the proper depth of at least 2 inches, but no more than 2.4 inches for an adult to promote adequate circulation.
- Chest must be allowed to fully recoil between each compression to allow blood to flow back into the heart following the compression.

For adult patients, CPR consists of 30 chest compressions followed by 2 ventilations.

> **Science Note:** Evidence shows that a rate of chest compressions that exceeds 120 compressions per minute begins to detrimentally impact compression depth by causing responders to be less likely to compress the chest at least 2 inches for an adult. Additional evidence shows that depth of chest compressions greater than 2.4 inches (6 cm) leads to increased non-life-threatening injuries in the average adult, such as rib fractures, and should be avoided. These upper limits for the rate and depth of compressions exist to improve patient outcomes, but it is also critical to maintain a rate greater than 100 per minute and a depth of at least 2 inches. Both rate and depth of compressions are best measured using a feedback device if available.

Ventilations

Ventilations supply oxygen to a patient who is not breathing. They may be given via several methods including:

- Mouth-to-mouth.
- Pocket mask.
- Bag-valve-mask (BVM) resuscitator.

During adult CPR, you give 2 ventilations that last approximately 1 second each and make the chest rise.

Mouth-to-Mouth Ventilations

If a pocket mask or BVM are not available, you may need to provide mouth-to-mouth ventilations:

- Open the airway past a neutral position using the head-tilt/chin-lift technique.
- Pinch the nose shut and make a complete seal over the patient's mouth with your mouth.
- Give ventilations by blowing into the patient's mouth. Ventilations should be given one at a time. Take a break between breaths by breaking the seal slightly between ventilations and then taking a breath before resealing over the mouth.

> When giving ventilations during CPR, if the chest does not rise after the first breath, reopen the airway, make a seal and try a second breath. If the breath is not successful, move directly back to compressions and check the airway for an obstruction before attempting subsequent ventilations. If an obstruction is found, remove it and attempt ventilations. However, **NEVER perform a blind finger sweep.**

> **Science Note:** With mouth-to-mouth ventilations, the patient receives a concentration of oxygen at approximately 16 percent compared to the oxygen concentration of ambient air at approximately 20 percent. Giving individual ventilations can help maintain this oxygen concentration level. However, if you do not break the seal and take a breath between ventilations, the second ventilation may contain an oxygen concentration of 0 percent with a high concentration of carbon dioxide (CO_2).

If you are otherwise unable to make a complete seal over a patient's mouth, you may need to use mouth-to-nose ventilations:

- With the head tilted back, close the mouth by pushing on the chin.
- Seal your mouth around the patient's nose and breathe into the nose.
- If possible, open the patient's mouth between ventilations to allow air to escape.

Pocket Mask Ventilations

CPR breathing barriers, such as pocket masks, create a barrier between your mouth and the patient's mouth and nose. This barrier can help to protect you from contact with a patient's blood, vomitus and saliva, and from breathing the air that the patient exhales.

To use a pocket mask:

- Assemble the mask and valve.
- Open the airway past the neutral position using the head-tilt/chin-lift technique from the patient's side when alone.
- Place the mask over the mouth and nose of the patient starting from the bridge of the nose, then place the bottom of the mask below the mouth to the chin (the mask should not extend past the chin).
- Seal the mask by placing the "webbing" between your index finger and thumb on the top of the mask above the valve while placing your remaining fingers on the side of the patient's face. With your other hand (the hand closest to the patient's chest), place your thumb along the base of the mask while placing your bent index finger under the patient's chin, lifting the face into the mask.

When using a pocket mask, make sure to use one that matches the size of the patient; for example, use an adult pocket mask for an adult patient, but an infant pocket mask for an infant. Also, ensure that you position and seal the mask properly before blowing into the mask.

BVM Resuscitator

A BVM resuscitator is a handheld device used to ventilate patients and administer higher concentrations of oxygen than a pocket mask. BVMs are used by either one responder responsible for managing the airway and delivering ventilations or two responders in a multiple responder situation.

To use a BVM (one responder):

1. Assemble the BVM as needed.
2. Open the airway past a neutral position while positioned at the top of the patient's head (cephalic position).
3. Use an E-C hand position:
   - Place one hand around the mask, forming an E with the last three fingers and a C with the thumb and index finger around the mask.
   - Seal the mask completely around the patient's mouth and nose by lifting the jaw into the mask while maintaining an open airway.
4. Provide ventilations:
   - With the other hand, depress the bag about halfway to deliver between 400 to 700 milliliters of volume to make the chest rise.
   - Give smooth and effortless ventilations that last about 1 second.

While a BVM is often used by a single responder, evidence shows that two responders are needed to most effectively operate a BVM. One responder opens and maintains the airway and ensures the BVM mask seal, while the second responder delivers ventilations by squeezing the bag slowly with both hands at the correct intervals to the point of creating chest rise.

To use a BVM (two responders):

1. Assemble the BVM as needed.
2. Open the airway past a neutral position while positioned at the top of the patient's head (cephalic position).
3. Use an E-C hand position (first responder):
   - Place both hands around the mask, forming an E with the last three fingers on each hand and a C with the thumb and index finger around both sides of the mask.
   - Seal the mask completely around the patient's mouth and nose by lifting the jaw into the mask while maintaining an open airway.
4. Provide ventilations (second responder):
   - Depress the bag about halfway to deliver between 400 to 700 milliliters of volume to make the chest rise.
   - Give smooth and effortless ventilations that last about 1 second.

> **BVMs can hold greater than 1000 milliliters** of volume and should never be completely deflated when providing ventilations. Doing so could lead to overventilation and hyperventilation. Also, pay close attention to any increasing difficulty when providing BVM ventilation. This difficulty may indicate an increase in intrathoracic pressure, inadequate airway opening or other complications. Be sure to share this information with the team for corrective actions.

Advanced Airways

When a patient has an advanced airway such as a supraglottic airway device or an endotracheal tube, CPR must be performed a little differently. At a minimum, two responders must be present. One responder gives 1 ventilation every 6 seconds, which is about 10 ventilations per minute. At the same time, the second responder continues giving compressions at a rate of 100 to 120 compressions per minute. There is no pause between compressions or ventilations, and responders do not use the 30 compressions to 2 ventilations ratio. This process is a continuous delivery of compressions and ventilations with no interruption.

Oxygen and Airway Adjuncts

Trained and authorized professional responders should consider the use of a high concentration of supplemental oxygen and airway adjuncts during the course of providing CPR including the use of an oropharyngeal airway (OPA) as long as it does not delay the administration of chest compressions. Upon achieving ROSC supplemental oxygen should be used based on local protocol and practice to maintain a normal oxygen saturation level and avoiding hyper oxygenation. Providers should utilize a pulse oximeter to monitor oxygen saturation levels.

Overventilation and Hyperventilation

In any resuscitation situation, it is essential not to overventilate or hyperventilate the patient. That is because, during cardiac arrest, the body's metabolic demand for oxygen is decreased. With each ventilation, intrathoracic pressure increases, which causes a decrease in atrial/ventricular filling and a reduction in coronary perfusion pressures. Overventilation and hyperventilation further increase the intrathoracic pressure, which in turn further decreases atrial/ventricular filling and reduces coronary perfusion pressures.

> **Science Note:** Hyperventilation most commonly occurs when patients are being ventilated in respiratory arrest or when an advanced airway is placed during cardiac arrest. It is critical to avoid hyperventilation of the patient because it leads to increased intrathoracic pressure and a subsequent decrease in coronary filling and coronary perfusion pressures by putting pressure on the vena cava.

Drowning

When a patient is removed from the water, responders should assume the nature of arrest was the result of a drowning and that the patient is hypoxic. The sequence of care for suspected drowning patients of all ages is different than the sequence of care for other cardiac arrests. Prior to starting CPR, responders should deliver 2 initial ventilations to suspected drowning patients of all ages if there is no normal breathing or only gasping and no pulse.

Stopping CPR

Once you have started providing CPR to an adult, continue with 30 compressions followed by 2 ventilations (1 cycle = 30:2) until:

- You see signs of return of spontaneous circulation (ROSC) such as patient movement or normal breathing. See **Recovery Positions** on the next page for more information.
- An AED is ready to analyze the patient's heart rhythm.
- Other trained responders take over and relieve you from compression or ventilation responsibilities.
- You are presented with a valid do not resuscitate (DNR) order.
- You are alone and too exhausted to continue.
- The scene becomes unsafe.

Recovery Positions

While recovery positions are not generally used in a healthcare setting, it is important to understand how and when to use them, especially when you are alone with a patient. In most cases while you are with the patient, you would leave an unconscious patient who is breathing and has no head, neck or spinal injury in a supine (face-up) position and maintain the airway. You should use a side-lying recovery position for patients who are unresponsive but breathing normally with no evidence of trauma if you are unable to manage the airway effectively or if you need to leave the patient in order to call for additional resources.

If the patient is an infant, follow these steps:

- Carefully position the infant face-down along the forearm.
- Support the infant's head and neck with your other hand while keeping the infant's mouth and nose clear.
- Keep the head and neck slightly lower than the chest.

AEDs

AEDs are portable electronic devices that automatically analyze the patient's heart rhythm and can provide defibrillation, an electrical shock that may help the heart re-establish a perfusing rhythm.

When a patient experiences a cardiac arrest, an AED should be applied as soon as one is readily available. AEDs deliver defibrillation(s) to patients in cardiac arrest with two specific dysrhythmias: ventricular fibrillation (VF) and ventricular tachycardia (VT). By using an AED early, the patient's chances of survival are greatly increased.

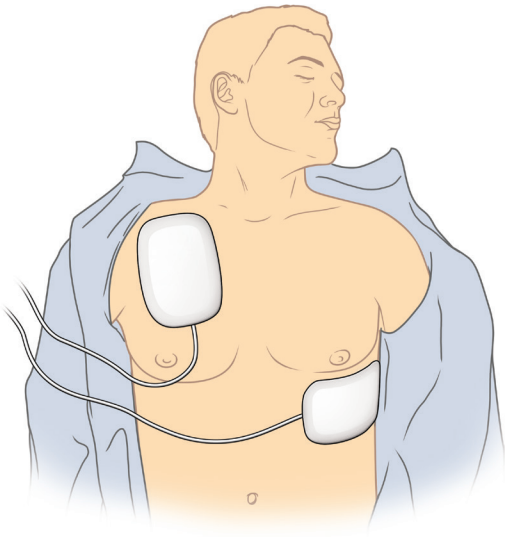
Science Note: For each minute CPR and defibrillation are delayed, a patient's chance for survival is reduced by 7 to 10 percent.

If CPR is in progress, continue CPR until the AED is turned on, the AED pads are applied and the AED is ready to analyze the heart rhythm. If you are alone and an AED is available, you should use it once you have determined the patient is in cardiac arrest.

Using an AED

For an AED to be effective, you MUST use it properly by doing the following:

- Turn the AED on.
- Make sure the patient's chest is clearly exposed and dry.
  - Remove any medication patches with a gloved hand.
  - If necessary, remove or cut any undergarments that may be in the way. The pads need to be adhered to the skin for the shock to be delivered to the heart.
- Apply the appropriate-sized pads for the patient's age in the proper location on the bare chest.
  - Use adult pads for adults and children over the age of 8 years or over 55 pounds.
  - Place one pad on the upper right chest below the right clavicle to the right of the sternum; place the other pad on the left side of the chest on the midaxillary line a few inches below the left armpit.



- Plug in the connector, and push the analyze button, if necessary. (Most AEDs available today have their pads pre-connected and will automatically analyze once the pads are applied to the chest. Make sure you understand how the AED within your organization operates.)
- Tell everyone to "clear" while the AED is analyzing to ensure accurate analysis. Ensure no one is touching the patient during the analysis or shock.
- When "clear" is announced, have the responder performing the compressions stop compressions and hover a few inches above the chest, but remain in position to resume compressions immediately after a shock is delivered or the AED advises that a shock is not indicated.
- Observe the AED analysis and prepare for a shock to be delivered if advised.
  - Ensure that everyone is clear of the patient before the shock is delivered.
  - Remember that the AED delivers an electrical current that could injure anyone in contact with the patient.
  - Have the responder in the hover position ready to resume compressions immediately after a shock is delivered or the AED advises that a shock is not indicated.
- Deliver the shock by pressing the shock button, if indicated.
- After the shock is delivered, immediately start compressions and perform about 2 minutes of CPR (about 5 cycles of 30:2) until the AED prompts that it is reanalyzing, the patient shows signs of ROSC, or you are instructed by the team leader or more advanced personnel to stop.
- Do not wait for the AED to prompt to begin CPR after a shock or no shock advised message.

Science Note: Some AEDs and manual defibrillators allow for compressions post-analysis while charging. Responders may perform compressions from the time the shock advised prompt is noted through the time that the prompt to clear occurs, just prior to depressing the shock button. Be sure to follow the manufacturer's recommendations and your local protocols and practices.

AED Safety

In some situations, such as when you are around water or the patient is on a metal surface, you may question whether or not it is safe to use an AED. The answer is yes. AEDs are very safe and built for almost any environment.

As long as the ill or injured patient is not actually in water, you can use an AED near water and in light rain or snow. Light rain, mist or snow does not generally pose a concern for AED operation. However, take steps to make sure that the patient is as dry as possible, is sheltered from the rain, is not lying in a pool or puddle of water, and his or her chest is completely dry before attaching the pads. Also make sure that you and other responders are not in contact with water when operating the AED. Moreover, avoid getting the AED or AED pads wet if possible. Do not delay defibrillation when taking steps to create a dry environment. The same is true for metal surfaces. Just make sure that the pads are not touching the metal surface.

It is also safe to use AEDs on patients who have pacemakers, other implantable cardioverter defibrillators or metal body piercings. To maintain safety, avoid placing the AED pads directly over these items. Position the pads so that they are at least an inch away, just to be safe.

Some patients may be wearing a medication patch. Medication patches on the chest can create a hazard or interfere with analysis and defibrillation when AED pads are applied on top of them. If this is the case, act swiftly and remove the patch with a gloved hand and wipe away any of the remaining medication from the skin. Then, make sure the chest is dry and apply the pads.

For an AED to work properly, it is important that the pads are attached securely to the patient's chest. However, some patients have excessive chest hair that may cause problems with AED pad-to-skin contact. If the chest hair is excessive (typically on the right upper chest), quickly shave the right upper chest area before applying the AED pads. See **Do's and Don'ts for AED Use** for more information.

Do's and Don'ts for AED Use

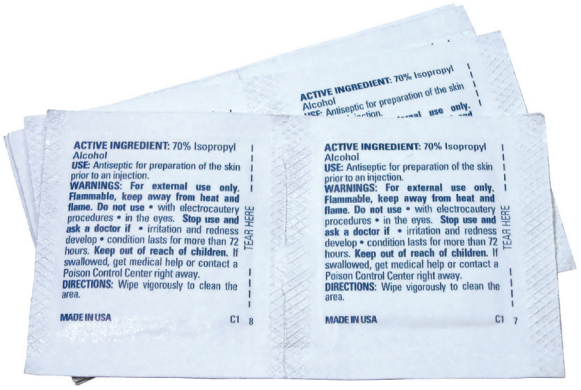
Follow these general precautions when using an AED.

Do's

- Before shocking a patient with an AED, **do** make sure that *no one* is touching or is in contact with the patient or any resuscitation equipment.
- **Do** use an AED if a patient is experiencing cardiac arrest as a result of traumatic injuries. Follow local protocols or practice.
- **Do** use an AED for a patient who is pregnant. Defibrillation shocks transfer no significant electrical current to the fetus. The mother's survival is paramount to the infant's survival. Follow local protocols and medical direction.

Don'ts

- **Do *not*** use alcohol to wipe the patient's chest dry. Alcohol is flammable.
- **Do *not*** touch the patient while the AED is analyzing. Touching or moving the patient may affect analysis.
- **Do *not*** touch the patient while the device is defibrillating. You or someone else could be shocked.
- **Do *not*** defibrillate someone when around flammable or combustible materials, such as gasoline or free-flowing oxygen.



For AEDs to perform properly and safely, they must be maintained as with any medical device. AEDs require minimal maintenance, but responders should be familiar with the various visual and audible prompts to warn of malfunctions or a low battery. To maintain the AED:

- Know the manufacturer's recommendations for maintenance, because many manufacturers require that they be contacted for service.
- Periodically check equipment.
- Have a fully charged backup battery, when available, that is properly sealed and unexpired, and also have correct AED pads available.
- Replace all used accessories, such as pads.

One-Responder and Two-Responder CPR—Adult

When performing CPR on an adult, certain components are the same regardless of the number of responders present. These are highlighted in Table 1-1.

One-Responder CPR

When performing one-responder CPR on an adult patient, the lone responder is responsible for conducting the scene size-up and the primary assessment, and for performing all the steps of CPR including the use of the AED, if available. CPR can be exhausting, and attempts should be made to find additional resources as early as possible during the scene size-up.

Two-Responder CPR

When two responders are available, Responder 1 performs the scene size-up and primary assessment, and begins the process of providing CPR, starting with chest compressions. Meanwhile, Responder 2 calls for additional resources and gets/prepares the AED, if available. Responder 1 continues to provide high-quality CPR with 30 compressions to 2 ventilations until Responder 2 is ready to assist and/or the AED is ready to analyze.

TABLE 1-1 One- and Two-Responder Adult CPR

	One-Responder CPR	Two-Responder CPR
Hand position	Hands centered on lower half of sternum	Hands centered on lower half of sternum
Compression rate	At least 100 but no more than 120 per minute	At least 100 but no more than 120 per minute
Compression depth	At least 2 inches but no more than 2.4 inches	At least 2 inches but no more than 2.4 inches
Compression/ ventilation ratio	30:2	30:2

When the AED is ready to analyze, Responder 1 should move to the patient's head, and Responder 2 should prepare to provide chest compressions and get into the hovering position. Responders should continue providing cycles of chest compressions and ventilations, switching positions about every 2 minutes or when the responder performing compressions begins to fatigue. Given that AEDs prompt to analyze every 2 minutes, the AED analyze period is an ideal time for responders to switch positions. Responders call for a position change by using an agreed-upon term (such as "Switch") at the end of the last compression cycle. The responder providing compressions should count out loud and raise the volume of his or her voice as he or she nears the end of each cycle (… 21 … 22 … 23 … 24 … **25 … 26 … 27 … 28 … 29 … 30**). The responder at the chest will move to give ventilations while the responder at the head will move to the chest to provide compressions.

In a healthcare setting, often there will be more than two responders. It is the responsibility of the team leader to orchestrate movements between responders to ensure no one responder becomes fatigued and that all critical areas are addressed: compressions, ventilations and AED. For example, additional responders may be assimilated into roles of compressor or ventilator, allowing the team leader to monitor performance and ensure that high-quality CPR is maintained. Additionally, if a BVM is available, ideally it is prepared by a third responder positioned at the top of the head with one responder squeezing the bag while another responder maintains an open airway and seals the mask.

High-Performance CPR

High-performance CPR refers to providing high-quality chest compressions as part of a well-organized team response to a cardiac arrest. Coordinated, efficient, effective teamwork is essential to minimize the time spent not in contact with the chest to improve patient outcomes.

Think about all of the activities performed during a resuscitation. For example:

- AED pads are applied.
- AED must charge.
- Pocket mask or BVM may need to be repositioned.
- Airway may need to be reopened.
- Other personnel arrive on scene.
- Responders switch positions.
- Advanced airway may need to be inserted.
- Pulse checks may be done, but unnecessarily.

All of these activities could affect your ability to maintain contact with the patient's chest.

> **Science Note:** Current research indicates that survival following resuscitation is significantly affected by the quality of CPR performed. One important aspect is minimizing interruptions in chest compressions, which helps to maximize the blood flow generated by the compressions.

Chest Compression Fraction

Chest compression fraction, or CCF, is the term used to denote the proportion of time that chest compressions are performed. It represents the fraction of time spent performing compressions, that is, the time that the responders are in contact with the patient's chest, divided by the total time of the resuscitation, beginning with the arrival on scene until the ROSC. Expert consensus identifies a CCF of at least 60 percent to promote optimal outcomes, with a goal of 80 percent.

To achieve the best CCF percentage, a coordinated team approach is needed, with each member assuming pre-assigned roles, anticipating the next action steps for yourself and other team members. This coordinated team approach also includes integrating and assimilating additional personnel, such as paramedics or a code team, who arrive on scene.

To further your understanding of high-performance CPR, consider the example of an automotive racing team. Each crew member has a specific role when the race car arrives in the pit area. They are supervised by a leader, who keeps the crew on task and gets the race car back on the track. The quality, efficiency and swiftness of the crew's actions can ultimately affect the outcome of how the race car performs. The same is true for a team response to CPR. All team members should have specific roles during a resuscitation. Based on available resources, potential roles include the following:

- Team leader
- Compressor
- Responder managing the airway
- Responder providing ventilations
- Responder managing the AED
- Recorder

Keep in mind that there are no national protocols in place for high-performance CPR. How you function within a team setting, including how additional personnel assimilate into the team, may vary depending on your local protocols or practice.

Integration of More Advanced Personnel

During resuscitation, numerous people may be involved in providing care to the patient. Responders must work together as a team in a coordinated effort to achieve the best outcomes for the patient. Characteristics of effective teamwork include well-defined roles and responsibilities; clear, closed-loop communication; and respectful treatment of others.

Coordination becomes even more important when more advanced personnel, such as an advanced life support team or code team, arrive on the scene. This coordination of all involved is necessary to:

- Ensure that all individuals involved work as a team to help promote the best outcome for the patient.
- Promote effective perfusion to the vital organs.
- Minimize interruptions of chest compressions, which have been shown to improve survival.

Ultimately, it is the team leader who is responsible for this coordination. When more advanced personnel arrive on scene, it is the team leader who communicates with advanced personnel, providing them with a report of the patient's status and events. The team leader also sets clear expectations, prioritizes, directs, acts decisively, encourages team input and interaction, and focuses on the big picture.

Crew Resource Management

During resuscitation, crew resource management helps to promote effective and efficient teamwork. Crew resource management is a communication process that centers around the team leader, who coordinates the actions and activities of team members so that the team functions effectively and efficiently. For example, when new individuals arrive on the scene or when team members switch roles during an emergency, it is the team leader who is responsible for coordinating these activities.

During resuscitation, the team leader directs and coordinates all the working elements, including team members, activities and actions, as well as equipment, to focus on providing high-quality CPR, the goal of any resuscitation effort.

Crew resource management also guides team members to directly and effectively communicate to a team leader about dangerous or time-critical decisions. It was developed as a result of several airline disasters as a way to prevent future incidents. Crew resource management has been shown to help avoid medical errors in healthcare.

To effectively communicate via crew resource management, team members should get the attention of the team leader, and state their concern, the problem as they see it and a solution. Working together, the team should then be sure to obtain direction from the team leader.

4 PROVIDING CPR/AED FOR CHILDREN AND INFANTS

While the differences in care for infants and children may appear subtle, it is important to understand them in order to achieve the best possible outcomes.

Pediatric Considerations

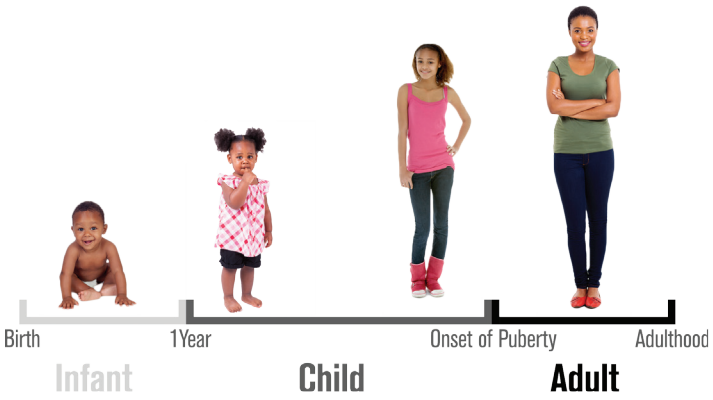
Children are not small adults. Therefore, they need to be cared for differently in an emergency including using equipment such as a pocket mask or BVM designed specifically for the size and age of the child.

Age

So how is a child defined as it relates to providing care? See **When Is a Child a Child?** for more information.

When Is a Child a Child?

In most instances, determining whether to treat a child as a child or as an adult has been based on age. Typically, an adult is defined as someone about the age of 12 (adolescent) or older; someone between the ages of 1 and 12 has been considered to be a child for CPR care; and an infant is someone younger than 1 year of age. However, for the purposes of this course, a child is defined as the age of 1 to the onset of puberty as evidenced by breast development in girls and underarm hair development in boys. An infant is considered under the age of 1 year.



Consent

Another factor to consider when caring for children and infants is consent. Legally, adults who are awake and alert can consent to treatment; if they are not alert, consent is implied. However, for most infants and children up to the age of 17 years, you must obtain consent from the child's parent or legal guardian if he or she is present regardless of the child's level of consciousness.

To gain consent, state who you are, what you observe and what you plan to do when asking a parent or legal guardian permission to care for his or her child. If no parent or legal guardian is present, consent is implied in life-threatening situations. Always follow your local laws and regulations as they relate to the care of minors.

Additional Resources

While it is rare in the professional setting to be alone with a child or infant, there is a slight change of when you should call for additional resources when you are alone. After determining that an adult is unresponsive and you are alone, you should immediately call for additional resources and get an AED. With children, it is more important to provide about 2 minutes of CPR before leaving them to call for help or get an AED unless the arrest is witnessed and believed to be cardiac in origin.

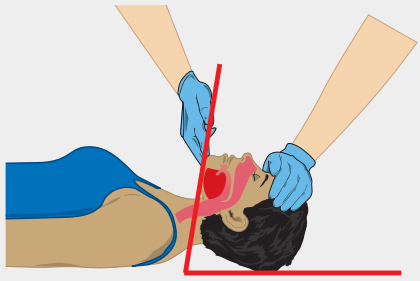
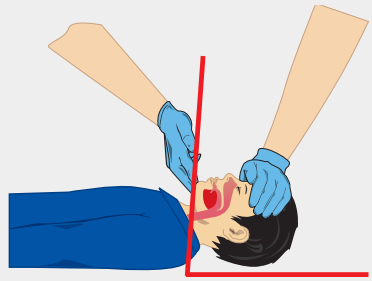
CPR/AED Differences Between Children and Adults

When performing CPR on a child, there are some subtle differences in technique. These differences include opening the airway, compression depth, the ratio of compressions to ventilations depending on the number of responders, and AED pads and pad placement.

Airway

To open the airway of a child, you would use the same head-tilt/chin-lift technique as for an adult. However, you would only tilt the head slightly past a neutral position, avoiding any hyperextension or flexion in the neck. Table 1-2 illustrates airway and ventilation differences for an adult and child.

TABLE 1-2 Airway and Ventilation Differences: Adult and Child

	Adult	Child (age 1 through onset of puberty)
Airway		
Head-tilt/ chin-lift	 **Past neutral** position	 **Slightly past neutral** position
Ventilations		
Respiratory arrest	 **1** ventilation every **5** to **6** seconds	 **1** ventilation every **3** seconds

Compressions

The positioning and manner of providing compressions to a child are also very similar to an adult. Place your hands in the center of the chest on the lower half of the sternum and compress at a rate between 100 and 120 per minute.

However, the depth of compression is different. For a child, compress the chest only ABOUT 2 inches, which is ⅓ the anterior-posterior diameter of the chest, instead of at least 2 inches, but no more than 2.4 inches, as you would for an adult.

Compressions-to-Ventilations Ratio

When you are the only responder, the ratio of compressions to ventilations for a child is the same as for an adult, that is, 30 compressions to 2 ventilations (30:2). However, in two-responder situations, this ratio changes to 15 compressions to 2 ventilations (15:2).

> **Science Note:** Most child-related cardiac arrests occur as a result of a hypoxic event such as an exacerbation of asthma, an airway obstruction or a drowning. As such, ventilations and appropriate oxygenation are important for a successful resuscitation. In these situations, laryngeal spasm may occur, making passive ventilation during chest compressions minimal or nonexistent. Therefore, it is critical to correct the oxygenation problem by providing high-quality CPR prior to leaving the child or infant.

> **Note:** Based on local protocols or practice, it is permissible to provide two ventilations prior to initiating CPR after the primary assessment if a hypoxic event is suspected.

AEDs

AEDs work the same way regardless of the patient's age, but there are differences in the pads used for children as well as the pad placement based on the size of the child. For children over the age of 8 years and weighing more than 55 pounds, you would continue to use adult AED pads, placing them in the same location as for an adult—one pad to the right of the sternum and below the right clavicle, with the other pad on the left side of the chest on the mid-axillary line a few inches below the left armpit. However, for children 8 years of age or younger or weighing less than 55 pounds, use pediatric AED pads if available. Be aware that some AEDs use a switch or key instead of changing pads, so follow the directions from the AED manufacturer on how to care for pediatric patients with their device.

At no time should the AED pads touch each other when applied. If it appears that the AED pads would touch each other based on the size of the child's chest, use an anterior and posterior pad placement as an alternative. Apply one pad to the center of the child's chest on the sternum and one pad to the child's back between the scapulae. Table 1-3 summarizes the differences for CPR and AED for adults and children.

> **In the absence of pediatric pads** or a pediatric setting on the AED, you may use adult pads for the child. Be sure that the pads will not touch each other if considering a traditional pad placement on the anterior chest. Use the anterior and posterior pad placement if the pads may touch each other. *REMEMBER*, because the energy supplied by pediatric pads is reduced, they would not be effective for an adult patient and should not be used. Always follow local protocols, medical direction and the manufacturer's instructions.

TABLE 1-3 CPR/AED Differences: Adult and Child

	Adult	Child (age 1 through onset of puberty)
Compressions		
Hand position	 Hands centered on lower half of sternum	 Hands centered on lower half of sternum
Compression rate	100 to 120 per minute	100 to 120 per minute
Compression depth	**At least** 2 inches (but no more than 2.4 inches)	**About** 2 inches (or ⅓ the anterior-posterior diameter of the chest)
Compression/ ventilation ratio	■ One-responder CPR: 30:2 ■ Two-responder CPR: 30:2	■ One-responder CPR: 30:2 ■ Two-responder CPR: **15:2**
AED		
AED pads	Adult pads: age > 8 years, weight > 55 pounds	■ **Pediatric pads: age 1–8 years, weight < 55 pounds** ■ Adult pads if pediatric pads not available
AED pad placement	 ■ Upper right chest below right clavicle to the right of sternum ■ Left side of chest several inches below left armpit on midaxillary line	 ■ Upper right chest below right clavicle to the right of sternum ■ Left side of chest several inches below left armpit on midaxillary line ■ **If pads risk touching each other—anterior/posterior placement**

CPR/AED Differences for Infants

Like children, there are several differences that need to be addressed when providing CPR to an infant. These differences include the primary assessment (assessing the level of consciousness and checking the pulse), opening the airway, compression depth, the ratio of compressions to ventilations depending on the number of responders and AED pad placement.

Primary Assessment Variations: Infant

When assessing the infant's level of consciousness, you should shout, "Are you okay?" or use the infant's name if known, and tap the bottom of the foot rather than the shoulder as part of the "shout-tap-shout" sequence. Another variation for the infant involves the pulse check. For an infant, check the brachial pulse with two fingers on the inside of the upper arm. Be careful not to use your thumb because it has its own detectable pulse. You will need to expose the arm to accurately feel a brachial pulse.

> **Science Note:** AVPU is not as accurate in infants and children as it is in adults. The pediatric assessment triangle—Appearance, Effort of breathing and Circulation—can give you a more accurate depiction of an infant's status. Regardless of what tool is used, the recognition of an unresponsive infant is the priority.

Airway

To open the airway of an infant, use the same head-tilt/chin-lift technique as you would for an adult or child. However, only tilt the head to a neutral position, taking care to avoid any hyperextension or flexion in the neck. Be careful not to place your fingers on the soft tissues under the chin or neck to open the airway. Table 1-4 illustrates airway and ventilation differences for an adult, child and infant.

Compressions

Although the rate of compressions is the same for an infant as for an adult or child, the positioning and manner of providing compressions to an infant are different because of the infant's smaller size. Positioning also differs based on the number of responders involved.

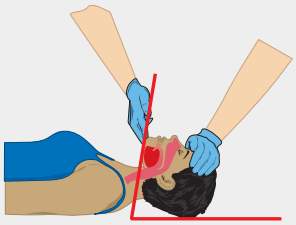
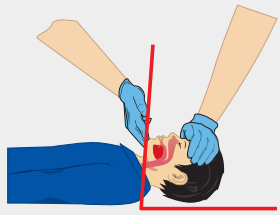
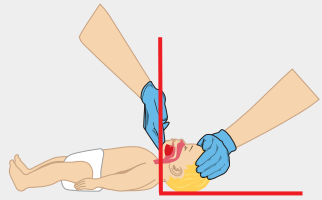
The firm, flat surface necessary for providing compressions is also appropriate for an infant. However, that surface can be above the ground, such as a stable table or countertop. Often it is easier for the responder to provide compressions from a standing position rather than kneeling at the patient's side.

Compressions are delivered at the same rate for adults and children, that is, between 100 and 120 compressions per minute. However, for an infant, only compress the chest ABOUT 1½ inches (or ⅓ the anterior-posterior diameter of the chest).

One-Responder CPR

To perform compressions when one responder is present, place two fingers from your hand closest to the infant's feet in the center of the chest just below the nipple line on the sternum. The fingers should be oriented so that they are parallel, not perpendicular to the sternum. Responders may use either their index finger and middle finger or their middle finger and fourth finger to provide compressions. Fingers that are more similar in length tend to make the delivery of compressions easier. The ratio of compressions to ventilations is the same for an adult or child, that is, 30 compressions to 2 ventilations (30:2).

TABLE 1-4 Airway and Ventilation Differences: Adult, Child and Infant

	Adult	Child (age 1 through onset of puberty)	Infant (birth to age 1)
Airway			
Head-tilt/ chin-lift	 **Past neutral** position	 **Slightly past neutral** position	 **Neutral** position
Ventilations			
Respiratory arrest	 **1** ventilation every **5** to **6** seconds	 **1** ventilation every **3** seconds	 **1** ventilation every **3** seconds

Two-Responder CPR

When two responders are caring for an infant in cardiac arrest, the positioning of the responders and the method of performing chest compressions differ from that of an adult or child. The responder performing chest compressions will be positioned at the infant's feet while the responder providing ventilations will be at the infant's head. Compressions are delivered using the encircling thumbs technique. To provide compressions using this technique:

- Place both thumbs on the center of the infant's chest side-by-side, just below the nipple line.
- Have the other fingers encircling the infant's chest toward the back, providing support.

While positioned at the infant's head, the responder providing ventilations will open the airway using two hands and seal the mask using the E-C technique. With two responders, the ratio of compressions to ventilations changes to that of a child, that is, 15 compressions to 2 ventilations (15:2).

AEDs

While the need to deliver a defibrillation for an infant occurs less often than for an adult, the use of an AED remains a critical component of infant cardiac arrest care. As with a child patient, use pediatric AED pads if available. Keep in mind that similar to a child, some AEDs use a switch or key instead of changing pads, so follow the directions from the AED manufacturer on how to care for pediatric patients with their device. When applying the pads, place one pad in the center of the anterior chest and the second pad in the posterior position centered between the scapulae. Just as with a child, if no pediatric pads are available, use adult AED pads. Table 1-5 summarizes the differences in CPR and AED for adults, children and infants.

TABLE 1-5 CPR/AED Differences: Adult, Child and Infant

	Adult	Child (age 1 through onset of puberty)	Infant (birth to age 1)	
Compressions				
Hand position	 Hands centered on lower half of sternum	 Hands centered on lower half of sternum	 One responder: **Two fingers** centered on sternum **just below nipple line**	 Two responders: **Two thumbs** centered on sternum **just below nipple line with fingers encircling chest**
Compression rate	100 to 120 per minute	100 to 120 per minute	100 to 120 per minute	
Compression depth	**At least** 2 inches, but no more than 2.4 inches	**About** 2 inches (or ⅓ the anterior-posterior diameter of the chest)	**About 1½ inches** (or ⅓ the anterior-posterior diameter of the chest)	
Compression/ ventilation ratio	■ One-responder CPR: 30:2 ■ Two-responder CPR: 30:2	■ One-responder CPR: 30:2 ■ Two-responder CPR: **15:2**	■ One-responder CPR: 30:2 ■ Two-responder CPR: **15:2**	

(*Continued*)

TABLE 1-5 continued

	Adult	Child (age 1 through onset of puberty)	Infant (birth to age 1)
AED			
AED pads	Adult pads: age > 8 years, weight > 55 pounds	■ **Pediatric pads: age 1 to 8 years, weight < 55 pounds** ■ Adult pads if pediatric pads not available	■ **Pediatric pads** ■ Adult pads if pediatric pads not available
AED pad placement	 ■ Upper right chest below right clavicle to the right of sternum ■ Left side of chest several inches below left armpit on midaxillary line	 ■ Upper right chest below right clavicle to the right of sternum ■ Left side of chest several inches below left armpit on midaxillary line ■ **If pads risk touching each other—anterior/posterior placement**	 ■ Anterior/posterior placement: ■ **Middle of chest** ■ **Back between scapulae**

5 PROVIDING CARE FOR AN OBSTRUCTED AIRWAY

Airway obstructions are a common emergency. You need to be able to recognize that a patient who cannot cough, speak, cry or breathe requires immediate care.

Obstructed Airway

Airway obstructions can lead to respiratory and even cardiac arrest if not addressed quickly and effectively. A conscious person who is clutching the throat is showing what is commonly called the universal sign for choking. However, in many cases a patient will just panic. Other behaviors that might be seen include running about, flailing arms or trying to get another's attention.

Caring for an Adult and Child

For an adult or child, if the patient can cough forcefully, encourage him or her to continue coughing until he or she is able to breathe normally. If the patient can't breathe or has a weak or ineffective cough, you will need to perform abdominal thrusts to clear the obstruction after gaining consent. To perform abdominal thrusts, stand behind the patient and while maintaining your balance, make a fist with one hand and place it thumb-side against the patient's abdomen—just above the navel. Cover the fist with your other hand, and give quick, upward thrusts.

Continue delivering abdominal thrusts until the object is forced out; the person can cough, speak or breathe; or the patient becomes unresponsive.

> **If you cannot reach far enough** around the patient to give effective abdominal thrusts or if the patient is obviously pregnant or known to be pregnant, give chest thrusts. To perform chest thrusts: from behind the patient place the thumb side of the fist against the lower half of the sternum and the second hand over the fist. Then give quick, inward thrusts.

If a patient who is choking becomes unresponsive, carefully lower the patient to a firm, flat surface, send someone to get an AED, and summon additional resources if appropriate and you have not already done so. Immediately begin CPR with chest compressions.

As you open the airway to give ventilations, look in the person's mouth for any visible object. If you can see it, use a finger sweep motion to remove it. If you don't see the object, do **not** perform a blind finger sweep, but continue CPR. Remember to never try more than 2 ventilations during one cycle of CPR, even if the chest doesn't rise.

Continuing cycles of 30 compressions and 2 ventilations is the most effective way to provide care. Even if ventilations fail to make the chest rise, compressions may help clear the airway by moving the blockage into the upper airway where it can be seen and removed.

> **Science Note:** Evidence suggests that it may take more than one technique to relieve an airway obstruction in the conscious patient and that abdominal thrusts, back blows and chest thrusts are all effective.

> **Note:** Based upon local protocols or practice, it is permissible to provide a series of back blows in addition to abdominal thrusts to an adult or child who is choking. Always follow local protocols, practice or medical direction instructions.

Caring for an Infant

When an infant is choking and awake but unable to cough, cry or breathe, you'll need to perform a series of 5 back blows and 5 chest thrusts. Start with back blows. Hold the infant face-down on one arm using your thigh for support. Make sure the infant's head is lower than his or her body and that you are supporting the infant's head and neck. With your other arm, give firm back blows with the heel of your hand between the infant's scapulae.

After 5 back blows, start chest thrusts. Turn the infant over onto your other arm using your thigh for support. Make sure to support the head and neck as you move the infant. Place two fingers in the center of the infant's chest, just below the nipple line. Give 5 quick thrusts. Continue this cycle of 5 back blows and 5 chest thrusts until the object is forced out; the infant can cough, cry or breathe; or the infant becomes unresponsive.

If an infant does become unresponsive while choking, carefully lower the infant onto a firm, flat surface, send someone to get an AED, and summon additional resources if appropriate and you have not already done so. Immediately begin CPR starting with chest compressions.

SECTION 2

Skill Sheets

CPR/AED—Adult

Step	Action *Denotes a Critical Action	Competencies
1.	**Scene size up:** ■ Scene safety* ■ Standard precautions* ■ Number of patients ■ Nature of illness/mechanism of injury ■ Initial impression, including severe, life-threatening bleeding* ■ Additional resources needed?	■ Sequence of these is not critical if all goals are accomplished and verbalized. (PPE may be worn instead of verbalized.) ■ Resources may include: 9-1-1, Advanced Life Support, Rapid Response Team, Code Team, or additional personnel as needed or appropriate.
2.	**Primary assessment:** ■ Assesses level of consciousness (LOC)* ■ Opens airway ■ Checks breathing and carotid pulse simultaneously for at least 5 seconds, but no more than 10 seconds*	■ **LOC:** Shouts, "Are you OK?" (or a reasonable facsimile) to elicit verbal stimuli ■ **LOC:** Taps the patient's shoulder to elicit painful stimuli and shouts again (shout-tap-shout) ■ **Airway:** Opens using head-tilt/chin-lift past a neutral position or a modified jaw thrust ■ **Breathing/pulse check:** Checks for breathing and carotid pulse simultaneously for at least 5 seconds, but no more than 10 seconds
3.	**Chest compressions:** ■ Exposes chest ■ Initiates 30 chest compressions using correct hand placement at the proper rate and depth, allowing for full chest recoil*	■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** At least 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
4.	**Ventilations:** ■ Opens the airway* ■ Gives 2 ventilations using a pocket mask*	■ **Airway:** Head-tilt/chin-lift past a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Minimizes interruptions to less than 10 seconds
5.	**Continues CPR:** ■ Gives 30 chest compressions using correct hand placement at the proper rate and depth, allowing for full chest recoil* ■ Opens airway ■ Gives 2 ventilations with pocket mask	■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** At least 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
6.	**Arrival of the AED and additional responders:** ■ Initial responder continues care* ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Continues care:** Maintains uninterrupted CPR ■ **Communicates** relevant patient information ■ **Verbalizes** compression count to coordinate ventilations with additional responders ■ **Verbalizes** coordination plan to switch compressors upon AED analysis
7.	**AED applied:** ■ Turns on machine ■ Attaches AED pads* ■ Plugs in connectors, if necessary ■ Continues compressions	■ **AED on:** Activates within 15 seconds of arrival ■ **Pads:** Pad 1—right upper chest below right clavicle and right of sternum; Pad 2—left side of chest several inches below left armpit on mid-axillary line
8.	**AED analysis and rotation:** ■ Ensures all responders are clear while AED analyzes and prepares for shock* ■ Says "Clear" ■ Rotates responders during analysis to prevent fatigue ■ Prepares BVM	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR

(*Continued*)

Step	Action *Denotes a Critical Action	Competencies
9.	**Shock advised:** ■ Says, "Clear"* ■ Presses shock button to deliver shock*	■ **Clear:** Ensures no one is touching the patient while shock being delivered ■ **Delivers shock:** Depresses shock button within 10 seconds
10.	**Resumes CPR:** ■ Continues with 5 cycles of CPR (30 compressions/ 2 ventilations)* ■ Performs compressions (Responder 2) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the BVM (Responder 1) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, resumes CPR starting with compressions until prompted by the AED for analysis ■ **Hand position:** Centered on lower half of sternum ■ **Depth:** At least 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
11.	**Ventilations with BVM:** ■ Opens airway from top of the head ■ Maintains mask seal ■ Compresses BVM to give 2 ventilations	■ **Seal:** Using the E-C technique ■ **Airway:** Head-tilt/chin-lift past a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Minimizes interruptions to less than 10 seconds ■ **Ventilations (2):** Bag squeezed enough to make chest rise; does not fully squeeze bag (approximately 400–700 ml of volume, avoiding overinflation)
12.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
13.	**AED analyzes:** ■ Says, "Stand clear" ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
14.	**Resumes CPR:** ■ Continues with 5 cycles of CPR (30 compressions/ 2 ventilations)* ■ Performs compressions (Responder 3) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the BVM (Responder 2) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, CPR resumed starting with compressions until prompted by the AED for analysis ■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** At least 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
15.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
16.	**AED analyzes and rotation:** ■ Says, "Clear"* ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
17.	**Spontaneous patient movement:** ■ Checks for breathing and pulse	■ **Pulse check:** Opens the airway and checks for breathing and pulse simultaneously for at least 5 seconds, but no more than 10 seconds

CPR/AED—Child

Step	Action *Denotes a Critical Action	Competencies
1.	**Scene size up:** ■ Scene safety* ■ Standard precautions* ■ Number of patients ■ Nature of illness/mechanism of injury ■ Initial impression, including severe, life-threatening bleeding* ■ Additional resources needed? ■ Consent	■ Sequence is not critical if all goals are accomplished and verbalized. (PPE may be worn instead of verbalized.) ■ Resources may include: 9-1-1, Advanced Life Support, Rapid Response Team, Code Team, or additional personnel as needed or appropriate. ■ **Consent:** States name, background, what they plan to do and permission to treat
2.	**Primary assessment:** ■ Assesses level of consciousness (LOC)* ■ Opens airway ■ Checks breathing and carotid pulse simultaneously for at least 5 seconds, but no more than 10 seconds*	■ **LOC:** Shouts, "Are you OK?" (or a reasonable facsimile) to elicit verbal stimuli ■ **LOC:** Taps the patient's shoulder to elicit painful stimuli and shouts again (shout-tap-shout) ■ **Airway:** Opens using head-tilt/chin-lift slightly past a neutral position or a modified jaw thrust ■ **Breathing/pulse check:** Checks for breathing and carotid pulse simultaneously for at least 5 seconds, but no more than 10 seconds
3.	**Chest compressions:** ■ Exposes chest ■ Initiates 30 chest compressions using correct hand placement at the proper rate and depth, allowing for full chest recoil*	■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** About 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
4.	**Ventilations:** ■ Opens the airway* ■ Gives 2 ventilations using a pocket mask*	■ **Airway:** Head-tilt/ chin-lift slightly past a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Minimizes interruptions to less than 10 seconds.
5.	**Continues CPR:** ■ Gives 30 chest compressions using correct hand placement at the proper rate and depth, allowing for full chest recoil* ■ Opens airway ■ Gives 2 ventilations with pocket mask	■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** About 2 inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
6.	**Arrival of the AED and additional responder(s):** ■ Initial responder continues care* ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Continues care:** Maintains uninterrupted CPR ■ **Communicates** relevant patient information including patient age if known ■ **Verbalizes** compression count to coordinate ventilations with additional responder(s) ■ **Verbalizes** coordination plan to switch compressors upon AED analysis
7.	**AED applied:** ■ Turns on machine ■ Attaches AED pads* ■ Plugs in connectors, if necessary ■ Continues compressions	■ **AED on:** Activates within 15 seconds of arrival ■ **Pads:** Applies correct pads for age of child. Pad 1—right upper chest below right clavicle and right of sternum; Pad 2—left side of chest several inches below left armpit on mid-axillary line

(*Continued*)

Step	Action *Denotes a Critical Action	Competencies
8.	**AED analysis and rotation:** ■ Ensures all responders are clear while AED analyzes and prepares for shock* ■ Says, "Clear" ■ Rotates responders during analysis to prevent fatigue ■ Prepares BVM	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
9.	**Shock advised:** ■ Says, "Clear"* ■ Presses shock button to deliver shock*	■ **Clear:** Ensures no one is touching the patient while shock being delivered ■ **Delivers shock:** Depresses shock button within 10 seconds
10.	**Resumes CPR:** ■ Continues with 10 cycles of CPR (15 compressions/ 2 ventilations)* ■ Performs compressions (Responder 2) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the BVM (Responder 1) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, CPR resumed starting with compressions until prompted by the AED for analysis ■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** About 2 inches ■ **Number:** 15 compressions ■ **Rate:** 100–120 per minute (7–9 seconds) ■ **Full chest recoil:** 12 of 15 compressions
11.	**Ventilations with BVM:** ■ Opens airway from top of the head ■ Maintains mask seal ■ Compresses BVM to give 2 ventilations	■ **Seal:** Using the E-C technique ■ **Airway:** Head-tilt/ chin-lift slightly past a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Minimizes interruptions to less than 10 seconds ■ **Ventilations (2):** Bag squeezed enough to make chest rise; does not fully squeeze bag (avoiding overinflation)
12.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
13.	**AED analyzes:** ■ Says, "Stand clear" ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
14.	**Resumes CPR:** ■ Continues with 10 cycles of CPR (15 compressions/ 2 ventilations)* ■ Performs compressions (Responder 3) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the BVM (Responder 2) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, resumes CPR starting with compressions until prompted by the AED for analysis ■ **Hand position:** Centered on the lower half of the sternum ■ **Depth:** About 2 inches ■ **Number:** 15 compressions ■ **Rate:** 100–120 per minute (7–9 seconds) ■ **Full chest recoil:** 12 of 15 compressions
15.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
16.	**AED analyzes and rotation:** ■ Says, "Clear"* ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
17.	**Spontaneous patient movement:** ■ Checks for breathing and pulse	■ **Pulse check:** Responder performing ventilations opens the airway and checks for breathing and pulse simultaneously for at least 5, but no more than 10 seconds

CPR/AED—Infant

Step	Action *Denotes a Critical Action	Competencies
1.	**Scene size up:** ■ Scene safety* ■ Standard precautions* ■ Number of patients ■ Nature of illness/mechanism of injury ■ Initial impression, including severe, life-threatening bleeding* ■ Additional resources needed? ■ Consent	■ Sequence is not critical if all goals are accomplished and verbalized. (PPE may be worn instead of verbalized.) ■ Resources may include: 9-1-1, Advanced Life Support, Rapid Response Team, Code Team, or additional personnel as needed or appropriate. ■ **Consent:** States name, background, what they plan to do and permission to treat
2.	**Primary assessment:** ■ Positions infant on a firm, flat surface ■ Assesses level of consciousness (LOC)* ■ Opens airway ■ Checks breathing and brachial pulse simultaneously for at least 5 seconds, but no more than 10 seconds*	■ **Position:** Places infant on a firm, flat surface ■ **LOC:** Shouts "Are you OK?" (or a reasonable facsimile) to elicit verbal stimuli. Uses infant's name if available ■ **LOC:** Taps the infant's foot to elicit stimuli and shouts again (shout-tap-shout) ■ **Airway:** Opens using head-tilt/chin-lift to a neutral position ■ **Breathing/pulse check:** Checks for breathing and brachial pulse simultaneously for at least 5 seconds, but no more than 10 seconds
3.	**Chest compressions:** ■ Exposes chest ■ Initiates 30 chest compressions using correct finger placement at the proper rate and depth, allowing for full chest recoil*	■ **Finger position:** Centered on the lower half of the sternum just below the nipple line ■ **Depth:** About 1½ inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil**: 26 of 30 compressions
4.	**Ventilations:** ■ Opens the airway* ■ Gives 2 ventilations using an infant pocket mask*	■ **Airway:** Head-tilt/chin-lift to a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Minimizes interruptions to less than 10 seconds
5.	**Continues CPR:** ■ Gives 30 chest compressions using correct finger placement at the proper rate and depth, allowing for full chest recoil* ■ Opens airway ■ Gives 2 ventilations with an infant pocket mask	■ **Finger position:** Centered on the lower half of the sternum just below nipple line ■ **Depth:** About 1½ inches ■ **Number:** 30 compressions ■ **Rate:** 100–120 per minute (15–18 seconds) ■ **Full chest recoil:** 26 of 30 compressions
6.	**Arrival of the AED and additional responder(s):** ■ Initial responder continues care* ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Continues care:** Maintains uninterrupted CPR ■ **Communicates** relevant patient information including patient age if known ■ **Verbalizes** compression count to coordinate ventilations with additional responder(s) ■ **Verbalizes** coordination plan to switch compressors upon AED analysis
7.	**AED applied:** ■ Turns on machine ■ Attaches AED pads* ■ Plugs in connectors, if necessary ■ Continues compressions	■ **AED on:** Activates within 15 seconds of arrival ■ **Pads:** Applies correct pads for an infant. Pad 1—in the center of the anterior chest; Pad 2—on the infant's back between the scapulae
8.	**AED analysis and rotation:** ■ Ensures all responders are clear while AED analyzes and prepares for shock* ■ Says, "Clear" ■ Rotates responders during analysis to prevent fatigue ■ Prepares infant BVM	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis and moves to a head and foot position for encircling thumbs technique ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR

(*Continued*)

Step	Action *Denotes a Critical Action	Competencies
9.	**Shock advised:** ■ Says, "Clear"* ■ Presses shock button to deliver shock*	■ **Clear:** Ensures no one is touching the patient while shock being delivered ■ **Delivers shock:** Depresses shock button within 10 seconds
10.	**Resumes CPR:** ■ Continues with 10 cycles of CPR (15 compressions/ 2 ventilations)* ■ Performs compressions—encircling thumbs technique (Responder 2) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the infant BVM (Responder 1) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, resumes CPR starting with compressions until prompted by the AED for analysis ■ **Thumb position:** Two thumbs centered on the lower half of the sternum just below nipple line ■ **Depth:** About 1½ inches ■ **Number:** 15 compressions ■ **Rate:** 100–120 per minute (7–9 seconds) ■ **Full chest recoil:** 12 of 15 compressions
11.	**Ventilations with BVM:** ■ Open airway from top of the head ■ Maintains mask seal ■ Compresses infant BVM to give 2 ventilations	■ **Seal:** Using the E-C technique ■ **Airway:** Head-tilt/chin-lift to a neutral position ■ **Ventilations (2):** 1 second in duration ■ **Ventilations (2):** Visible chest rise ■ **Ventilations (2):** Delivers in 5–7 seconds ■ **Ventilations (2):** Bag squeezed enough to make chest rise; does not fully squeeze bag (avoiding overinflation)
12.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
13.	**AED analyzes:** ■ Says, "Stand clear" ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
14.	**Resumes CPR:** ■ Continues with 10 cycles of CPR (15 compressions/ 2 ventilations)* ■ Performs compressions (Responder 3) ■ Manages airway and mask seal (Responder 1) ■ Provides ventilations using the infant BVM (Responder 2) ■ Continues until AED prompts	■ **Resumes CPR:** Immediately following shock, CPR resumed starting with compressions until prompted by the AED for analysis ■ **Thumb position:** Two thumbs centered on the lower half of the sternum just below nipple line ■ **Depth:** About 1½ inches ■ **Number:** 15 compressions ■ **Rate:** 100–120 per minute (7–9 seconds) ■ **Full chest recoil:** 12 of 15 compressions
15.	**Anticipates compressor change:** ■ Communicates with additional responders ■ Prepares for rotation upon AED analysis	■ **Verbalizes** coordination plan to switch compressors prior to AED analysis
16.	**AED analyzes and rotation:** ■ Says, "Clear"* ■ No shock advised	■ **Clear:** Ensures no one is touching the patient during analysis ■ **Rotation:** Switches compressor during analysis ■ **Hover:** Hovers hands (new compressor) a few inches above chest during analysis to prepare for CPR
17.	**Spontaneous patient movement:** ■ Checks for breathing and pulse	■ **Pulse check:** Responder performing ventilations opens the airway and checks for breathing and brachial pulse simultaneously for at least 5, but no more than 10 seconds

SECTION 3

Additional Topics

Key Skills

When providing care to patients, responders need to be competent in psychomotor skills, such as opening the airway and giving compressions and ventilations. In addition, responders need to integrate the key skills of critical thinking, problem solving, communication and team dynamics to achieve the best possible outcomes.

Critical Thinking

Critical thinking refers to thinking clearly and rationally to identify the connection between information and actions. When you use critical thinking, you are constantly identifying new information and situations, adapting to them logically to determine your best actions and anticipating patient reactions.

Critical thinking is an essential skill in healthcare, and especially in basic life support situations. You use critical thinking when you:

- Conduct a scene size-up.
- Obtain an initial impression.
- Determine a course of action.
- Anticipate roles and functions as part of a team based on the patient's presentation and condition.
- Consistently re-evaluate the situation for changes, interpreting these changes, and applying them to the patient's care and treatment.
- Modify actions based on the changes.

A simple example of critical thinking in action during a basic life support resuscitation may occur when a team leader is informed that it is becoming more difficult to ventilate a patient with the BVM resuscitator. Using critical thinking, the team leader re-evaluates the situation to determine potential causes including overventilation, hyperventilation or poor airway positioning. Then the team leader directs a new course of care or adjustment.

Problem Solving

Problem solving refers to the ability to find solutions to challenging or complex situations or issues that arise, using readily available resources. In situations requiring basic life support and resuscitation, problems or issues can arise at any point. For example, the AED may be delayed in arriving or have a low battery. A patient may be unresponsive and face-down on the floor. A parent may be hysterical and interfere with care. These situations must be addressed with minimal interruption to patient care to ensure the best possible outcomes.

Problem solving also requires creativity in finding solutions. Use whatever resources are at hand, including equipment, other team members or even bystanders if needed.

Communication

Communication involves four essential components:

- **Sender:** The person initiating the communication
- **Message:** The content of the communication; must be clear so that all persons involved know exactly what the message is
- **Receiver:** The person translating and interpreting the message
- **Closed loop:** Ensures that messages are received and understood

Communication is not just the words spoken (verbal), but also includes nonverbal messages conveyed through body language, such as gestures and facial expressions.

When responding to an emergency situation, communication is essential. You need to communicate with patients, their families and bystanders as well as colleagues. To effectively communicate with patients, families and bystanders, you need to:

- Build rapport.
- Establish trust.
- Minimize fears, as necessary.
- Gather data.

In doing so, you need to demonstrate credibility and trustworthiness, confidence and empathy.

Communication with the Patient and Family

Patients requiring resuscitation are unresponsive, making communication with the family that much more important. Remember, during emergencies, families are stressed and may not always hear what you are saying. Speak slowly and in terms the family can understand. Build rapport and establish trust. Be prepared to repeat information, if necessary. Be open and honest, especially about the patient's condition. Minimize their fears, as necessary, but avoid giving any misleading information or false hope. Reassure them that everything that can be done is being done.

Communication with the Family About a Patient's Death

Unfortunately, not all patients survive and you may be involved in communicating with the family about a patient's death. Dealing with death is a difficult topic, even for healthcare professionals. In this situation:

- Provide the information honestly and with compassion, in a straightforward manner, including information about events that may follow.
- Allow the family to begin processing the information.
- Allow time for the family to begin the grief process; ask if there is anyone, such as other family members or clergy, that they would like to contact or have you contact.
- Anticipate a myriad of reactions by family members such as crying, sobbing, shouting, anger, screaming or physically lashing out.
- Wait and answer any questions that the family may have.

Communication with the Team

As a healthcare or public safety professional, you are often working as part of a team to provide care to patients. Patient care teams have many moving parts. It can be difficult for any one person to be aware of all activity that is going on throughout treatment. Therefore, it is critical to effectively communicate with your fellow responders to provide effective care.

Being a member of the team is just as important as being a team leader. When you are part of a team, it is critical that you communicate with members of your team. Everyone on the team needs to have a voice and be part of the process in order to be able to speak up if a problem arises. Crew resource management is an important team-based response approach to emergency care. (See Section 1, page 22 for more information on crew resource management.)

Teamwork

Teamwork refers to a group of people with well-defined roles and responsibilities working toward a common goal. The group members demonstrate respect for one another and use clear, closed-loop communication.

Teamwork is crucial during resuscitation because the ultimate goal is saving a life, and effective team care requires a coordinated effort of the team leader and the team members. See Box 3-1, Elements of an Effective Team.

Box 3-1. **Elements of an Effective Team**

Elements of an Effective Team Leader	Elements of an Effective Team Member
■ Sets clear expectations ■ Prioritizes, directs and acts decisively ■ Encourages team input and interaction ■ Focuses on the big picture ■ Assigns and understands roles ■ Allows team input and interaction ■ Monitors performance while providing support ■ Acts as a role model ■ Coaches the team ■ Re-evaluates and summarizes progress	■ Has the necessary knowledge and skills to perform your role ■ Stays in assigned role but assists others as needed as long as you can maintain your responsibilities ■ Communicates effectively with the team leader if: ❍ You are lacking any knowledge or skills ❍ You identify something that the team leader may have overlooked ❍ You recognize a dangerous situation or need for urgent action ■ Focuses on achieving the goals ■ Asks pertinent questions and shares pertinent observations

The Emergency Medical Services System

The Emergency Medical Services (EMS) system is a network of community resources including healthcare and public safety professionals who respond across a continuum of care including but not limited to:

- 9-1-1 call takers and dispatchers at the public safety answering point (PSAP).
- First responders.
- EMS Providers: EMRs, EMTs, AEMTs and paramedics.
- Emergency department and hospital personnel.

The purpose of the EMS system is to provide a coordinated response and optimal emergency care to individuals experiencing sudden illness or injury.

The EMS system depends on all providers to perform their roles promptly and correctly, which in turn increases the chances for survival and recovery. Professional responders must keep their education and training current, and stay abreast of science changes, new evidence-based guidelines and other developments in emergency care.

Legal Considerations

Adults who are awake, alert and oriented have a basic right to accept or refuse care. Consent to treat can be obtained verbally or through a patient gesture. If the patient is a minor, consent must be obtained from a parent or legal guardian, if available. If a parent or legal guardian is not present, then consent is implied for life-threatening conditions.

To obtain consent from a patient, follow these steps:

- Identify yourself to the patient (parent or legal guardian for a minor).
- State your level of training.
- Explain what you observe.
- Explain what you plan to do.
- Ask for permission to provide care.

If a patient is unconscious, has an altered mental status, is mentally impaired, or is unable to give consent verbally or through a gesture, then consent is *implied*.

While providing care to a patient, you may learn details about the patient that are private and confidential. Do not share this information with anyone except personnel directly associated with the patient's medical care.

Always document care that is provided. By documenting, you establish a written record of the events that took place, the care you provided and the facts you discovered after the incident occurred.

Remember, laws vary from state to state. Ask about your state's laws and consult your legal representative for specific information about your legal responsibilities. Table 3-1 highlights some of the common legal considerations.

TABLE 3-1 Legal Considerations

Duty to Act	The duty to respond to an emergency and provide care. Failure to fulfill these duties could result in legal action.
Scope of Practice	The range of duties and skills you have acquired in training that you are authorized to perform by your certification to practice.
Standard of Care	The public's expectation that personnel summoned to an emergency will provide care with a certain level of knowledge and skill.
Negligence	Failure to follow a reasonable standard of care, thereby causing or contributing to injury or damage.
Refusal of Care	A competent patient's indication that a responder may not provide care. Refusal of care must be honored, even if the patient is seriously injured or ill or desperately needs assistance. A patient can refuse some or all care. If a witness is available, have the witness listen to, and document in writing, any refusal of care.

(*Continued*)

TABLE 3-1 Continued

Advance Directives	Written instructions that describe a patient's wishes regarding medical treatment or healthcare decisions. Guidance for advance directives, including any required identification and verification process, is documented in state, regional or local laws, statutes and/or protocols, and must be followed. Advance directives include: ■ Do Not Resuscitate (DNR) orders, also called Do Not Attempt Resuscitation (DNAR) orders. ■ Physician Orders for Life-Sustaining Treatment (POLST). ■ Living wills. ■ Durable powers of attorney.
Battery	The unlawful, harmful or offensive touching of a person without the person's consent.
Abandonment	Discontinuing care once it has begun. You must continue care until someone with equal or more advanced training takes over.
Confidentiality	The principle that information learned while providing care to a patient is private and should not be shared with anyone except personnel directly associated with the patient's medical care.

Standard Precautions

Standard precautions are safety measures to prevent disease transmission based on the assumption that all body fluids may be infectious. Standard precautions can be applied through the use of:

- **Personal protective equipment (PPE)—** Specialized clothing, equipment and supplies, such as gloves, CPR breathing barriers, gowns, face shields, protective eyewear and biohazard bags that prevent direct contact with infected materials. PPE should be available in the workplace and identified in the exposure or infection control plan.
- **Good hand hygiene—**Hand washing is the most effective measure to prevent the spread of infection. Alcohol-based hand sanitizers allow you to clean your hands when soap and water are not readily available and your hands are not visibly soiled.
- **Engineering controls—**Objects used in the workplace that isolate or remove a hazard, reducing the risk for exposure.

- **Work practice controls—**Methods of working that reduce the likelihood of an exposure incident by changing the way a task is carried out.

- **Proper equipment cleaning—**After providing care, the equipment and surfaces used should always be cleaned and disinfected or properly disposed.
- **Proper spill cleanup procedures—**If a spill occurs, appropriate measures should be taken to limit and reduce exposure to possible contaminants.

As a healthcare professional, you also need to adhere to good health habits to prevent the spread of infection and disease transmission and be current with all required/suggested immunizations. And always make sure to review your employer-specific guidelines for standard precautions.

Unfortunately, even with the best use of standard precautions, exposures do occur. When an exposure incident occurs, follow these steps:

- Clean the contaminated area thoroughly with soap and water. Wash needlestick injuries, cuts and exposed skin.
- If splashed around the mouth or nose with blood or other body fluids, flush the area with water.
- If eyes are involved, irrigate with clean water, saline or sterile irrigants for 20 minutes.

After the exposure:

- Report the incident to the appropriate person identified in your employer's infection/exposure control plan immediately.
- Write down what happened, including the time, date and circumstances, actions taken and any other information required by your employer.
- Seek immediate follow-up care according to your employer's infection/exposure control plan.

SECTION 4

Appendix

Basic Life Support Differences: Adult, Child and Infant

	Adult	Child (age 1 through onset of puberty)	Infant (birth to age 1)
Calling for additional resources	**Immediately,** then perform CPR	If alone, **2 minutes of CPR before** leaving to call	If alone, **2 minutes of CPR before** leaving to call
Airway: Head-tilt/chin-lift	**Past neutral** position	**Slightly past neutral** position	**Neutral** position
Ventilations: Respiratory arrest	**1** ventilation every **5** to **6** seconds	**1** ventilation every **3** seconds	**1** ventilation every **3** seconds
Compression rate	100 to 120 per minute	100 to 120 per minute	100 to 120 per minute
Compression depth	**At least** 2 inches (but no more than 2.4 inches)	**About** 2 inches (or ⅓ the anterior-posterior diameter of the chest)	**About 1½ inches** (or ⅓ the anterior-posterior diameter of the chest)
Compression/ ventilation ratio	■ One-responder CPR: 30:2 ■ Two-responder CPR: 30:2	■ One-responder CPR: 30:2 ■ Two-responder CPR: **15:2**	■ One-responder CPR: 30:2 ■ Two-responder CPR: **15:2**
AED pads	Adult pads: age > 8 years, weight > 55 pounds	■ **Pediatric pads: age 1–8 years, weight < 55 pounds** ■ Adult pads if pediatric pads not available	■ **Pediatric pads** ■ Adult pads if pediatric pads not available
AED pad placement	■ Upper right chest below right clavicle to right of sternum ■ Left side of chest several inches below left armpit on midaxillary line	■ Upper right chest below right clavicle to right of sternum ■ Left side of chest several inches below left armpit on midaxillary line ■ **If pads risk touching each other—anterior/ posterior placement**	Anterior/posterior placement: ■ **Middle of chest** ■ **Back between scapulae**

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Note: *b* indicates box; *t* indicates table.

The American Red Cross exists to provide compassionate care to those in need. Our network of generous donors, volunteers and employees share a mission of preventing and relieving suffering, here at home and around the world.

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There are many ways you can be part of our mission:

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For more information on the Scientific Advisory Council, visit redcross.org/science.

Care steps outlined within this handbook are consistent with:

- 2015 International Consensus on CPR and Emergency Cardiovascular Care (ECC) Science with Treatment Recommendations
- 2015 American Heart Association Guidelines Update for CPR and ECC

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Mission

The American Red Cross prevents and alleviates human suffering in the face of emergencies by mobilizing the power of volunteers and the generosity of donors.

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