ADULT CPR with AED

FOLLOWS 2010 ECC/ILCOR GUIDELINES

Updated with 2015 Guidelines
Welcome!

We’re excited that you’ve decided to take CPR, and that you’ve chosen us to direct your learning experience.

Despite technological advances and new scientific discoveries, heart disease remains the number one cause of death globally, with 17.3 million deaths per year; 38.7% of cases of out of hospital cardiac arrests (OHCA) are witnessed by a bystander (AHA, 2015). Learning CPR can save lives- you can save a life.

In this course, you will learn:

- The Chain of Survival and your place within the chain
- How to provide high quality chest compressions for adults
- How to initiate early use of an AED (automated external defibrillator)
- How to provide rescue breathing for victims of respiratory arrest
- How to provide CPR with 2 rescuers
- How to assist adult victims of choking

Let’s get started!
The Five Fears

Many bystanders are reluctant to perform CPR. There are many reasons why bystanders are reluctant to get involved. Let’s take a look at some of these reasons so that you can understand why they have no real basis of support.

Fear of Disease: Use universal precautions when the possibility exists of coming into contact with bodily fluids. Use gloves, mask, and/or gown when you have them available. The benefit of initiating lifesaving resuscitation in a patient in cardiopulmonary arrest greatly outweighs the risk for secondary infection in the rescuer or the patient. Nevertheless, use of simple infection-control measures during CPR and CPR training can reduce a very low level of risk even further (Mejicano & Maki, 1998).

Fear of Lawsuits: These laws state that a person acting in good faith who is rendering reasonable first aid will not be held accountable for damages to the person to whom the aid is rendered, unless gross and willful misconduct are involved. Good Samaritan laws may differ for professional health care providers versus lay rescuers from state to state. Implied consent means that there is an assumption that if an unconscious person were able to request care, they would do so.
**Fear of Uncertainty:** People sometimes fear that they won’t remember what to do. Remembering the correct number of compressions or the number of compressions to ventilations is not as important as the willingness to respond and to push hard and fast. Hands-only CPR is designed to provide simple life support. No mask, no worry- performing compressions alone has been shown to be effective at saving lives.

**Fear of Harming the Victim:** A victim in need or clinically dead can only be helped by your intervention efforts. You can’t hurt someone who is dead, and any injuries you may unknowingly cause (such as injured ribs) can be dealt with in a surviving victim of cardiac arrest.
Fear of Injury to Self: As you will learn, scene safety is of utmost importance, and checking the scene for safety should be your first action when you come across an unconscious victim. If the scene is not safe for you to enter, you must not enter. This will only result in more victims. Under no circumstances should you risk becoming a victim. Instead, you should call for help (activate EMS).
Before you learn how to perform CPR, it’s important to understand how the heart, lungs, brain and cells perform. Here is a brief review of these systems.

THE HEART

The heart consists of four chambers, the right and left atria (singular: atrium) and the right and left ventricles. The atria are located above the ventricles, as can be seen in the above diagram. The heart is a muscular organ supplied by the coronary arteries. It is located below your breastbone (sternum) and, in an adult, is approximately the size of your fist.

The heart pumps blood that has been deoxygenated after supplying the body’s tissues into the lungs, and when that blood has been oxygenated again in the lungs, it exits the lungs to the left
side of the heart, where it is pumped out into the body once again, to provide oxygen to the vital organs.

Your body has about 5 liters of blood, which circulate through this system approximately 3 times per minute.

What is known as the cardiovascular system is composed of the heart, arteries, capillaries, and veins.

**THE LUNGS**

*Diagram of the Human Lungs*

Your lungs are spongy, air-filled sacs, with one lung located on either side of the chest. The trachea, which is sometimes called the windpipe, conducts air down into the lungs through the
bronchi, which are smaller tubular branches. The bronchi then divide into smaller and smaller tubules called bronchioles. Air is exchanged in the alveoli, which are tiny sacs that allow oxygen and carbon dioxide to move between the lungs and the bloodstream via tiny capillaries.

Your lungs take in oxygen to supply your body’s organs and tissues. They release carbon dioxide, a waste product, into the atmosphere when you exhale.

Room air at regular atmospheric pressure contains 21% oxygen. Our bodies utilize approximately 4-6% of that oxygen and release about 16-17% back into the atmosphere, along with carbon dioxide, when we exhale. This 16-17% that we exhale can provide just enough oxygen to sustain someone in cardiac arrest, at least for a short time.

**THE BRAIN**

Your brain needs a constant supply of oxygen. Without oxygen, brain cells begin to die in 4 to 6 minutes.

On average, the brain weighs three pounds, and uses a whopping 20% of the body’s oxygen!

The medulla is located in the brain stem and controls automatic bodily functions, including consciousness and respiratory and cardiovascular function.
All of the body’s tissues are made up of cells.

All cells require oxygen to carry out their normal functions. They also require nutrients. Oxygen deprivation, or hypoxia, will cause cells to die within a few short minutes.

The body’s cells use oxygen and produce carbon dioxide as a waste product. Carbon dioxide must be eliminated via the lungs through ventilation.

Red blood cells transport oxygen throughout the body.
CARDIOVASCULAR DISEASE

As mentioned previously, cardiovascular disease is the number one cause of death worldwide. While it is important to learn what to do when cardiovascular disease leads to a heart attack or stroke, it is equally as important, if not more so, to understand how to prevent cardiovascular disease from occurring in the first place.

There are numerous factors that can increase an individual’s risk of heart attack. Some of these factors can be controlled (modifiable risk factors), while others cannot (non-modifiable risk factors).

Modifiable risk factors, or factors that can be controlled to a certain degree by an individual, include:

- cigarette smoking
- hypertension
- obesity
- sedentary lifestyle (lack of exercise)
- high cholesterol
- high blood sugar (in diabetes)
- poor diet (diet high in sugar, fat)
- stress

Non-modifiable risk factors, or risk factors that individuals cannot change, include:

- age
- sex
- genetics/hereditary factors (i.e. hereditary high cholesterol or hyperlipidemia)
- race (i.e., certain groups may be at higher risk for hypertension, or high blood pressure)

CARDIOVASCULAR DISEASE IS THE NUMBER ONE CAUSE OF DEATH IN THE UNITED STATES, ACCORDING TO THE CENTER FOR DISEASE CONTROL (CDC). THE CDC ESTIMATES THAT MORE THAN 650,000 AMERICANS DIE FROM CARDIOVASCULAR DISEASE (1 in 4 DEATHS) EACH YEAR IN THE UNITED STATES.

Cardiovascular disease damages the heart and blood vessels, and frequently causes heart attack and/or stroke. Americans of all ages should focus on prevention of cardiovascular disease by eating healthy foods, exercising 30 minutes (at least) each day, controlling weight, minimizing stress, consuming healthy fats and oils, and avoiding cigarette or cigar smoking.
Atherosclerosis, or hardening of the arteries, is a condition caused by the building up of plaque inside the body’s arteries, the large blood vessels that carry blood away from the heart to the body’s organs. Plaque is composed of fatty substances, cholesterol, fibrin (a clotting substance in the blood), calcium and cellular waste products. When plaque builds up, it can partially or totally block the flow of blood through an artery in the brain (which causes stroke), the heart (which causes a heart attack), the kidneys, the arms, the legs and other vital areas. Plaque may break off to block an artery, or a blood clot (thrombus) may form on the surface of the plaque-either of these two circumstances can lead to a heart attack or stroke.
HEART ATTACK

A heart attack often presents with one or more of the following symptoms:

- Chest tightness, pressure, or discomfort
- Nausea
- Sweating
- Shortness of breath
- Fatigue
- Weakness
- Pain in the jaw or arm
- Pallor (pale color of the skin)

Women and people with diabetes often present with atypical symptoms, such as nausea and vomiting or back pain. About one-third of patients report no chest pain at all.

WHAT CAN YOU DO?

- Recognize the symptoms and signs of a heart attack.
- Call 911.
- Don’t let the patient drive him or herself to the hospital
- Keep the patient calm and seated in a position that is comfortable.
- **Offer 1 adult aspirin or 2 baby aspirin**- aspirin should be chewed before swallowing to speed absorption (Note: do not give if the patient has already taken aspirin or if the patient has an allergy to aspirin)
- Be prepared to start CPR if it becomes necessary
STROKE

You should suspect stroke if a patient or victim presents with:

- Severe headache with no known cause
- Numbness or weakness of the face, arm or leg on one side of the body
- Drooping eyelid or mouth on one side
- Confusion or trouble understanding
- Difficulty speaking (slurred speech or difficulty finding words)
- Loss of balance or coordination
- Dizziness
- Trouble with vision (i.e. blurred or double vision, loss of vision in one eye)

WHAT CAN YOU DO?

- **Know the signs and symptoms** of a stroke
- **Call 911**
- Don’t give the patient food or drink
- Keep the patient calm and quiet
- Monitor the patient
- Be prepared to begin CPR if it becomes necessary

A stroke is caused by one of two mechanisms: it can be caused by a ruptured blood vessel in the brain (called a hemorrhagic stroke) or by a blockage in one of the arteries that causes loss of blood flow and oxygen to a part of the brain (called an ischemic stroke). Ischemic strokes are more common. Remember that “Time is brain,” and act quickly. Stroke is the 3rd leading cause of death in the United States.
Signs of a Stroke

**Brain**
- confusion, trouble talking or understanding speech, dizziness, loss of balance, bad headache

**Eyes**
- trouble seeing in one or both eyes

**Stomach**
- throwing up (or urge to)

**Body**
- feel tired

**Legs**
- trouble walking

**Face, Arm, or Leg**
- numbness or weakness (mainly on one side of the body)
Guideline Changes

For anyone who has taken CPR prior to 2010, there have been a few key changes since the 2010 Guidelines were instituted. These changes include:

- Changing from the ABCs (Airway-Breathing-Circulation) to a C-A-B sequence of steps. This was one of the major changes that took place in 2010, when research showed that decreasing the delay in beginning chest compressions lead to a higher incidence of ROSC (return of spontaneous circulation). Rescuers are now trained to provide interventions in the following order: 1) Chest Compressions, 2) Airway, and 3) Breathing. Decreasing the delay in beginning compressions increases survival rates.

- The removal of “Look, listen and feel” for breathing. It is often hard for even trained providers to identify effective breathing. It is no longer recommended to look, listen and feel to determine whether a victim is breathing. Rather, if the victim is not responsive, has no pulse, and is not breathing or is breathing in an irregular fashion (i.e. only gasping), begin CPR immediately!

- Emphasis on high-quality CPR. High-quality CPR is defined as:
  - Compression rate of 100-120 beats per minute on victims of all ages;
  - Compression depth of AT LEAST 2 inches in adults (but no greater than 2.4 inches). Allow the chest to completely expand (recoil) after each compression (do not lean on the chest between compressions);
  - Not interrupting CPR except to use an AED (keep interruptions in chest compressions to less than 10 seconds);
  - Avoiding excessive ventilations;
  - Above all else, PUSH HARD AND FAST!

- Since many responders (even professionals) are unable to feel or palpate a pulse quickly, the recommendation is to feel for a pulse for NO MORE THAN 10 seconds. If you can’t feel a pulse or if you’re not sure you can feel a pulse, begin CPR.

- It has been recognized that health care professionals should call for assistance when they come upon an unconscious victim, but they may also simultaneously assess breathing and check for a pulse before fully activating the emergency response system. This may encourage efficiency in assessment and response, rather than following a step-by-step response.

- Health care professionals may tailor their response to an unconscious victim by altering the response sequence to fit the situation or scenario (using an AED immediately when one is close by and the arrest is witnessed, or providing ventilations first when the cause of arrest is known to be an anoxic event (i.e. drowning).
• Rescuers should provide 1 breath every 6 seconds when an advanced airway is in place and compressions are ongoing continuously (rather than trying to remember a range of ventilations for adults, children and infants).
The Adult Chain of Survival represents a continuum of care, from early recognition of the victim in cardiac arrest to post-resuscitation care to provide the best chance of survival from cardiac arrest. The five links in the Adult Chain of Survival include:

- Early recognition of cardiac arrest
- Activation of the Emergency Response System
- Early CPR, with an emphasis on high-quality chest compressions
- Early defibrillation
- Comprehensive post-cardiac arrest care

Note that in the diagram above, the first two of the five steps (early recognition of cardiac arrest and activation of the emergency response system) have been combined to acknowledge the fact that these steps often occur simultaneously when multiple rescuers are present.
THE TEAM APPROACH

In many situations, there may be only one rescuer who will carry out the normal sequence of assessments and actions. However, in many situations, there is often more than one rescuer trained and willing to help.

This is when a team approach can be used. The first rescuer should take the role of team leader and delegate tasks. One rescuer can provide compressions, one can prepare to give breaths with a bag-valve mask, and one can prepare the AED. By working together, the most efficient care can be given to the patient.

Chest Compressions for Adults

Chest compressions are the most important component of CPR. Chest compressions are an attempt to mimic the normal activity of the heart. When a rescuer presses down on a victim’s chest, blood is forced out of the heart and into the arteries. When pressure on the chest is released, blood is allowed to return to the heart. A small amount of oxygen will be present in the bloodstream for several minutes after the heart ceases to beat, just enough to keep the brain alive. Compressions can keep vital organs functioning until higher level care is available.

Adult Chest Compressions
To perform compressions on an adult, place the heel of your non-dominant hand on the victim’s chest between the nipples. Then place your other hand on top of the first and interlace your fingers. The heel of your hand should be pressing on the bottom two-thirds of the sternum, avoiding the xiphoid process (the small bony prominence at the very bottom of the sternum (breastbone). You should be as close to the victim’s side as possible, with your knees against the victim’s side (this will help prevent back injury). Lock your elbows and press down hard, depressing the sternum at least 2 inches (5 cm), but no more than 2.4 inches (6 cm). Your shoulders should be positioned directly over your hands in a straight line. Push hard and fast 100 to 120 times per minute, counting out loud as you do so. It’s important that you allow the chest to recoil (return to it’s normal, relaxed position) in between compressions. If you do not allow the chest to recoil, the heart will not fill completely, which means that less blood (and therefore oxygen) will be pumped out of the heart to vital organs with the next compression.

Performing compressions is exhausting. Most people find that they become very tired after providing compressions for 2 or 3 minutes. When a person performing compressions becomes fatigued, there is a tendency to compress less firmly and more slowly; for this reason, it is recommended that rescuers trade off doing compressions every 2 minutes to prevent fatigue and optimize the quality of compressions. If you are alone, you will have to do the best you can- keep performing compressions until help arrives or you are physically so exhausted that you cannot continue.
One Rescuer Adult CPR

If you are alone and come across an individual who is down, follow the steps below. If someone else is in the area to assist, use the ‘Two Rescuer’ sequence.

Stay Safe: If you come upon an individual who may need CPR, look around and make sure you and the victim are in a safe place. For example, if the victim is in water or on a road, try to move the victim to a safer area. If you are in a safe area, do not try to move the victim as he/she may have other injuries (i.e., to the head or neck) that you cannot see. Simply roll him over onto his back. Make sure the victim is on a firm surface, in case compressions are needed.

Assess the Victim: To quickly assess the victim, shake his shoulder and yell at him. Check for breathing. If he/she is not breathing, or is not breathing normally (i.e., only gasping), you must summon help. Note: Agonal breathing is breathing that is very slow, shallow and/or gasping. Agonal breathing is a sign that the victim is dying. It is important not to mistake agonal breathing for normal breathing!

Activate the Emergency Response System and Find an AED: Yell for help. If someone responds, tell him/her to call for help by dialing 9-1-1. If you are in an area where an AED may be available, tell him to go find the AED. Make sure you tell the person to return to assist you as soon as possible. If you are alone, call for help by dialing 9-1-1 and run to get the AED if you know where one is nearby. If you do not know where an AED is, begin CPR immediately after calling for help. Mobile phones have made activating the emergency response system much easier- you can call 9-1-1 and put your phone on speaker while you start CPR.

Begin CPR

1. Check for a pulse on the side of the neck. Feel for a pulse for at least 5 seconds but NO MORE THAN 10 seconds. To check for a carotid pulse, slide 2 or 3 fingers into the groove between the windpipe and the neck muscles at the side of the neck.

2. If there is no pulse (or if you are unsure if there is a pulse), begin CPR starting with chest compressions. Provide 30 chest compressions, followed by two breaths. NOTE: If you are not comfortable giving rescue breathing and/or you do not have a mask available, do ‘Compression Only’ CPR.
   a. Use the heel of one hand on the lower half of the breastbone in the middle of the chest.
   b. Place the other hand on top of the first hand.
   c. Straighten your arms and lock your elbows so that your body weight is over your hands.
d. The most important part of CPR is to remember to push HARD and FAST. Each compression should be AT LEAST two inches deep (but no more than 2.4 inches) and the rate should be 100-120 compressions per minute.

e. Be sure to let up on the pressure on the sternum after each compression (chest recoil) so the chest can re-expand and blood can flow back into the heart. The purpose of CPR is to help the blood flow through the heart and into the rest of the vital organs; if you allow the chest to re-expand, more blood will flow into the heart and will be available to deliver to the rest of the body.

f. Count out loud as you do compressions. When you have done 30 compressions, try to open the victim’s airway by doing a head tilt/chin lift. Note that if you are doing ‘Compressions Only’ CPR, you can skip this step.
   i. With your non-dominant hand, push on the victim’s forehead to tilt the head back.
   ii. With your dominant hand, place your fingers under the bony part of the lower jaw and gently lift the jaw to bring the chin forward. Be sure you lift up on the bony part of the jaw and not the soft tissue under the jaw so you don’t block the victim’s airway. Do not use your thumb to lift the jaw. Allow the victim’s mouth to remain slightly open.
   iii. If you think the person’s neck may be injured, avoid the head tilt/chin lift. Use the jaw thrust maneuver if you have been trained to do so.

g. If you have a barrier device to use between your mouth and the victim’s face, use it. Although the risk of infection from performing CPR is very, very low, it is expected that healthcare workers use a barrier device when providing CPR. This includes the use of face masks or bag-mask devices (see next section). Give each breath slowly – each breath should last one second. Make sure the chest rises with each breath. Repeat, giving a second breath.

h. Start another cycle of chest compressions. Remember, push HARD and FAST. Alternate chest compressions (30) and giving breaths (2) until help arrives.
Adult BLS/CPR (outside hospital)

1. Secure Scene

2. Responsive and Breathing?
   - Yes
     - Continue to Monitor
   - No
     - Call for help; Get AED

3. Pulse felt within 10 seconds?
   - Yes
     - Feel for carotid
     - Pulse for 5-10 seconds
   - No
     - Perform compressions

4. After 30 compressions
   - Open airway and give 2 rescue breaths

5. Connect to AED when AED arrives

Compressions at least 2 inches deep and at least 100/minute. Allow chest recoil between compressions.
Airway/ Breathing

Face masks provide a barrier between the rescuer and the victim. Some masks are equipped with a one-way valve that allows the rescuer’s breaths to enter the victim’s airway, but prevents the victim’s expired air from entering the rescuer’s airway. These masks also prevent contact with vomitus and blood, which could pose an infection risk to the rescuer. It takes practice to learn how to use these masks effectively to provide ventilations.

Using a Face Mask:

a) Position yourself at the victim’s side. If you are a lone (single) rescuer, positioning yourself at the victim’s side will allow you to provide both ventilations and compressions without having to move.

b) Position the mask on the victim’s face. Masks are usually triangular in shape, and you will notice that the mask has a “pointy” end- this end goes over the bridge of the victim’s nose.

c) Seal the mask against the victim’s face. To do this, take the hand that is closest to the top of the victim’s head and place it along the edge of the mask. Some people find it easier to form a ‘C’ with their index finger and thumb and use these digits to grasp the mask around the base of the mouthpiece. With the thumb of your other hand, apply pressure along the bottom edge of the mask. Then place the remaining fingers of your second hand along the bony edge of the jaw and lift the jaw upwards. Open the airway by performing a head-tilt chin-lift procedure. While you lift the jaw, ensure that you are sealing the mask all the way around the outside edge of the mask to obtain a good seal against the victim’s face.

d) Deliver air over 1 second, ensuring that the victim’s chest rises.

e) If the victim’s chest does not rise, reposition the mask and try to get a better seal. Remember, you should be lifting the victim’s jaw into the mask, rather than simply pushing the mask down onto the victim’s face.

f) Provide 2 ventilations over 1 second each with the mask after every 30 compressions.

g) If the victim has a pulse but is not breathing, provide rescue breathing by providing 1 breath every 5 to 6 seconds (10-12 breaths/minute). Check for a pulse every 2 minutes- if there is no pulse, start chest compressions along with ventilations at a rate of 30:2.
Using a Bag-Mask Device:

A bag-mask device (or BVM, bag-valve mask) consists of a mask attached to a reservoir bag. They are commonly used to provide positive-pressure ventilations during CPR. They can be attached to an oxygen source to provide 100% oxygenation during resuscitation. As with the face mask, it takes practice to be able to use a bag-mask device. It can also be very difficult for one person to use a bag-mask device; therefore, it is recommended that use of a bag-mask device be used only when there are two rescuers available.

The steps to using a bag-mask device are as follows:

a) Position yourself at the top of the victim’s head - this allows room for the second rescuer to provide compressions.
b) Place the mask of the bag-mask device on the victim’s face, using the bridge of the patient’s nose as a guide to correct positioning.
c) Use the E-C clamp technique to hold the mask in the correct position while you lift the jaw to obtain an open airway. To perform the E-C clamp technique, take the index finger and thumb of your non-dominant hand and form them into a ‘C’ around the top of the mask. Your other fingers of the same hand are used to lift the jaw (the ‘E’ part of the E-C clamp technique.
d) Squeeze the bag to deliver a breath - each breath should be delivered over 1 second. Watch for chest rise. If you do not observe chest rise, you do not have a tight seal. If this occurs, reposition the mask and try again. Be careful not to overinflate the lungs - each breath should result in visible and natural chest rise.
e) Provide 2 ventilations after every 30 compressions. If the patient has a pulse but is not breathing, provide one breath every 5-6 seconds (10-12 breaths/minute) and check for a
pulse every 2 minutes. If the victim loses their pulse, you will need to begin chest compressions.

The Jaw Thrust Maneuver

If you suspect that a victim may have a neck or spinal cord injury (i.e., the victim has fallen, been in a motor vehicle accident or suffered another mechanism of injury that could result in injury to the neck or spinal cord), you should not use the head tilt-chin lift maneuver to open the victim’s airway. This could further damage the neck or spinal cord. Instead, you should use the jaw thrust maneuver to open and maintain the victim’s airway.

To perform this maneuver:

a) Place your hands on either side of the victim’s head. Rest your elbows on the surface that the victim is laying on.
b) Put the fingers of both your hands under the angle of the victim’s lower jaw and lift so that the jaw slides forward.
c) Use your thumb to push the lower lip away from you if the victim’s lips close.
Two Rescuer Adult CPR (without an AED)

If you come across a victim who is down and another person is available to help, send that person to activate the Emergency Response System and find an AED while you assess whether the victim needs CPR. When you have determined that the victim requires CPR, start CPR beginning with compressions. When the second person returns (without an AED in this case):

- You should continue chest compressions and count the compressions aloud each time you compress the victim’s chest.
- The second rescuer should keep the person’s airway open using the head tilt-chin lift maneuver. The second rescuer should give two rescue breaths after every 30 compressions, using a face mask or a bag-mask device.
- You and the second rescuer should switch positions/roles about every two minutes so neither one of you gets tired. If you are counting out loud, two minutes is about 5 cycles of thirty compressions and two breaths. You should change positions sooner if the person doing compressions becomes too tired to perform high-quality compressions.
- Continue switching roles as above until EMS arrives to relieve you or the victim regains consciousness.
Using an AED

An AED, or automated external defibrillator, is a device that has the ability to detect and treat, through electrical energy, the lethal arrhythmias known as ventricular fibrillation and ventricular tachycardia. These rhythms are a common cause of sudden cardiac arrest.

Ventricular fibrillation is a condition in which the lower chambers of the heart, the ventricles, quiver in an unorganized fashion, which renders them incapable of pumping blood to the rest of the body. Untreated, ventricular fibrillation rapidly causes cardiac arrest. Ventricular tachycardia is a rapid rhythm also originating in the ventricles. In ventricular tachycardia, the ventricles contract so quickly, albeit in a somewhat organized fashion, that inadequate blood flow is produced. Ventricular tachycardia often precedes ventricular fibrillation. Both rhythms are lethal if not treated.

An AED sends electrical energy (a ‘shock’) through the heart, which stuns the heart and allows the normal pacemaker of the heart, usually located in the right atrium, to take over and restore a normal heart rhythm.
Early defibrillation is key to survival in cardiac arrest. For each minute that defibrillation is delayed, the chance of survival is reduced by 10%. (after 10 minutes, few people are successfully resuscitated.)

Early defibrillation can increase survival rates to greater than 50%. Rescuers should immediately begin chest compressions, and use the AED as soon as it is available and ready to use.

AEDs can be found wherever crowds of people gather—swimming pools, airports, malls, sporting arenas, schools, hotels...More and more businesses are also investing in these life-saving machines. In some communities, private AED owners are registering their AEDs with ambulance dispatch, so that they can be easily located by bystanders when needed. Make it a point to learn where the AEDs in your neighborhood or town are located— you never know when you might need one!

AEDs have been designed to be extremely “user friendly”. All you need to do as a rescuer is turn on the machine (the most important step) and listen as the machine guides you through the steps to use the AED safely and effectively. Although there are many brands of AEDs on the market, they all work in a similar fashion and are designed to be used by lay rescuers.
When an AED becomes available (i.e., when you or another rescuer have retrieved it), place it at the victim’s side, closest to the rescuer who will operate it. In this way, the other rescuer can continue performing CPR until the AED is ready to analyze and deliver a shock (if needed).

There are four universal steps to using any AED. These will be highlighted in the following list of steps so they are easily recognizable.

The steps to use an AED are as follows:

1. **Turn on the machine.** This is the most important step—turning on the machine will enable the AED unit to guide you through the next steps. To turn on the AED, open the top of the carrying case and push the ON button. Note: some models will turn on automatically when you lift the lid of the carrying case.

2. **ATTACH AED pads** to the victim’s bare chest. Expose the patient’s chest. Dry it off if wet, shave excessive hair if possible. Use adult pads for victims who are 8 years of age or older. Peel off the adhesive backing. Place one pad on the upper right chest just below the collarbone. Place the other pad on the patient’s lower left ribcage, a couple of centimeters beneath the armpit. Some pads are marked—there will be a red heart on the pad that is to be placed on the victim’s left side (the heart side). Press pads firmly onto the patient’s chest. Then attach the connecting cables to the AED unit. Note: some cables will come preconnected.

3. **Analyze the rhythm.** When the AED unit instructs you to, CLEAR the victim while the machine is analyzing the victim’s heart rhythm. This means you should ensure that no one is touching the victim, including yourself. The rescuer performing chest compressions or giving breaths will need to stop at this point. Note: some AEDs will begin to analyze the victim’s rhythm independently; for others, you will need to push the ANALYZE button. Analyzing the victim’s rhythm will take up to 10 seconds, so don’t be alarmed by this.

4. **Push to shock.** If a shock is advised, the machine will clearly state “SHOCK ADVISED, STAND CLEAR”. You should ensure that no one is touching the victim, including yourself. You need to look around to make sure no one is touching the victim’s body while stating “CLEAR” or some similar message that warns others a shock is to be delivered. Once you are certain that no one is touching the victim, push the SHOCK button. You will notice that the victim’s muscles contract strongly.

   - If a shock is not necessary (the rhythm is not ventricular fibrillation or pulseless ventricular tachycardia), the AED will state NO SHOCK ADVISED and tell you to resume CPR.
   - After approximately 5 cycles of compressions and ventilations, or 2 minutes of CPR, the AED will instruct you to repeat steps 3 and 4—analyze the rhythm and push to shock if the rhythm requires a shock and the AED instructs you to do so.
   - Continue CPR alternating with analysis of the rhythm until help arrives (i.e. EMS).
Special Circumstances

There are times when using an AED may present special challenges. Here’s what to do when faced with one of the following:

- **The victim has a hairy chest**- ideally, you should use a razor to shave the areas that will be covered by the AED pads. If a razor is not available and the AED machine is prompting you to CHECK PADS or CHECK ELECTRODES, try pressing down firmly on the AED pads to ensure good contact with the skin. If the machine continues to prompt you, quickly pull off the pads- this should remove enough hair to allow a new set of pads to adhere firmly to the victim’s skin. Many AED machines are coming equipped with a razor in the carrying case to combat this problem. If you happen to own an AED, ensure that a razor is included in the case.

- **The victim is in water**- if the victim is in water, pull the victim to a dry area. You are not in danger of getting a shock if the victim is in water. Water is a great conductor of electricity, so if the victim is in water, the shock will be dispersed across the skin of the victim, and the victim will not receive the full dose of electrical energy required to convert them to a normal rhythm. If the victim’s chest is wet, quickly dry the chest with a towel or your sleeve; however, the chest does NOT need to be completely dry. If the victim is lying in a small puddle or in snow, you can safely use the AED without moving the victim.

- **The victim has an implanted pacemaker or defibrillator**- obviously, if the victim has one of these devices, it must have failed! You will recognize these devices as a small lump under the skin on the chest, usually the upper chest on either side. Some older models may be implanted in the abdomen. They are generally about the size of a deck of cards or smaller. You will also be able to see a scar over the area. If the victim has one of these devices, avoid placing the AED pad directly over it; doing so may block delivery of the shock.

- **The victim has a medication patch on their chest**- many medications can now be delivered transdermally (through the skin). These includes pain medications, hormones, smoking cessation drugs, nitroglycerin and others. Do not place an AED pad over one of these patches. If it won’t delay delivery of a shock, remove the patch and wipe the skin before applying the AED pad. These patches may cause the skin to burn under the AED pad if left in place, or they may block delivery of the shock.

Now you know what to do should you encounter one of these special circumstances.
Two Rescuer Adult CPR with an AED

We’ve learned a lot so far! Thus far, we’ve learned how to perform compressions, maintain the airway and use an AED on an adult victim. Now it’s time to put it all together. The following steps outline how to perform CPR with an AED when there are two rescuers present.

When you come across a victim who is down and there are two rescuers present:

- **Rescuer 1** checks for response and breathing- tap the victim on the shoulder and ask if they are okay. At the same time, observe the victim’s chest for breathing. If the victim is not breathing, or is breathing abnormally or only gasping, stay with the patient and prepare to perform the next steps.
- **Rescuer 2** activates the emergency response system and leaves to retrieve an AED.
- **Rescuer 1** checks for a carotid pulse for 5 to not more than 10 seconds. If a pulse is not felt, or the rescuer is not sure if there is a pulse, the rescuer will expose the chest (in preparation for AED use) and begin CPR, starting with chest compressions. **Rescuer 1** will continue cycles of chest compressions and ventilations with a pocket mask or bag-mask device until Rescuer 2 returns with an AED.
- **Rescuer 2** arrives with an AED and places it on the side opposite to **Rescuer 1**, who is performing chest compressions. **Rescuer 2** powers on the AED and attaches the pads to the victim’s chest, also attaching the cables to the AED unit if necessary. **Rescuer 1** should continue CPR while the pads are being placed, right up until it is time to analyze the victim’s heart rhythm.
- **Rescuer 2** CLEARS the victim, ensuring neither rescuer is touching the victim, and waits for the AED to ANALYZE, or pushes the ANALYZE button when prompted by the AED to do so.
- **Rescuer 2** pushes the SHOCK button if a shock is indicated, making sure that the victim is CLEAR beforehand.
- If no shock is needed, or after the victim has been shocked, **Rescuer 2** should resume chest compressions (as Rescuer 1 may be fatigued by this time) while **Rescuer 1** manages the victim’s airway and delivers breaths using the face mask or bag-mask device.
- After approximately 5 cycles of CPR, or 2 minutes, the AED will state that the victim’s rhythm should be ANALYZED. During analysis, which can take up to 10 seconds, **Rescuer 2** and **Rescuer 1** should switch positions, so that **Rescuer 1** CLEARS the victim, pushes SHOCK if a shock is advised, and immediately resumes chest compressions (or performs chest compressions if no shock is advised). **Rescuer 2** then takes over management of airway and breathing. Rescuers should switch positions every 2 minutes when it is time to ANALYZE the victim’s heart rhythm. This will prevent rescuer fatigue and ensure that rescuers are able to provide high-quality chest compressions at the proper rate and depth. CPR and analysis with the AED should continue until EMS arrives.
CPR with an Advanced Airway

When there is no advanced airway in place, rescuers must pause compressions to deliver breaths using a face mask or bag-mask device. Once an advanced airway is in place, there is no longer a need to pause compressions to deliver breaths.

Why is this? If the chest is compressed during ventilations, most of the air (and thus oxygen) delivered would be forced out of the victim’s mouth before it could enter the lungs. An advanced airway means that air is reliably delivered to the lungs, regardless of whether a rescuer is applying force to the chest at the same time a breath is being delivered.

Advanced airways include:

- Laryngeal mask airways (LMAs)
- Supraglottic airway (Combitube or King LT)
- Endotracheal (ET) tube

When an advanced airway is in place, compressions are delivered at a rate of 100-120 compressions per minute. Breaths are delivered over 1 second simultaneously at a rate of 1 breath every 6 seconds (10-12 breaths per minute).
Mouth-to-Mouth Breaths

Although it is necessary to use a pocket mask or bag-mask device to deliver breaths in the healthcare setting, there are times when these devices may not be available. Should a cardiac arrest occur at home, you would likely not hesitate to perform mouth-to-mouth breathing for a relative or loved one; you might choose to give mouth-to-mouth to a friend as well. In cases such as these, you will likely decide the benefit outweighs the risk to your own health.

To provide mouth-to-mouth breaths to an adult (or child aged 1 to 8 years):

1. Use the head tilt-chin lift to hold the victim’s airway open.
2. Using the hand on the victim’s forehead that is maintaining the head tilt-chin lift, pinch the victim’s nose closed using the thumb and index finger.
3. Inhale a regular breath, then cover the victim’s mouth with your own, creating a tight seal.
4. Give one breath over 1 second, watching to see if the chest rises.
5. If the chest doesn’t rise as you give the breath, repeat the head tilt-chin lift.
6. Give a second breath over 1 second and watch for chest rise.
7. If the second breath fails to go in, go immediately to chest compressions.

You may wonder how mouth-to-mouth breathing can sustain the victim. In actual fact, your expired air contains about 17% oxygen—this is just enough oxygen to meet the victim’s needs.

When providing mouth-to-mouth breathing, it is important not to provide breaths that are too forceful or too rapid. Doing so may cause air to enter the stomach rather than the lungs, which can cause gastric inflation. Gastric inflation may result in vomiting, and an unconscious victim may develop pneumonia if vomitus makes its way to the lungs. To avoid gastric inflation, give each breath slowly over 1 second and deliver just enough air to make the chest rise.

Rescue Breathing

Respiratory arrest is defined as the cessation of breathing. During respiratory arrest, as well as inadequate breathing, the victim will still have some amount of cardiac output, which you will be able to detect as a palpable pulse.

It is important to be able to recognize respiratory arrest, or impending respiratory arrest, which may be seen as slow, irregular or gasping respirations. These abnormal respirations are inadequate to support life. Respiratory arrest inevitably leads to cardiac arrest if not treated, therefore healthcare providers should intervene quickly to prevent this deterioration by providing rescue breathing.

To provide rescue breathing when the victim has a pulse, give 1 breath every 5 to 6 seconds.
Choking in the Conscious Adult or Child (older than 1 year of age)

1. STAND (OR KNEEL) BEHIND THE VICTIM AND WRAP YOUR ARMS AROUND THE VICTIM’S WAIST.
2. PUT ONE FOOT IN BETWEEN THE VICTIM’S FEET AND ONE FOOT BEHIND YOU—THIS POSITION PROVIDES STABILITY SHOULD THE VICTIM BECOME UNCONSCIOUS AND YOU NEED TO EASE THE VICTIM TO THE GROUND.
3. PLACE YOUR FIST WITH THE THUMB SIDE IN JUST ABOVE THE VICTIM’S BELLYBUTTON AND WELL BELOW THE STERNUM (BREASTBONE).
4. GRAB YOUR FIST WITH YOUR OTHER HAND.
5. ADMINISTER ABDOMINAL THRUSTS, PULLING INWARD AND UPWARD UNTIL THE FOREIGN OBJECT COMES OUT OR THE PATIENT BECOMES UNCONSCIOUS. EACH THRUST SHOULD BE FORCEFUL, DISTINCT AND SEPARATE.

NOTE: FOR PREGNANT OR OBESE PATIENTS, GIVE CHEST THRUSTS INSTEAD OF ABDOMINAL THRUSTS.
Choking in the Unconscious Adult or Child

1. IF YOU ARE CARING FOR SOMEONE WHO IS CHOKING AND THEY LOSE CONSCIOUSNESS, LOWER THE VICTIM GENTLY TO THE GROUND.
2. ACTIVATE EMS/CALL 9-1-1
3. BEGIN CPR, STARTING WITH CHEST COMPRESSIONS- DO NOT CHECK FOR A PULSE.
4. EACH TIME YOU OPEN THE AIRWAY TO PROVIDE VENTILATIONS, OPEN THE VICTIM’S MOUTH AND CHECK FOR THE OBJECT. IF YOU CAN SEE THE OBJECT, TURN THE VICTIM’S HEAD TO THE SIDE AND SWEEP IT OUT OF THE VICTIM’S MOUTH WITH YOUR INDEX FINGER. NEVER PERFORM A BLIND FINGER SWEEP- THIS MAY FORCE THE OBJECT FARTHER DOWN THE VICTIM’S AIRWAY.
5. IF YOU DO NOT SEE THE OBJECT, ATTEMPT TO PROVIDE BREATHS. IF BREATHS WILL NOT GO IN, RESUME CHEST COMPRESSIONS.
6. AFTER APPROXIMATELY 5 CYCLES OF COMPRESSIONS AND (ATTEMPTED) VENTILATIONS, ACTIVATE EMS/CALL 9-1-1 IF NOT ALREADY DONE.
7. IF THE OBSTRUCTION IS RELIEVED, CHECK RESPONSIVENESS, BREATHING AND PULSE. PROVIDE RESCUE BREATHING OR CPR AS REQUIRED. IF THE VICTIM IS RESPONSIVE, THEY SHOULD BE TAKEN TO HOSPITAL TO RULE OUT ANY INJURY CAUSED BY ABDOMINAL OR CHEST THRUSTS.

MOVING VICTIMS

It is generally not recommended that a rescuer move a victim unless there is a direct danger to the victim’s (or rescuer’s) life, or if it is necessary to provide care. Try to immobilize the spine and protect the head, neck, and back if it is necessary to move a victim.
Recovery position

An unconscious victim who is breathing and has a pulse should be assisted into the recovery position to protect the airway.

This position keeps the airway open, prevents aspiration of fluids into the lungs and allows fluid (such as saliva or blood that could occlude the airway) to drain from the mouth.

1. Extend the victim’s arm that is closest to you above the victim’s head.
2. Place the victim’s leg that is farthest away from you over his other leg.
3. Place the victim’s arm that is farthest from you across his chest.
4. Supporting the head and neck, roll the victim towards you.
5. Position his or her top leg so the knee props up the victim’s body
6. Place the victim’s hand or arm under his/ her chin to aid in keeping the airway open.
## CPR CERTIFICATION SKILLS REVIEW

<table>
<thead>
<tr>
<th>Skill</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check scene safety</td>
<td>Ensure the safety of the scene before entry</td>
</tr>
<tr>
<td>Determine patient responsiveness</td>
<td>Tap on the shoulder and shout, “Are you OK?”&lt;br&gt;Look for gasping, abnormal breathing, or absence of chest movement.</td>
</tr>
<tr>
<td>Activate EMS – Call for help!</td>
<td>If alone with no mobile phone, leave the victim to activate EMS and retrieve AED before returning to victim. If another person is available, ask them to activate EMS, get an AED and return to provide assistance.</td>
</tr>
<tr>
<td>Check pulse</td>
<td>Check for a pulse for no more than 10 seconds in the carotid artery of the neck.</td>
</tr>
<tr>
<td>Compressions:</td>
<td>30:2 at 100-120/minute.&lt;br&gt;Use both hands.&lt;br&gt;Depth of compressions 2” minimum to 2.4” maximum.</td>
</tr>
<tr>
<td>Hard and Fast</td>
<td></td>
</tr>
<tr>
<td>Airway</td>
<td>Head tilt/chin lift. Check mouth for obstruction, foreign matter for choking victims. Use jaw thrust if suspected neck/spinal cord injury</td>
</tr>
<tr>
<td>Breathing</td>
<td>2 breaths over 1 second each, following 30 compressions. Watch for chest rise.&lt;br&gt;When an advanced airway is present, give 1 breath every 6 seconds while continuous chest compressions are being performed.</td>
</tr>
<tr>
<td>Rescue breathing: Patient with pulse and not breathing or gasping</td>
<td>1 breath every 5-6 seconds, reposition airway if breaths aren’t going in, recheck pulse every 2 minutes</td>
</tr>
<tr>
<td>AED</td>
<td>Give CPR until AED is available and charged- use AED as soon as it is available.</td>
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</tbody>
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Child and Infant CPR

FOLLOWS 2010 ECC/ILCOR GUIDELINES

Updated with 2015 Guidelines
Welcome!

We’re excited that you’ve decided to take Child and Infant CPR, and that you’ve chosen us to direct your learning experience.

You never know when you may be called upon to perform CPR on a child or infant. All parents, grandparents, babysitters, older siblings, daycare workers, teachers and anyone else who lives or works with children should learn how to perform CPR when disaster strikes. CPR can save a child’s life by providing the brain, heart and other organs with life-giving oxygen in the event of respiratory and/or cardiac arrest. Drowning, poisoning, accidents, smoke inhalation and SIDS are only a few of the emergencies that could result in death if not treated quickly.

In this course, you will learn:

- The Pediatric Chain of Survival and your place within the chain
- How to provide high quality chest compressions for children and infants
- How to initiate early use of an AED (automated external defibrillator)
- How to provide rescue breathing for pediatric victims of respiratory arrest
- How to provide CPR to children and infants when there are 2 rescuers
- How to assist child and infant victims of choking

Let’s get started!
Chest Compressions

Chest compressions are the most important component of CPR. Chest compressions are an attempt to mimic the normal activity of the heart. When a rescuer presses down on a victim’s chest, blood is forced out of the heart and into the arteries. When pressure on the chest is released, blood is allowed to return to the heart. A small amount of oxygen will be present in the bloodstream for several minutes after the heart ceases to beat, just enough to keep the brain alive. Compressions can keep vital organs functioning until higher level care is available.

To perform compressions on a child victim (aged 1 to puberty*):

To perform compressions on a child, place the heel of your non-dominant hand on the victim’s chest between the nipples. Then place your other hand on top of the first and interlace your fingers. The heel of your hand should be pressing on the bottom two-thirds of the sternum, avoiding the xiphoid process (the small bony prominence at the very bottom of the sternum (breastbone). You should be as close to the victim’s side as possible, with your knees against the victim’s side (this will help prevent back injury and fatigue). Lock your elbows and press down hard, depressing the sternum at least 1/3 the depth of the chest, or approximately 2 inches (5 cm). If you find that you are pressing too deeply with two hands, use only one hand. Your shoulders should be positioned directly over your hands in a straight line. Push hard and fast 100 to 120 times per minute, counting out loud as you do so. It’s important that you allow the chest to recoil (return to it’s normal, relaxed position) in between compressions. If you do not allow the chest to recoil, the heart will not fill completely, which means that less blood (and therefore oxygen) will be pumped out of the heart to vital organs with the next compression.

Performing compressions is exhausting. Most people find that they become very fatigued after providing compressions for just a few minutes. When a person performing compressions becomes fatigued, there is a tendency to compress less firmly and more slowly; for this reason, it is recommended that rescuers trade off doing compressions every 2 minutes to prevent fatigue and optimize the quality of compressions. If you are alone, you will have to do the best you can– keep performing compressions until help arrives or you are physically unable to do so.
*Note that puberty, for the purposes of CPR, is defined as the presence of underarm hair in males or any breast development in a female.

One Rescuer Child CPR

If you are alone and come across a child who is down, follow the steps below. If someone else is immediately available to assist, use the ‘Two Rescuer’ sequence.

Stay Safe: If you come upon a child who may need CPR, look around and make sure you and the child are in a safe place. If the child is in water or on a road, try to move the child to a safer area. If you are in a safe area, do not try to move the child as he/she may have other injuries that you cannot see. Simply roll him/her over onto his back. Make sure the child is on a firm surface, in case compressions are needed.

Assess the Victim: To quickly assess the victim, shake his shoulder and yell at him. Check for breathing. If he/she is not breathing, or is not breathing normally (i.e., only gasping), shout for help.

Activate the Emergency Response System and Find an AED: Yell for help. If someone responds, tell him/her to call for help by dialing 9-1-1. If you are in an area where an AED may be available, tell him/her to go find the AED. Make sure you tell the person to return to assist you as soon as possible. If you are alone and witnessed the child collapse, call for help by dialing 9-1-1 and run to get the AED if you know where one is nearby. If you do not know where an AED is, begin CPR immediately after dialing 9-1-1.

Begin CPR

1. Check for a pulse on the side of the neck. Feel for a pulse for at least 5 seconds but NO MORE THAN 10 seconds. To check for a carotid pulse, slide 2 or 3 fingers into the groove between the traches (windpipe) and the neck muscles at the side of the neck. Alternately, you can check for a pulse in the femoral artery located in the groin. To do this, place two fingers in the inner thigh, part way between the pubic bone and the hip bone, just below the crease where the leg joins the abdomen. Remember, do not feel for a pulse for more than 10 seconds.

2. If there is no pulse or the pulse is less than 60 /minute with signs of poor perfusion* (or if you are unsure if there is a pulse), begin CPR starting with chest compressions. Provide 30 chest compressions, followed by two breaths. NOTE: If you are not comfortable giving rescue breathing and/or you do not have a mask available, do ‘Compression Only’ CPR.

   a. Use the heel of one hand on the lower half of the breastbone in the middle of the chest.

   b. Place the other hand on top of the first hand.
c. Straighten your arms and lock your elbows so that your body weight is over your hands.
d. The most important part of CPR is to remember to push HARD and FAST. Each compression should be one-third the depth of the chest or approximately two inches deep and the rate should be 100-120 compressions per minute.
e. Be sure to let up on the pressure on the sternum after each compression (chest recoil) so the chest can re-expand and blood can flow back into the heart. The purpose of CPR is to help the blood flow through the heart and into the rest of the vital organs; if you allow the chest to fully re-expand, more blood will flow into the heart and will be available to deliver to the rest of the body.
f. Count out loud as you do compressions. When you have done 30 compressions, try to open the victim’s airway by doing a head tilt/chin lift. Note that if you are doing ‘Compressions Only’ CPR, you can skip this step.
   i. With your non-dominant hand, push on the victim’s forehead to tilt the head back.
   ii. With your dominant hand, place your fingers under the bony part of the lower jaw and gently lift the jaw to bring the chin forward. Be sure you lift up on the bony part of the jaw and not the soft tissue under the jaw so you don’t block the victim’s airway. Do not use your thumb to lift the jaw. Allow the victim’s mouth to remain slightly open.
   iii. If you think the person’s neck may be injured, avoid the head tilt/chin lift and use the jaw thrust maneuver if you have been trained to do so. Instructions for performing a jaw thrust are provided later in the unit.
g. If you have a barrier device to use between your mouth and the child’s face, use it. Although the risk of infection from performing CPR is very, very low, it is recommended to use a barrier device when providing CPR. This includes the use of face masks. Give each breath slowly – each breath should last one second. Make sure the chest rises with each breath. Repeat, giving a second breath.
h. Start another cycle of chest compressions. Remember, push HARD and FAST. Alternate chest compressions (30) and breaths (2) until help arrives.

*Signs of poor perfusion: this refers to a lack of blood flow that results in certain visible signs, including pale skin color or bluish discoloration of the skin. Fingers, earlobes, lips and nail beds may look bluish or light gray. Sometimes there may be mottling, which is a mixture of a purplish or blotchy red-blue coloring on the extremities (arms or legs).
Airway/ Breathing

Face masks provide a barrier between the rescuer and the victim. Some masks are equipped with a one-way valve that allows the rescuer’s breaths to enter the victim’s airway, but prevents the victim’s expired air from coming in contact with the rescuer’s airway. These masks also prevent contact with vomitus and blood, which could pose an infection risk to the rescuer. These masks can be purchased online for minimal cost, and can be kept virtually anywhere- in a purse, car or at home. It takes practice to learn how to use these masks effectively to provide ventilations.

Using a Face Mask:

a) Position yourself at the victim’s side. If you are a lone (single) rescuer, positioning yourself at the victim’s side will allow you to provide both ventilations and compressions without having to move.

b) Position the mask on the victim’s face. Masks are usually triangular in shape, and you will notice that the mask has a “pointy” end- this end goes over the bridge of the victim’s nose.

c) Seal the mask against the victim’s face. To do this, take the hand that is closest to the top of the victim’s head and place it along the edge of the mask. Some people find it easier to form a ‘C’ with their index finger and thumb and use these digits to grasp the mask around the base of the mouthpiece. With the thumb of your other hand, apply pressure along the bottom edge of the mask. Then place the remaining fingers of your second hand along the bony edge of the jaw and lift the jaw upwards. Open the airway by performing a head-tilt chin-lift procedure. While you lift the jaw, ensure that you are sealing the mask all the way around the outside edge of the mask to obtain a good seal against the victim’s face.

d) Deliver air over 1 second, ensuring that the victim’s chest rises.

e) If the victim’s chest does not rise, reposition the mask and try to get a better seal. Remember, you should be lifting the victim’s jaw into the mask, rather than simply pushing the mask down onto the victim’s face.

f) Provide 2 ventilations over 1 second each with the mask after every 30 compressions.

g) If the victim has a pulse but is not breathing, provide rescue breathing by providing 1 breath every 3 to 5 seconds (12-20 breaths per minute). Check for a pulse every 2 minutes- if at any time the victim loses their pulse, start chest compressions along with ventilations at a rate of 30:2.
Mouth-to-Mouth Breaths

Although it is recommended to use a face mask to deliver breaths, there are times when these devices may not be necessary. Should a cardiac arrest occur at home, you would likely not hesitate to perform mouth-to-mouth breathing for your own child; you might choose to give mouth-to-mouth to a child in your care as well. In cases such as these, you will likely decide the benefit outweighs the risk to your own health, which is very, very small to begin with.

To provide mouth-to-mouth breaths to a child:

1. Use the head tilt-chin lift to hold the victim’s airway open.
2. Using the hand on the victim’s forehead that is maintaining the head tilt-chin lift, pinch the victim’s nose closed using the thumb and index finger.
3. Inhale a regular breath, then cover the victim’s mouth with your own, creating a tight seal.
4. Give one breath over 1 second, watching to see if the chest rises.
5. If the chest doesn’t rise as you give the breath, repeat the head tilt-chin lift.
6. Give a second breath over 1 second and watch for chest rise.
7. If the second breath fails to go in, go immediately to chest compressions.

The Jaw Thrust Maneuver

If you suspect that a child may have a neck or spinal cord injury (i.e., the child has fallen, been in a motor vehicle accident or suffered another mechanism of injury that could result in injury to the neck or spinal cord), you should not use the head tilt-chin lift maneuver to open the victim’s airway. This could further damage the neck or spinal cord. Instead, you should use the jaw thrust maneuver to open and maintain the victim’s airway.
To perform this maneuver:

a) Place your hands on either side of the victim’s head. Rest your elbows on the surface that the victim is laying on.

b) Put the fingers of both your hands under the angle of the victim’s lower jaw and lift so that the jaw slides forward.

c) Use your thumb to push the lower lip away from you if the victim’s lips close.

Using an AED

An AED, or automated external defibrillator, is a device that has the ability to detect and treat, through electrical energy, the lethal arrhythmias known as ventricular fibrillation and ventricular tachycardia.

Ventricular fibrillation is a condition in which the lower chambers of the heart, the ventricles, quiver in an unorganized fashion, which renders them incapable of pumping blood to the rest of the body. Untreated, ventricular fibrillation rapidly causes cardiac arrest. Ventricular tachycardia is a rapid rhythm originating in the ventricles. In ventricular tachycardia, the ventricles contract so quickly, albeit in a somewhat organized fashion, that inadequate blood flow is produced. Ventricular tachycardia often precedes ventricular fibrillation. Both rhythms are lethal if not treated.

An AED sends electrical energy (a ‘shock’) through the heart, which stuns the heart and allows the normal pacemaker of the heart, usually located in the right atrium, to take over and restore a normal heart rhythm.

**Early defibrillation is key to survival in cardiac arrest.** For each minute that defibrillation is delayed, the chance of survival is reduced by 10%. (after 10 minutes, few people are successfully resuscitated.)

Early defibrillation can increase survival rates to greater than 50%. Rescuers should immediately begin chest compressions, and use the AED as soon as it is available and ready to use.
AEDs can be found wherever crowds of people gather—swimming pools, airports, malls, sporting arenas, schools, hotels...more and more businesses are also investing in these life-saving machines. In some communities, private AED owners are registering their AEDs with ambulance dispatch, so that they can be easily located by bystanders when needed. Make it a point to learn where the AEDs in your neighborhood or town are located— you never know when you might need one! If you work in a place that has an AED, make sure you are familiar with the AED should you ever need to use it.

AEDs have been designed to be extremely “user friendly”. All you need to do as a rescuer is turn on the machine (the most important step) and listen as the machine guides you through the steps to use the AED safely and effectively. Although there are many brands of AEDs on the market, they all work in a similar fashion and are designed to be used by lay rescuers.

When an AED becomes available (i.e., when you or another rescuer have retrieved it), place it at the child’s side, closest to the rescuer who will operate it. In this way, the other rescuer can continue performing CPR until the AED is ready to analyze and deliver a shock (if needed).

There are four universal steps to using any AED. These will be highlighted in the following list of steps so they are easily recognizable.

The steps to using an AED are as follows:

1. **Turn on the machine.** This is the most important step—turning on the machine will enable the AED unit to guide you through the next steps. To turn on the AED, open the
top of the carrying case and push the ON button. Note: some models will turn on automatically when you lift the lid of the carrying case.

2. **ATTACH AED pads** to the child’s bare chest. Expose the child’s chest. Dry it off if wet. Choose adult pads for victims who are 8 years of age or older, and choose pediatric pads for children aged 1 year to puberty. Peel off the adhesive backing. Place one pad on the upper right chest just below the collarbone. Place the other pad on the patient’s lower left ribcage, a couple of centimeters beneath the armpit. Some pads are marked—there will be a red heart on the pad that is to be placed on the victim’s left side (the heart side). For defibrillators equipped with child-sized pads, there will be a picture on the front of the package to indicate whether the pads are for an adult or child. Press pads firmly onto the patient’s chest. Then attach the connecting cables to the AED unit. Note: some cables will come preconnected.

3. **Analyze the rhythm.** If the AED unit instructs you to, CLEAR the victim while the machine is analyzing the child’s heart rhythm. This means you should ensure that no one is touching the child, including yourself. The rescuer performing chest compressions or giving breaths will need to stop at this point. Note: some AEDs will begin to analyze the victim’s rhythm independently; for others, you will need to push the ANALYZE button. Analyzing the victim’s rhythm will take up to 10-15 seconds, so don’t be alarmed by this.

4. **Push to shock.** If a shock is advised, the machine will clearly state “SHOCK ADVISED, STAND CLEAR”. You should ensure that no one is touching the victim, including yourself. You need to look around to make sure no one is touching the victim’s body while stating “CLEAR” or some similar message that warns others a shock is to be delivered. Once you are certain that no one is touching the victim, push the SHOCK button. You will notice that the victim’s muscles contract strongly.
   - If a shock is not necessary (the rhythm is not one that can be helped by delivery of a shock), the AED will state NO SHOCK ADVISED and tell you to resume CPR.
   - After approximately 5 cycles of compressions and ventilations, or 2 minutes of CPR, the AED will instruct you to repeat steps 3 and 4—analyze the rhythm and push to shock if the rhythm requires a shock and the AED instructs you to do so. If two rescuers are present, the rescuers should switch positions each time the AED is analyzing the rhythm to prevent fatigue related to delivery of compressions.
   - Continue CPR alternating with analysis of the rhythm until help arrives (i.e. EMS)

For victims younger than 8 years of age, some AEDs are modified to deliver a lower dose of electrical energy and will come with child pads, as previously mentioned. Sometimes there is a special switch or key that must be used with the child pads. But what should you do if only adult pads are available? If adult pads are the only option, use them.

In terms of pad placement, pads should not touch or overlap. If the pads are too large for a smaller child’s chest, place one pad on the front of the child’s chest and the other on the child’s back. The idea is to “sandwich” the child’s heart between the pads. Interestingly enough, research has shown that using adult pads on small children, and even infants, does not lead to permanent heart damage in most cases.
There are a few special circumstances to keep in mind when using an AED:

- **The victim is in water** - if the child is in water, pull the victim to a dry area. You are not in danger of getting a shock if the victim is in water. Water is a great conductor of electricity, so if the victim is in water, the shock will be dispersed across the skin of the victim, and the victim will not receive the full dose of electrical energy required to convert them to a normal rhythm. If the child’s chest is wet, quickly dry the chest with a towel or your sleeve; however, the chest does NOT need to be completely dry. If the victim is lying in a small puddle or in snow, you can safely use the AED without moving the victim.

- **The victim has an implanted pacemaker or defibrillator** - obviously, if a child has one of these devices, it will have failed. Some children with severe congenital heart disease may have one of these devices. You will recognize these devices as a small lump under the skin on the chest, usually the upper chest on either side. They are generally about the size of a deck of cards or smaller. You will also be able to see a scar over the area. If the victim has one of these devices, avoid placing the AED pad directly over it; doing so may block delivery of the shock.

**Two Rescuer CPR for Children (aged 1 year to puberty)**

When two rescuers are present, performing CPR on a child is the same as performing CPR on an adult, except that the compression ventilation ratio when 2 rescuers are present drops to 15:2. One or two hands may be used to compress the chest to a depth of 1/3 the diameter of the chest. Remember that compressions should be done when there is no pulse present or when the child’s heart rate is less than 60 beats a minute and there are signs of poor perfusion. Rescuers should trade off performing compressions every two minutes to avoid fatigue.

**CPR for Infants (up to 12 months of age)**

CPR for infants is similar to CPR for adults and children. There are a few differences as follows:

- **Checking for responsiveness:** never shake an infant as this may cause brain damage. To check for responsiveness in an infant, tap the soles of the feet while calling to the infant in a loud voice.

- **Pulse check location** - for an infant, it is easiest to check for a pulse using the brachial artery. To locate the brachial artery, place 2 or 3 fingers on the inside of the upper arm between the shoulder and elbow. Press the fingers gently for 5 to 10 seconds to feel for a pulse. Pushing too firmly may occlude the infant’s pulse.

- **Depth of compressions** - compress the infant’s chest to one-third the depth of the chest, or approximately 1 ½ inches.
• **Compression delivery technique** - 2 finger technique: when one rescuer is present, the chest is compressed using two fingers on the lower half of the sternum, avoiding the xiphoid process (the very end of the sternum where it narrows and comes to a point). To landmark, place 2 fingers in the center of the infant’s chest, just below the nipple line. Push down on the infant’s chest one-third the depth of the chest, or approximately 1 ½ inches. Allow the chest to fully recoil (return to its neutral position) in between compressions. Compressions should be delivered at a rate of 100-120 compressions/minute.

• **2 thumb-encircling hand technique**: When two rescuers are present, the compression: ventilation ratio drops to 15:2, the same as for children. To perform this technique, position yourself at the infant’s feet. Place your thumbs side by side on the center of the infant’s chest just below the nipple line. Encircle the infant’s chest so that the fingers of both hands support the infant’s back. Use your thumbs to deliver compressions at the appropriate depth and rate (100-120 compressions/minute; 1/3 of the depth of the chest or approximately 1 ½ inches). This position allows another rescuer to support airway and breathing without getting in the way of the rescuer performing chest compressions, and is therefore the preferred technique when two rescuers are present. This technique also allows for more consistent chest compressions and superior blood flow and blood pressure compared to the 2-finger technique.

* Compression: ventilation ratio* - The compression: ventilation ratio for 1 rescuer CPR in infants is 30:2, the same as for two rescuer CPR children.

* When to call EMS* - it is far more common for infants to experience a respiratory arrest prior to going into cardiac arrest, unless the infant has a congenital heart problem; in
adults the opposite is true - cardiac arrests are more common due to cardiovascular disease. Therefore, the goal is to intervene before the infant goes into cardiac arrest. For this reason, when to call EMS is dependent upon whether you witnessed the infant’s arrest. If you did NOT witness the infant’s arrest (unwitnessed arrest) and you are alone, you should provide CPR for 2 minutes prior to calling EMS and finding an AED. If you witness the arrest (i.e., the infant suddenly becomes unresponsive), you should call EMS and get an AED before returning to the child to start CPR.

**One Rescuer CPR for Infants (up to 12 months of age)**

If you are the lone rescuer of an infant:

1. Assess the child for responsiveness by tapping the soles of the infant’s feet while calling his/her name loudly. Check for breathing - if there is no breathing or the infant is breathing abnormally or only gasping, call for help.

2. If someone responds to your call for help, ask them to call 9-1-1 (activate EMS) and find an AED. If you are alone and witness the infant go into arrest, perform CPR for 2 minutes before calling for help; if you come across and infant who has been “down” for an unknown period of time, call 9-1-1 first before beginning CPR.

3. Check the infant’s brachial pulse for at least 5, but no more than 10, seconds. Place 2 or 3 fingers on the inside of the upper arm between the shoulder and elbow. Press the fingers down gently for 5 to 10 seconds to feel for a pulse. Remember: pushing too firmly may occlude the infant’s pulse.

4. If you are not sure you can feel the pulse, the pulse is absent or the infant’s heart rate is below 60 beats per minute with signs of poor perfusion (pale or bluish discoloration in the face, extremities or nail beds), start CPR, beginning with 30 compressions followed by two breaths.
a. Place the infant on his back on the ground or on a firm surface.
b. Place 2 fingers in the center of his chest just below the nipple line; do not press on the end of the breastbone.
c. Provide 100-120 chest compressions per minute to a depth of 1/3 the depth of the chest or approximately 1 ½ inches.
d. The principles of providing breaths for infants are the same as for children and adults. Use the correct sized face mask for the infant (the mask should cover the mouth and nose without extending past the chin or covering the eyes). Each breath should go in over 1 second and should cause visible chest rise. A breath should require only a small puff of air into the mouthpiece of the device to cause chest rise—avoid excessive ventilations. Lastly, perform a head tilt-chin lift maneuver to open the infant’s airway; the infant’s head should be placed in “sniffing position” with the infant’s head tilted just enough that the nose appears to be sniffing the air. In this position, the external ear canal should be level with the top of the infant’s shoulder. Avoid hyperextending the neck— you also want to avoid allowing the chin to fall down towards the neck. You can do this by placing one hand on the infant’s forehead while you perform chest compressions. In this way, the infant’s airway will remain open and will not close off. Placing a small towel under the infant’s shoulders can help to maintain proper positioning.
5. After about two minutes of compressions (five cycles of 30 compressions and 2 breaths), leave the child to call 911 and get an AED if you know where one is (and you or someone has not already done so). Then return to the infant to continue CPR.

6. Use an AED as soon as it is available.

Two Rescuer CPR for Infants (up to 12 months of age)

If there are 2 rescuers available:
1. **Rescuer 1**- Assess the child for responsiveness by tapping the soles of the feet and calling to him/her loudly. Check for breathing- if the infant is not breathing or is breathing abnormally or only gasping, send **Rescuer 2** to activate EMS and bring the AED (if one is available).

2. **Rescuer 1**- Check the infant’s brachial pulse for at least 5, but not more than 10, seconds. Place 2 or 3 fingers on the inside of the upper arm between the shoulder and elbow. Press the fingers down gently for 5 to 10 seconds to feel for a pulse. Remember: pushing too firmly may occlude the infant’s pulse.

3. **Rescuer 1**- If you are not sure you can feel the pulse, the pulse is absent or the infant’s heart rate is below 60 beats per minute with signs of poor perfusion (pale or bluish discoloration in the face, extremities or nail beds), start CPR, beginning with 30 compressions followed by two breaths.

   a. Place the infant on his back on the ground or on a firm surface.
   b. Place 2 fingers in the center of the infant’s chest just below the nipple line; do not press on the end of the breastbone.
   c. Provide 100-120 chest compressions per minute to a depth of 1/3 the depth of the chest or approximately 1 ½ inches.
   d. The principles of providing breaths for infants are the same as for children and adults. Use the correct sized face mask for the infant (the mask should cover the mouth and nose without extending past the chin or covering the eyes). Each breath should go in over 1 second and should cause visible chest rise. A breath should require only a small puff of air into the mouthpiece of the device to cause chest rise- avoid excessive ventilations. When the second person returns, change the ratio of compressions to ventilations to 15:2.

4. **Rescuer 2** should place the thumbs of both hands on the lower half of the infant’s breastbone, while being careful not to press on the end of the breastbone (xiphoid process). Put the fingers of both hands around the infant’s back to provide support. Use the thumbs to depress the sternum approximately 1/3 the depth of the chest, or approximately 1 ½ inches. Compress at a rate of 100-120 compressions per minute.

5. **Rescuer 1** should provide breaths as described above.
6. Continue CPR at a ratio of 15 compressions to 2 breaths and switch roles every 2 minutes to avoid fatigue.

7. Use the AED when available.

**Mouth-to-Mouth-and Nose Breathing**

To provide breaths to an infant when there is no face mask available:

1. Use a head tilt-chin lift to maintain an open airway (sniffing position), being careful not to hyperextend the neck, which could block the airway.
2. Place your mouth over the victim’s mouth AND NOSE to create a tight seal.
3. Blow into the infant’s nose and mouth over 1 second, with just enough volume and force to cause the chest to rise with each breath. Be careful not to ventilate too forcefully, as doing so may cause lung damage.
4. If the chest does not rise, repeat the head tilt-chin lift and try to ventilate the victim again. You may need to try to provide breaths at a few different positions before you achieve airway patency (airway is in an open position).
5. If the infant is older and you cannot cover both the infant’s mouth and nose, pinch the nostrils closed and place your mouth over the victim’s to form a tight seal—just the same as you would do for a child.

You may wonder how mouth-to-mouth or mouth-to-mouth-and-nose breathing can sustain the victim. In actual fact, your expired air contains about 17% oxygen—this is just enough oxygen to meet the victim’s needs for a brief period of time.

When providing mouth-to-mouth or mouth-to-mouth-and-nose breathing, it is important not to provide breaths that are too forceful or too rapid. Doing so may cause air to enter the stomach rather than the lungs, which can cause gastric inflation. Gastric inflation may result in vomiting, and an unconscious victim may develop pneumonia if vomitus makes its way to the lungs. To avoid gastric inflation, give each breath slowly over 1 second and deliver just enough air to make the chest rise.

**Rescue Breathing**

Respiratory arrest is defined as the cessation of breathing. During respiratory arrest, as well as when there is inadequate breathing, the victim will still have some amount of cardiac output, which you will be able to detect as a palpable pulse.

It is important to be able to recognize respiratory arrest, or impending respiratory arrest, which may be seen as slow, irregular or gasping respirations. These abnormal respirations are inadequate to support life. Respiratory arrest inevitably leads to cardiac arrest if not treated, therefore rescuers should intervene
quickly to prevent this deterioration by providing *rescue breathing*. For children and infants, give one breath every 3-5 seconds (12-20 breaths per minute). Check for a pulse every 2 minutes - if the victim loses their pulse, begin chest compressions combined with breaths.

**Choking in the Conscious Child (older than 1 year of age)**

1. STAND (OR KNEEL) BEHIND THE VICTIM AND WRAP YOUR ARMS AROUND THE VICTIM’S WAIST.
2. IF STANDING, PUT ONE FOOT IN BETWEEN THE VICTIM’S FEET AND ONE FOOT BEHIND YOU - THIS POSITION PROVIDES STABILITY SHOULD THE VICTIM BECOME UNCONSCIOUS AND YOU NEED TO EASE THE VICTIM TO THE GROUND.
3. PLACE YOUR FIST WITH THE THUMB SIDE IN JUST ABOVE THE VICTIM’S BELLYBUTTON AND BELOW THE STERNUM (BREASTBONE).
4. GRAB YOUR FIST WITH YOUR OTHER HAND.
5. ADMINISTER ABDOMINAL THRUSTS, PULLING INWARD AND UPWARD UNTIL THE FOREIGN OBJECT COMES OUT OR THE VICTIM BECOMES UNCONSCIOUS. EACH THRUST SHOULD BE FORCEFUL, DISTINCT AND SEPARATE.

**Choking in the Conscious Infant (less than 12 months of age)**

1. SIT OR KNEEL WITH THE INFANT IN YOUR LAP.
2. IF NOT DIFFICULT TO DO, REMOVE THE INFANT’S CLOTHING TO EXPOSE THE INFANT’S CHEST.
3. REST THE INFANT’S BODY ON YOUR FOREARM WITH THE INFANT’S HEAD LOWER THAN THE BODY. SUPPORT THE JAW AND HEAD WITH YOUR HAND. REST YOUR FOREARM ON YOUR THIGH OR LAP TO PROVIDE SUPPORT.
4. GIVE 5 BACK BLOWS FORCEFULLY WITH THE HEEL OF YOUR HAND BETWEEN THE INFANT’S SHOULDER BLADES.
5. SUPPORT THE BACK OF THE INFANT’S HEAD WITH THE PALM OF YOUR HAND AND THE INFANT’S JAW AND HEAD WITH THE OTHER PALM WHILE TURNING HIM OVER (FACE UP) ONTO YOUR OTHER FOREARM. KEEP THE INFANT’S HEAD LOWER THAN ITS BODY. REST YOUR FOREARM ON YOUR THIGH FOR SUPPORT.
6. GIVE 5 CHEST THRUSTS, JUST AS YOU WOULD WHEN PERFORMING CHEST COMPRESSIONS IN CPR. CHEST THRUSTS SHOULD BE DELIVERED AT A RATE OF 1 CHEST THRUST PER SECOND AND SHOULD BE GIVEN WITH ENOUGH FORCE TO DISLodge A FOREIGN BODY.
7. REPEAT BACK BLOWS/CHEST THRUSTS UNTIL THE OBJECT COMES OUT OR THE VICTIM LOSES CONSCIOUSNESS.
Choking in the Unconscious Child

1. IF YOU ARE CARING FOR A CHILD WHO IS CHOKING AND THEY LOSE CONSCIOUSNESS, LOWER THE VICTIM GENTLY TO THE GROUND.
2. ACTIVATE EMS/CALL 9-1-1
3. BEGIN CPR, STARTING WITH CHEST COMPRESSIONS- DO NOT CHECK FOR A PULSE.
4. EACH TIME YOU OPEN THE AIRWAY TO PROVIDE VENTILATIONS, OPEN THE VICTIM’S MOUTH AND CHECK FOR THE OBJECT. IF YOU CAN SEE THE OBJECT, TURN THE VICTIM’s HEAD TO THE SIDE AND SWEEP IT OUT OF THE VICTIM’S MOUTH WITH YOUR INDEX FINGER. NEVER PERFORM A BLIND FINGER SWEEP- THIS MAY FORCE THE OBJECT FARTHER DOWN THE VICTIM’S AIRWAY.
5. IF YOU DO NOT SEE THE OBJECT, ATTEMPT TO PROVIDE BREATHS. IF BREATHS WILL NOT GO IN, RESUME CHEST COMPRESSIONS.
6. AFTER APPROXIMATELY 5 CYCLES OF COMPRESSIONS AND VENTILATIONS, ACTIVATE EMS/CALL 9-1-1 IF NOT ALREADY DONE.
7. IF THE OBSTRUCTION IS RELIEVED, CHECK RESPONSIVENESS, BREATHING AND PULSE. PROVIDE RESCUE BREATHING OR CPR AS REQUIRED. IF THE VICTIM IS RESPONSIVE, THEY SHOULD BE TAKEN TO HOSPITAL TO RULE OUT ANY INJURY CAUSED BY ABDOMINAL OR CHEST THRUSTS.
Choking in the Unconscious Infant

1. CALL FOR HELP. IF SOMEONE RESPONDS, SEND THEM TO ACTIVATE EMS/CALL 9-1-1
2. PLACE THE INFANT ON A FLAT, FIRM SURFACE.
3. BEGIN CPR, STARTING WITH COMPRESSIONS. EACH TIME YOU OPEN THE AIRWAY TO DELIVER BREATHS, LOOK TO SEE IF THE OBJECT IS VISIBLE. IF THE OBJECT IS VISIBLE, TURN THE INFANT’S HEAD TO THE SIDE AND USE YOUR INDEX FINGER TO SWEEP THE OBJECT OUT OF THE INFANT’S MOUTH. NEVER PERFORM A BLIND FINGER SWEEP, AS THIS MAY FORCE THE OBJECT FARTHER DOWN INTO THE AIRWAY.
4. AFTER 5 CYCLES OF COMPRESSIONS AND VENTILATIONS (OR ATTEMPTED VENTILATIONS), ACTIVATE THE EMERGENCY RESPONSE SYSTEM IF NOT ALREADY DONE.
5. IF THE OBSTRUCTION IS RELIEVED, CHECK RESPONSIVENESS, BREATHING AND PULSE. PROVIDE RESCUE BREATHING OR CPR AS REQUIRED. IF THE VICTIM IS RESPONSIVE, THEY SHOULD BE TAKEN TO HOSPITAL TO RULE OUT ANY INJURY CAUSED BY ABDOMINAL OR CHEST THRUSTS.
## CPR CERTIFICATION SKILLS REVIEW

<table>
<thead>
<tr>
<th>Skill</th>
<th>Child</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check scene safety</td>
<td>Ensure the safety of the scene before entry</td>
<td>Ensure the safety of the scene before entry</td>
</tr>
<tr>
<td>Determine patient responsiveness</td>
<td>Tap on the shoulder and shout, “Are you ok?”&lt;br&gt;Look for gasping, abnormal breathing, or absence of chest movement.</td>
<td>Tap the soles of the feet while calling the infant’s name.&lt;br&gt;Look for gasping, abnormal breathing, or absence of chest movement.</td>
</tr>
<tr>
<td>Activate EMS – Call for help!</td>
<td>If cardiac event is <em>witnessed</em>, activate EMS and get an AED (if you know where one is) before starting CPR.&lt;br&gt;If cardiac event is <em>not witnessed</em>, provide 2 minutes of CPR, then leave the victim to activate EMS and get an AED. Return to the victim to resume CPR and use the AED as soon as possible.</td>
<td>Same as for child.</td>
</tr>
<tr>
<td>Check pulse</td>
<td>Use carotid or femoral artery. Check for pulse for 5 to no more than 10 seconds.</td>
<td>Check brachial artery in the upper arm for 5 to no more than 10 seconds.</td>
</tr>
<tr>
<td>Compressions: Hard and Fast</td>
<td>1 rescuer: 30:2&lt;br&gt;2 rescuers: 15:2&lt;br&gt;1 or 2 hands depending on child’s size.&lt;br&gt;Depth: 1/3 AP diameter of chest, or about 2”</td>
<td>1 rescuer: 30:2&lt;br&gt;2 rescuers: 15:2&lt;br&gt;2 fingers on breastbone below nipple line OR 2 thumbs (2 rescuers)&lt;br&gt;Depth: 1/3 AP diameter of chest, or about 1 ½”</td>
</tr>
<tr>
<td>Airway</td>
<td>Open the airway using head tilt-chin lift-use jaw thrust if you suspect spinal cord injury.</td>
<td>Open the airway using head tilt-chin lift. Head should be in “sniffing” position. Use roll under shoulders to maintain proper positioning.</td>
</tr>
<tr>
<td>Breathing</td>
<td>2 breaths over 1 second each, following 30 compressions (or 15 compressions for 2 rescuers). Watch for chest rise. Avoid excessive ventilation.</td>
<td>Same as for child</td>
</tr>
<tr>
<td>Rescue breathing: Patient with pulse</td>
<td>1 breath every 3-5 seconds, rechecking circulation every 2 minutes.</td>
<td>Same as child.</td>
</tr>
<tr>
<td>condition</td>
<td>AED</td>
<td></td>
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</tr>
<tr>
<td>and not breathing or gasping*</td>
<td>For infants and children up to age 8 years, use child pads; if not available, use adult pads, don’t let pads contact each other. May use anterior-posterior pad placement.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use child attenuator pads; if not available, use adult pads, don’t pads contact each other. May use anterior-posterior pad placement.</td>
<td></td>
</tr>
</tbody>
</table>
Standard First Aid
Welcome!

We’re so excited that you’ve chosen us to be your learning partner in Standard First Aid. We strive to provide the best online learning experiences anywhere on the Web, and we’re certain you’ll find the information within this course of great value to you in your work and life.

In order to pass the course, you will need to complete the online examination. To be certain you pass on the first attempt, please read through the course at your leisure to be sure you understand the information contained within.

Topics included in this course are as follows:

- Scene Safety
- Universal Precautions
- Patient Assessment
- Control of Bleeding
- Shock
- Musculoskeletal Injuries
- Burns
- Chest Pain
- Respiratory Emergencies
- Stroke
- Seizures
- Diabetic Emergencies
- Poisoning
- Hyperthermia (Heat Exposure)
- Hypothermia
- Frostbite
- Foreign Bodies
- Traumatic Tooth Loss
- Bites and Stings
- Anaphylaxis
- Minor Cuts and Puncture Wounds

Let’s get started!
Scene Safety

Imagine that you’re driving along in your car, and to your horror you observe the car in front of you lose control, drive into a deep ditch at the side of the road and flip twice, landing on it’s side. You have taken CPR and First Aid and you’re prepared to help. What should you do first?

Scenes like these happen every day. That’s why we take these courses- so that we can help at the right time in the right way. Before you attend to any victim, there is one important step you must take: **you must ensure that the scene is safe.**

Why? Scene safety is important because the last thing you would want to do in such a situation is to become a victim yourself- that would be of no help to anyone. There are several things that you should look for when determining in the scene is safe for you to enter. Look for:

- Flames or smoke
- Traffic (especially on the highway)
- Risk of an explosion
- Chemical spills/fumes
- Downed electrical wires
- Potential collapse of a building or structure
- Animals (frightened animals may bite if you attempt to render assistance to their owner)
- Potential for violence towards yourself or others
- Other dangers

Only when you have ensured that **you will be safe** should you provide first aid to a victim.

**Universal Precautions**
One of your major concerns when providing first aid should be to protect yourself from bloodborne pathogens. **Bloodborne pathogens** are infectious microorganisms that have the ability to cause disease in humans. They are spread through direct contact with infected blood. Some of these include hepatitis C and HIV, the virus that causes AIDS. **Universal precautions** are measures that help to protect against bloodborne pathogens and assume that all victims are potentially infectious. By observing universal precautions, you are protecting yourself against exposure to potentially disease-causing microorganisms present in another’s blood or body fluids. To protect yourself, you should use PPE, or personal protective equipment, such as gloves. If you do not have gloves, you can improvise by using a plastic bag to cover your hands. Always follow these guidelines when providing first aid to protect yourself:

- Wash your hands, both before and after provision of first aid (you want to protect the victim from your pathogens as well, which is why you should wash your hands before providing care)
- Cover any of your own scrapes or cuts, as these can become portals of entry for microorganisms
- Avoid touching your nose, mouth or eyes while providing care and until you have washed your hands well after providing care
- Be careful to avoid injury at the site by being aware of any objects that may cut or scrape your skin

**Patient Assessment**

Once you have determined that the scene is safe (and only after you have ensured that this is so), you may approach the victim to perform an assessment. Assessment has three separate, but equally important, steps.

- Check responsiveness and ABC’s to identify any life-threatening emergencies that must be dealt with immediately.
- Obtain a history from the victim and any bystanders.
- Perform an examination, using the head-to-toe method.
Check responsiveness and ABCs

To check responsiveness, talk to the victim to see if they respond. Shake their shoulders and yell “Are you okay?”. If they do not respond, this means they are likely unconscious and you must move quickly to assess airway, breathing and circulation.

Next, assess for breathing. Look for normal, absent or abnormal breathing (such as gasping). If responsiveness and breathing are absent or abnormal, call for help. If someone is around, ask them to activate the emergency response system (call 9-1-1) and get an AED (automated external defibrillator). If you are alone and no one responds to your call for help, use your cell phone to call 9-1-1. Quickly leave to obtain an AED if you know where one is located.

Check the victim’s pulse. If the victim is an adult, check for a pulse using the carotid artery. Use 2 or 3 fingers to locate the trachea (the windpipe), then slide these 2 fingers into the groove located between the trachea and the muscles on the side of the victim’s neck. Try to feel a pulse for 5, but not more than 10, seconds. If you cannot feel a pulse, or you’re not sure that you can feel a pulse, start CPR, beginning with compressions. If the victim is a child, you can also use the carotid artery to find a pulse, or you may also use the femoral artery. Place 2 fingers in the inner thigh, halfway between the victim’s hipbone and pubic bone and just below the crease where the victim’s leg meets the abdomen. If the victim is an infant, use the brachial artery in the upper arm. Place 2 or 3 fingers on the inside of the infant’s arm between the elbow and shoulder. In child and infant victim’s if there is no pulse, you are not sure if there is a pulse OR if the pulse is less than 60 beats per minute with signs of poor perfusion (pale color or bluish discoloration around the mouth or at the nailbeds), start CPR beginning with compressions.

When performing CPR, remember the following:

- Push HARD and FAST, 100 to 120 compressions/minute for victims of all ages
- Allow the chest to fully recoil after each compression (return to its normal position)
- Press down on the chest at least 2 inches for an adult victim; for children and infants, compress the chest to 1/3 the depth of the chest, or approximately 2 inches for most children and 1 ½ inches for infants less than 1 year of age. Use 2 hands to compress the chest of adults, 1 or 2 hands to compress the chests of children (depending on size) and 2 fingers to compress the chests of infants. When 2 rescuers are present with an infant victim, the chest is compressed using the 2 thumbs of the rescuer, while the fingers encircle the chest and provide support to the back.
When providing breaths, use a barrier device (such as a pocket face mask) if available to prevent inhalation of expired air or other matter. If you choose to provide mouth-to-mouth breaths, use a head tilt-chin lift to open the airway and hold the airway open with your hand. With the hand you use on the forehead to hold the airway open, pinch the victim’s nostrils shut. Place your mouth over the victim’s mouth to create a tight seal. Take a normal breath and breathe through your mouth into the victim’s mouth. Deliver each breath over 1 second and watch for chest rise. If the chest does not rise, try the head tilt-chin lift again and attempt another breath. If you cannot ventilate the victim, return immediately to chest compressions. For small children and infants, cover their mouth AND nose with your mouth. Deliver each breath over 1 second and watch for chest rise.

Hands-only CPR can be provided when a barrier device is not available—provide continuous chest compressions at a rate of 100 to 120 compressions per minute.

Compression-ventilation ratios for adults (1 and 2 rescuers) is 30 compressions to 2 breaths; for children and infants, the compressions to ventilation ratio is 30:2 when 1 rescuer is present, and changes to 15: 2 when a second rescuer is available.

Avoid excessive ventilation—this may lead to gastric inflation (air in the stomach), which may cause the victim to vomit. When an unconscious victim vomits, vomited material may travel down the airway into the patient’s lungs, which may cause what is known as aspiration pneumonia.

Use an AED (automated external defibrillator) as soon as it is available. Follow the steps as the AED guides you. Remember, the first and most important step when using an AED is to turn the machine ON—the AED will guide you through the next steps.

Note: This course is not designed to teach you to perform CPR. If you have not learned to perform CPR, we offer CPR with AED here. {hyperlink to the appropriate course}. We have added this material as a quick review. We recommend you take the full CPR/AED course if you have not already done so.

**Obtain a history**

---

**SAMPLE History**

- Signs and symptoms
- Allergies
- Medications
- Pertinent past medical history
- Last oral intake
- Events leading up to the incident

Assuming the victim does not require CPR, you should next obtain a history from the patient and any witnesses or bystanders. Ask the victim what happened, as well as any others who may
be able to provide important information that may determine what you do next. This information may also be important to emergency responders one they arrive on the scene. An easy way to obtain a thorough history is to use the mnemonic SAMPLE:

S - signs and symptoms- ask the victim how he/she feels. What can you notice when you look at the victim? For example, the victim may tell you that their right leg hurts- this is a symptom. You notice that the patient is holding their leg and grimacing in apparent pain- this is a sign.

A - allergy- ask the patient if they have any allergies to anything. If family members or loved ones are present, they may be able to provide you with this information on the patient’s behalf.

M - medications - ask the patient if they take any medications. This should include over-the-counter medications, vitamins and supplements, as these can sometimes have unwanted side effects, such as excessive bleeding for example.

P - previous problems - ask if the patient has ever experienced a similar event. Also ask if they have any major health problems, such as heart disease, diabetes or bleeding disorders.

L - last meal taken - ask the patient when the last time was that the patient ate or drank anything.

E - event - ask for a summary of the present event. What exactly happened?

Perform an examination

Once you have obtained the victim’s history, you should move on to performing a head-to-toe examination, starting at the head and working your way down to wards the feet. You should look for:

- Bruises
- Cuts/lacerations
- Bumps/lumps
- Sources of bleeding
- Obvious deformities of the arms and legs
- Painful areas

Note: If the patient is conscious, you should ask for permission (consent) before examining the victim. If the victim is unconscious, there are Good Samaritan laws that protect you legally, providing you are following the standard of care (providing care as you have learned or have been trained).

Take a close look at the victim. Assess the victim’s breathing. Are they breathing very shallowly or quickly? Do they have pain when they breathe? Is their breathing too slow? Also assess their color (pale, bluish discoloration or flushing) and skin temperature. Is the skin warm and dry, or cool and clammy? This may provide important information.
During your examination, you should immediately call 9-1-1 for help if you find any life-threatening signs or symptoms:

- Chest pain or pressure
- Altered level of consciousness
- Uncontrolled bleeding
- Serious broken bones
- Difficulty breathing
- Seizures
- Signs of shock (pale, clammy and cool skin)

Note: You should not try to move the victim unless absolutely necessary, as moving the victim could cause further injury. You may need to move the victim if the scene is not safe for you and the victim (there is fire or smoke nearby, or you fear an explosion may occur). Otherwise, you should leave the victim in the same position they were in. Remember, scene safety is of utmost importance—although you may want to, you should not put your own life at risk unnecessarily—doing so may create another victim—YOU.

Control of Bleeding

Although most bleeding episodes are not life-threatening, severe bleeding can result in death if not stopped. As a first aid responder, protect yourself from bloodborne pathogens by wearing gloves if they are available—a plastic bag over your hand can be used if you don’t have any gloves.

Try to identify the source of the bleeding. If blood is spurting, it is likely that an artery has been cut. Apply direct pressure to stop the bleeding. If the wound is in the victim's belly and organs are visible, do NOT try to put the organs back into the abdomen; simply cover the wound with a clean dressing, apply pressure as needed to control the bleeding and get the victim to medical care.

For other bleeding wounds, do the following:
1. Encourage the victim to lie down; if the victim is dizzy, raise the victim’s feet above his/her head.

2. Do NOT remove any object that is deeply embedded in the wound.

3. If the source of blood is an extremity, raise the affected arm or leg above the level of the victim’s heart. Apply pressure directly to the wound using a clean cloth or clean/sterile bandage. Hold pressure for ten minutes; do NOT peek to see if bleeding has stopped.

4. Apply a pressure bandage. If you note that there is blood coming through the pressure bandage, do not remove it—simply reinforce the bandage if you notice bleeding around the original bandage.

5. Continue to apply pressure to the wound.

6. If the victim becomes drowsy, extremely anxious, thirsty, or if his skin becomes very cool and/or clammy, you should suspect shock. If the victim is anxious, try to keep them calm and still. Raise the victim’s legs above the level of their heart.

7. Get the victim to emergency care as soon as possible.

**Shock**

Shock is caused by inadequate blood flow to the body’s organs. It can be caused by blood loss or loss of body fluids, as may occur following untreated severe vomiting or diarrhea. Symptoms of shock may include the following:

- Drowsiness
- Confusion
- Loss of consciousness
- Extreme thirst
- Pale skin color
- Rapid heart rate
- Cool, clammy skin
- Rapid breathing
- Anxiety
Victims in shock must receive emergency care as soon as possible to prevent death. Call 9-1-1. While waiting for emergency services:

1. Ensure the victim is laying down.
2. Elevate the victim’s legs above the level of their heart, approximately 8 to 12 inches. This will promote blood flow to the heart.
3. Cover the victim with a blanket to keep them warm.
4. Keep the victim calm and still.

Musculoskeletal Injuries

Sprains, strains, fractures and dislocations are almost always caused by trauma. Any of these injuries may cause deformity, swelling, and severe pain. All of these injuries should be evaluated by a medical professional; however, there are some steps that should be taken in providing first aid. These steps may prevent further injury and disability:

- Call 9-1-1 if the injury is a result of major trauma.
- Assume the victim has a neck injury in any case of major trauma and avoid moving the victim until help arrives. Do not allow the victim to move his/her neck.
- Stabilize the affected body part only if doing so does not cause additional pain; do not try to force a deformed joint back into place as this may cause further damage.
- Many victims of musculoskeletal injury will assume a position of comfort- allow them to do so if this decreases their pain.
- Remember the acronym RICE when treating injured extremities (arms and legs, feet and hands):
  - Rest any injured joint
  - Apply a cold pack or ice if available to reduce swelling and control pain
  - Apply Compression (an elastic bandage) for any sprains or strains
  - Elevate the injured body part above the heart to reduce swelling
- Do not give the victim anything by mouth until seen by a medical professional; the exception to this rule is if medical care is not available within a couple of hours, an over-the-counter pain reliever may help manage pain.
- Control bleeding if present (see section on Control of Bleeding)
- If the victim shows signs of shock (see section on Shock), have the victim lay down and wait for help.
Burns

Many burns are minor and can be treated with first aid; others burns are more serious and require medical attention. The severity of a burn can depend on many factors, including:

- The age of the victim - burns can be more severe in babies, young children and the elderly
- The size of the burn - how much of the body is affected, often described as a percentage, which may be an indicator of survivability
- The depth of the burn - how deeply the burn extends down into the subcutaneous tissue
- The location of the burn - burns located on the hands, face, groin/genitals, neck, hands and feet can have severe functional and cosmetic consequences
- The presence of other injuries - burns combined with other severe injuries may affect outcome and survivability

It is important to be able to recognize the type of burn in order to provide the correct care.

<table>
<thead>
<tr>
<th>Type of Burn</th>
<th>Appearance &amp; Sensation</th>
<th>Complications</th>
<th>First Aid Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Degree</td>
<td>Redness; Dry skin; Painful</td>
<td>Infection</td>
<td>First degree- cool the burn with cool running water for 10-20 minutes, or apply a cool wet compress. Remove rings from burned fingers as the area may swell. Apply lotion or aloe vera gel for comfort. May take an over-the-counter pain reliever if needed. Sunburns are an example of first-degree burn.</td>
</tr>
<tr>
<td>Second Degree (Partial Thickness)</td>
<td>Red with blisters; Moist; Painful</td>
<td>Infection and cellulitis; scarring and contractures; may require debridement</td>
<td>Treat as for a first degree burn unless the burned area is large. Seek medical help for larger burns, especially those on the hands, face, neck, groin or feet. Leave large blisters intact- do NOT</td>
</tr>
</tbody>
</table>
puncture. If small blisters rupture (smaller than your fingernail) cleanse the area with mild soap and water and apply antibiotic ointment and a non-stick dressing. Seek medical care for signs of infection (increased pain, redness, swelling, oozing from the wound).

<table>
<thead>
<tr>
<th>Degree</th>
<th>Characteristics</th>
<th>First Aid Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Degree (Full Thickness)</td>
<td>Stiff; dry; leathery; white or brown color; Painless</td>
<td>Scarring and contractures; May require debridement or amputation; large third degree burns may result in death</td>
</tr>
<tr>
<td>Fourth Degree</td>
<td>Black; charred; Painless</td>
<td>Possible gangrene; Usually leads to loss of function and sometimes death</td>
</tr>
</tbody>
</table>

Smoke inhalation may be as deadly as severe burns. If a burn victim has soot around or in their mouth or nose, this indicates that the airway may be affected and breathing may become a problem. If you suspect smoke inhalation, call 9-1-1.

**Chest Pain**

There are many causes of chest pain, some minor and some very serious. Without a medical workup, it is often impossible to tell whether chest pain is life threatening. For this reason, if you or a companion experiences chest pain that lasts more than a few minutes, it is critical that chest pain be evaluated by medical professionals. Symptoms that should raise your suspicion of heart attack include:

- Chest pain that gets worse when you are active but decreases with rest
- Pressure or squeezing pain in the middle of your chest
- Pain that spreads to your shoulder, arm, neck or back
- Pain accompanied by dizziness, weakness, shortness of breath, nausea or vomiting.
- Pale, clammy skin (diaphoresis or sweating)
Any of these symptoms may indicate angina, pulmonary embolism (a blood clot that moves to the lung), aortic dissection or a myocardial infarction (heart attack). If you or someone you are with experiences any of these symptoms:

1. Call immediately for help (call 9-1-1). If you cannot call for help, get to medical treatment as soon as possible.
2. If you have a well-stocked first aid kit, have the victim chew an adult aspirin or 2 baby aspirins (unless allergic). This can help reduce blood clotting which is a cause of heart attack.
3. Have the victim lay or sit comfortably until help arrives, and keep the victim calm
4. If the victim becomes unresponsive, activate the emergency response system and begin CPR if indicated.

Chest pain may not be life-threatening. For example, pneumonia and costochondritis (pain in the cartilage connecting your ribs to your sternum) are common causes of chest pain. Strained chest muscles, gastric reflux, gallbladder disease, and even anxiety can cause chest pain. These syndromes and diseases may cause chest pain; however, any chest pain should be diagnosed by medical personnel to rule out one of the deadly conditions.

**Respiratory Emergencies**

Respiratory conditions are common in the population in every age group. For this reason, it’s important to know what to do to assist someone experiencing difficulty breathing. Respiratory problems are almost always an emergency, and medical assistance will be required in almost all cases. Common causes of respiratory distress include:

- Asthma
- Emphysema
- COPD (chronic obstructive pulmonary disease, common in the elderly population)
- Respiratory infections (such as pneumonia, croup, whooping cough)
- Pneumothorax (collapsed lung, usually from trauma)
- Heart failure or severe heart disease
- Fluid around the heart or lungs (pericardial or pleural effusion)
- Anaphylaxis (life-threatening allergic reaction)
- Pulmonary thrombosis (blood clot in the lung)
- Injury to the chest, lungs or neck

Difficulty breathing may present as difficulty taking a deep breath, being short of breath or experiencing ‘air hunger’, the sensation of not being able to get enough air. There may also be pain with breathing in certain conditions, especially if the victim has been involved in a trauma.

**Signs and symptoms of respiratory distress are often quite obvious, and may include:**

- Rapid breathing
- Inability to breathe properly unless sitting upright
- Anxiety
- Altered level of consciousness (drowsiness, confusion or unconsciousness)
- Cough
• Dizziness
• Pain with breathing
• Grunting, high-pitched whistling (stridor) or wheezing when breathing
• Bluish discoloration to the lips, nailbeds or fingers
• Rapid heart rate
• Diaphoresis (sweating)
• Difficulty speaking more than a couple of words at a time
• Gasping for breath
• Fever (if the cause is infectious)
• Hemoptysis (coughing up blood)
• Rash or hives (if the victim is suffering an anaphylactic reaction)

As can be seen, respiratory emergencies can present in numerous ways. If you are administering first aid to someone experiencing a respiratory emergency, you should:

1. Call 9-1-1.
2. Loosen tight clothing that may be restricting the victim’s breathing.
3. Assist the victim to use any inhalers, oxygen or other medical devices.
4. Bandage any open wounds of the neck or chest if necessary. If the victim has a ‘sucking’ chest wound (a chest wound that allows air to enter the chest cavity with each breath), apply plastic wrap or a plastic bag to the wound, sealing it in place EXCEPT for one side to allow air to escape. This will prevent air from entering the chest, but will also allow any trapped air to escape.
5. Do not give the person food or drink.
6. Do not put a pillow under the victim’s head (this may close off the victim’s airway).
7. Do not move the person if they have been injured (in case of spinal cord injury).
8. Continue to monitor the victim’s breathing and heart rate. Should the victim stop breathing or lose their pulse, perform rescue breathing or CPR until help arrives.

Do not be falsely reassured if a victim with noisy breathing (wheezing, gurgles or high-pitched whistling) suddenly has quiet breathing- this may indicate that the victim is no longer moving air into the lungs and may mean that the victim is close to respiratory collapse.

**Stroke**

A stroke is a true medical emergency. There is a saying in medicine, “Time is Brain”, which means that the longer a person waits to receive medical care after a stroke, the greater the chances of serious neurological damage or death. The brain requires oxygen and nutrients to function and cannot last long without these- brain cells begin to die within minutes when deprived of oxygen.

It is important that everyone is familiar with the signs of stroke:

• Weakness or numbness on one side of the body or face
• Facial drooping (one side of the mouth will appear to be lower than the other, smile will be crooked)
• Changes in vision (blurred vision, loss of vision or dimness)
• Difficulty speaking or difficulty “finding” words/slurred speech
• Altered gait/difficulty walking
• Severe headache (not always present)
• Dizziness or weakness

A victim of stroke may be found unconscious if the stroke is severe.

A stroke occurs for one of two reasons: a blood clot blocks blood flow to a portion of the brain (called ischemic stroke), or there is bleeding into the brain (called hemorrhagic stroke). The most important thing to note with either type of stroke is when symptoms first appeared (when the victim was last known to be normal). This is because certain treatments for stroke are time-dependent.

If you suspect stroke:

• Call 9-1-1. This is your priority action. Be sure you tell dispatch that you suspect stroke, as this will start important preparations at the hospital.
• Keep the victim calm.
• Try to determine when the victim was last normal, or without symptoms.
• Do NOT give food or water. Some strokes may affect swallowing.
• Do NOT give aspirin. Although most strokes are ischemic in nature, some are hemorrhagic, and giving aspirin in these cases would worsen bleeding and could cause death.
• If the victim is unconscious, monitor breathing and pulse and be prepared to perform CPR if it should become necessary.

Seizures

Seizures (convulsions) are not uncommon and can be quite frightening to witness if you have never seen one before. Seizures are not a disease in and of themselves, but rather are a symptom of any number of disorders that affect the brain, including epilepsy. Seizures do not cause permanent brain damage. A seizure is a sudden surge of electrical activity in the brain which affects the way a person moves and acts. Some seizures are severe, while others are barely noticeable unless you know what you are looking for. You will not need to provide first aid unless the seizure is a grand mal seizure, in which the person loses consciousness, falls to the ground and experiences jerking and stiffening of the muscles. These are also called generalized seizures, or tonic-clonic seizures. These types of seizures usually last 1 to 3 minutes and subside on their own without treatment. Seizures that last longer than 5 minutes require medical care and monitoring.

If you are assisting a victim who is suffering a seizure:

1. Loosen and tight or restrictive clothing that may hamper breathing.
2. Do NOT try to restrain the victim or hold them down- this may result in injury to the victim.
3. Do NOT try to put anything in the victim’s mouth to prevent them biting their tongue- the victim may choke on the object or injure their mouth.
4. Remove any dangerous objects/furniture from the victim’s space that could cause injury.
5. If there are panicked bystanders, ask them to move back and give the victim some space. Reassure them that the seizure will pass and there is no reason to panic.
6. Once the victim has stopped seizing, they may be confused and disoriented for a period of time. Provide reassurance. If the victim is semiconscious or unconscious, place the victim on his/her side to prevent choking on any secretions from the mouth, particularly if the victim bit their tongue and it is bleeding.
7. Monitor breathing and pulse until help arrives.
8. Call 9-1-1. Many seizure patients will not require transport to a hospital if the seizure is their “usual” pattern of seizure, but it is a wise idea to allow medical personnel to make that decision.

Children will sometimes experience what is known as febrile seizures when they have a high fever-treatment is the same as for an adult victim. Controlling fever will often prevent these types of seizures. Most children outgrown these types of seizures as their brain develops.

**Diabetic Emergencies**

Millions of people around the world suffer from diabetes, and diabetic emergencies are common. In type 1 diabetes, the body produces no insulin, and the individual must use artificial insulin to survive. In type 2 diabetes, the individual’s pancreas produces insulin, but the person’s body is unable to utilize it properly. Our cells require a constant supply of sugar to survive, particularly the brain. Too much sugar in the blood (hyperglycemia) and too little sugar (hypoglycemia) have different symptoms, and it is important to be able to recognize the difference between the two.

**Signs and symptoms of hyperglycemia include:**

- Fatigue (tiredness)
- Thirst
- Warm, dry skin
- Sweet or fruity breath
- Rapid heart rate and breathing
- Drowsiness
- Loss of consciousness (diabetic coma)

**Signs and symptoms of hypoglycemia include:**

- Weakness/faintness
- Hunger
- Shakiness/trembling
- Sweating
- Cold, clammy skin
- Combativeness, confusion or irrational behaviour
- Rapid heart rate
- Loss of consciousness (severe)
To treat hyperglycemia:

1. Call 9-1-1. If you know or suspect the victim is a diabetic, tell dispatch.
2. Monitor breathing and pulse and prepare to act if the person becomes unconscious.

To treat hypoglycemia:

1. Have the victim sit or lay down.
2. If they have their own source of sugar (i.e. glucose gel) have them take it; if they do not, give them food or drink containing sugar, such as soda, juice with sugar in it or candy.
3. If they show signs of improving, ask them to check their blood glucose (if they have a testing kit).
4. Give them more sugar if necessary.
5. If they do not improve quickly call 9-1-1. Look for other causes.
6. Continue to monitor breathing and pulse and prepare to act if the person becomes unconscious.

Poisoning

Poisoning can occur with almost any substance, even with medications prescribed by a healthcare provider. In fact, intentional and unintentional overdoses of medicines are much more common than poisonings by other substances. You should know the number of your regional poison control center or the United States National Poison Center at 800-222-1222 and call them before providing first aid to anyone suspected of having any kind of poisoning. When you call, have some general information about the victim readily available. In addition, if you know the medicine, product or plant the victim ingested, this will be invaluable to the expert on the phone.
Be aware that the symptoms of poisoning can be the same as many other diseases and conditions; however, there are certain signs to look for if you suspect poisoning. If you notice any of these, call for medical assistance BEFORE calling poison control:

- Altered level of consciousness (may be sleepy or hyperactive)
- Altered respiratory pattern (breathing very slowly or too quickly)
- Slurred speech
- Nausea and/or vomiting
- Chemical smell on the victim’s breath
- Burns on or around the lips or in the mouth
- Seizures
- Empty pill bottles in the area
- Spilled chemical bottles

While you are waiting for medical assistance, be sure you and the victim are both safe. Move to fresh air if you suspect the victim has been breathing lethal fumes, as in carbon monoxide poisoning. Look into the victim’s mouth and, with a gloved hand, remove anything you can easily reach. If the poison spilled on the victim, remove any contaminated clothing and begin to flush the area with water until help arrives, but only if you have proper protective wear, such as gloves. Do NOT make the victim vomit unless advised to do so. Monitor the victim and start CPR if that becomes necessary.

If you reach the poison control center, follow any instructions given by them. If the victim is taken to hospital, take or send any pills, bottles or plants.

**Hyperthermia (Heat Exposure)**

Heat related injuries include heat cramps, heat exhaustion and heat stroke. Heat stroke is the most severe of these injuries and typically happens when the victim has been performing heavy work or engaging in sports in a very hot environment. The victim usually has been sweating heavily and not replenishing fluids lost to sweating. In addition, some medications and alcohol use may predispose an individual to heat stroke. The main symptoms of heat stroke include:

- Faintness/dizziness
- Headache
- Nausea/vomiting
- Hot, dry skin or cool, clammy skin
- Rapid and weak pulse
- Weakness
- Altered level of unconsciousness (may lose consciousness)

Untreated heat exhaustion or heat stroke can cause death. Act quickly if you suspect either condition. If you suspect a person has hyperthermia, there are several things you can do to help the victim:

1. Call 9-1-1
2. Move the person to a cooler environment, out of the sun and into a shady or air-conditioned space.
3. Lay the victim down and elevate their legs and feet.
4. Remove restrictive or tight clothing.
5. Begin to actively cool the victim by fanning the person and applying cool compresses to the armpits, neck and groin areas.
6. If the victim is awake enough to drink and is not vomiting, try giving cool liquids to drink. Do NOT give the person alcohol or beverages containing caffeine. Move the person out of the sun and into a shady or air-conditioned space.
7. If the victim loses consciousness, monitor airway, breathing and circulation and prepare to perform CPR if necessary.

Hypothermia

Hypothermia is caused by prolonged exposure to the cold (cold weather or cold water).

- Shivering and loss of coordination
- Slurred speech, apathy, confusion
- Extremely slow breathing
- Loss of consciousness (severe hypothermia)

If you suspect someone has hypothermia, there are several things you can do to help the victim:

1. Call 9-1-1
2. Move the person to a warmer environment.
3. Remove any wet clothing and cover the victim with a dry blanket (or dress in dry clothing for mild cases).
4. Begin to actively warm the victim by applying hot water bottles or chemical hot packs (wrapped in towels or blankets to prevent burns) to the chest and abdominal areas (core areas). Do not worry about warming the arms and legs; warm the blood at the center (core) of the body and allow that warm blood to warm the extremities.
5. Do NOT immerse the victim in hot water- warming the victim too quickly may cause lethal heart rhythms
6. Do NOT use a heating pad or heating lamp.
7. If the victim is awake enough to drink and is not vomiting, try giving warm liquids to drink. Do NOT give the person alcohol or caffeinated beverages.
8. If the victim is unconscious, monitor breathing and pulse and prepare to perform CPR if necessary.

Frostbite

Frostbite is caused by exposure to cold temperatures for prolonged periods, which causes damage to the skin and underlying tissues.

Symptoms of frostbite may include:

- Pins and needles sensation, followed by numbness
- Pale and hard skin
- Aching, throbbing or lack of sensation in the affected area
- Red and very painful skin/tissue as unthawing occurs
• Blisters and blackened, dead tissue (severe frostbite)

Areas with poorer circulation are most prone to frostbite, such as the nose, ears, hands and feet. When frostbite extends to the blood vessels and damages them, the affected area may not recover and amputation is often necessary.

To treat frostbite:

1. Look for signs and symptoms of hypothermia and treat first (see section on Hypothermia above). Call 9-1-1 immediately if frostbite is severe or if there are signs and symptoms of hypothermia.
2. Bring the victim into a warm, dry place.
3. Remove tight jewellery if fingers are affected, or socks and boots if feet are affected. Remove any wet clothing to prevent further cooling.
4. If medical assistance is close by: wrap the affected area with dry gauze, separating fingers and toes.
5. If medical assistance is not close by, you will need to rewarm the affected areas.
6. Soak affected areas in warm water for 20 to 30 minutes (do NOT use hot water). Keep changing the water as it cools. If the victim’s face is affected, apply warm compresses one after another. Pain, color changes and changes in sensation will occur as the tissue warms. Warming is complete when the affected tissue is soft again and full feeling returns.
7. Once fingers and toes have thawed, wrap them in dry gauze, being careful to separate the digits.
8. Move the injured tissue as little as possible.
9. If the frostbite is severe and affects more than one area, give warm fluids (NOT alcohol) to warm the victim and replenish fluids.
10. Do NOT break any blisters that form
11. Do NOT rewarm if there is a risk of refreezing - wait until you can get medical assistance)
12. Do NOT use direct heat to thaw damaged tissue (i.e. hair dryer, heating pad)
13. Do NOT massage the affected area

Foreign Bodies
A foreign object in any part of the body can cause pain, infection, and other problems. Most commonly, foreign bodies are found in the ear, eye, nose or skin.

Ear
Foreign bodies in the ear can lead to hearing loss, pain, and infection. The important thing to remember is to NEVER stick anything in the ear in an attempt to remove an object. Doing so may push the foreign body deeper into the ear and may result in damage to the ear. If you can see the object and grab it with a pair of tweezers, remove it. Use gravity by having the person tilt their head toward the ear with the foreign body.

Many times, an insect will crawl into an ear seeking the warmth and confined space. If you know that an insect is in the ear, you may be able to remove it by warming some baby oil and pouring it into the ear. The oil will serve to drown the insect and may allow the insect to float out of the ear. Do NOT use this method if there is any drainage from the ear that might indicate a ruptured eardrum. You should not use this method in any child who has tubes in his ears for recurrent ear infections.

Whether or not these methods are successful in removing the foreign body from the ear, a licensed practitioner should check the affected ear as soon as possible.

Eye
Foreign bodies in the eye can lead to vision loss, pain and infection. Be sure your hands are clean before you start working with the eyes. Many times, it may be possible to remove the foreign object by flushing the eye with saline solution or clean water while holding your eyelid open.

If the object is embedded in the eyeball, do NOT remove it. Instead, cover the eye loosely with a gauze pad and get immediate medical attention. An object deeply embedded in the eyeball must be removed surgically to prevent further damage to the eye.

If you flush a foreign body from the eye but the victim continues to have pain or redness, or if the victim cannot see normally, medical attention is immediately required.

Nose
Foreign bodies in the nose can lead to pain and infection. The important thing to remember is to NEVER stick anything in the nose in an attempt to remove an object. Doing so may push the foreign body deeper into the nose and may result in damage to the structures of the nose. If you can see the object and grab it with a pair of tweezers, remove it.

Instruct the victim to breathe through his mouth until the foreign body is removed. Breathing through his nose may cause the object to enter the victim's windpipe or lungs. Instead, have him blow his nose gently in an attempt to remove the object. If the object is not removed using these methods, seek medical help for professional removal.

Skin
Foreign bodies in the skin can lead to infection and pain. Before attempting to remove an object from the skin, make sure your hands are clean. If the object in the skin is wood, do NOT soak the extremity. Getting the wood wet will cause it to swell and fragment, making the removal more difficult. If enough of the foreign body is above the skin, you may be able to grasp it with tweezers and pull it out. After
removal, gently squeeze the area around the wound to encourage bleeding to wash out any fragments that might be left behind. Apply some antibiotic ointment and cover the area if it is likely to get dirty. Be sure to consult with your healthcare provider to determine if you should receive a tetanus shot.

Occasionally, the foreign body will be completely under the top layer of skin. If you feel comfortable using a sharp needle to remove the object, you must first clean the needle as well as possible using rubbing alcohol or soap and water. If you can see the point of entry for the object, use the needle to lift the skin above the object and move the point of the needle to lift the tip of the foreign body out above the level of the skin. Use the tweezers to grasp the object and pull it out. Cleanse the wound thoroughly, apply a topical antibiotic ointment, and cover the wound if it is likely to get dirty. Again, be sure to check on the status of your tetanus immunization.

**Traumatic Tooth Loss**

Losing a tooth due to trauma does not always mean that a tooth is lost forever. If a tooth is lost due to trauma you should:

1. Avoid touching the roots of the tooth- handle it by the crown only.
2. Avoid rubbing the tooth in an effort to clean it of debris.
3. If debris is present, gently swish the tooth around for less than 10 seconds in a bowl of lukewarm water-do NOT rinse the tooth under running water.
4. Attempt to place the tooth back in its socket. Bite down gently on a piece of gauze or moistened paper towel if it will not go all the way in.
5. If the tooth will not go back into the socket, place it in some milk or a mild saltwater solution.
6. See a dentist as soon as possible- the sooner a dentist is consulted, the better the chance of successful reimplantation.

**Bites and Stings**

Animal bites can be dangerous for several reasons. Animal bites can be deep and there is a high risk of infection.

1. If the bite is minor, clean the wound thoroughly with soap and water and apply a thin layer of antibiotic cream. Cover with a bandage.
2. For deeper wounds, apply pressure to stop any bleeding and seek medical attention. If medical help is not readily available, stop any bleeding, clean the wound well and apply a clean dressing until medical attention is available.

Any time the skin is broken, there is risk of infection. Signs of infection (redness, swelling, pain that is getting worse instead of better, warmth, red streaks moving out from the wound) require medical help immediately. A tetanus shot is required if tetanus is not up to date.

If there is a chance that the animal carried rabies, it is critical that medical help be sought immediately. If possible, cage the animal that bit the victim, but do not risk a second bite to yourself. Remember that unimmunized domesticated animals can also carry rabies. In many areas of the US, a large proportion of
the populations of bats and skunks are rabid. Any wild animal that is acting unusually (i.e. it lets you get close to it) may be ill with rabies.

Human Bites
The human mouth is very dirty -- and human bites can be worse than animal bites. For human bites, it is important to clean the wound very well with soap and water. Apply a thin layer of antibiotic cream and a clean bandage. Watch for signs and symptoms of infection and seek medical care if any develop.

If the wound is very deep, get health care as soon as possible. Again, if you have not had a tetanus shot in the last ten years, seek medical care to get one as soon as possible after the wound.

Insect Bites or Stings
Insect bites and stings can be a problem not only due to localized pain and swelling, but also because of the generalized systemic reactions that can occur. If a victim has been bit or stung:

1. Move to an area where the victim is safe from additional bites or stings.
2. Remove the stinger if it is still stuck in the skin. Do this by scraping a fingernail or other object, such as a credit card, across the skin; avoid trying to pluck the stinger out with your fingers as this may release more venom into the skin.
3. Cleanse the area with soap and water.
4. Apply an ice pack or cold cloth to help reduce swelling and pain.
5. Ibuprofen or acetaminophen may relieve the pain caused by inflammation. A topical antihistamine may help relieve pain and swelling. Calamine or Caladryl lotion may help with itching. A paste created from water and meat tenderizer or baking soda may also help reduce swelling and itching.

Snake Bite
Most snakes will avoid you if possible and will bite only when threatened or surprised. If you come across a snake, back away slowly and leave the snake alone.

If you or someone around you are bit by a snake:

1. Call 9-1-1.
2. Remain calm and try to remember what the snake looks like (color, markings, shape of pupils).
3. Do NOT try to catch the snake (and never bring a live snake to the hospital).
4. Immobilize the affected area with a splint.
5. Keep the area affected by the bite lower than the heart.
6. Keep the victim as quiet as possible to keep the venom from spreading.
7. If possible, clean the wound gently. Do not flush it with water.
8. Do NOT cut the wound or try to suck the venom from the bite. Do NOT apply ice or a tourniquet.
9. Remove any jewelry or other items that might constrict the area if swelling occurs.

Anaphylaxis

Some people are highly allergic to certain insect bites or stings. Certain foods, such as peanuts, can also cause a severe and life-threatening allergic reaction.

Anaphylaxis is a severe allergic reaction that can rapidly cause death if not immediately treated. Anaphylaxis causes a dangerous drop in blood pressure leading to shock. It can also cause swelling of the airway leading to inability to breathe. Symptoms may occur within minutes of exposure to the allergen.

Symptoms and signs may include:

- Shortness of breath
- Swelling of lips, eyes, mouth or throat
- Dizziness or faintness
- Wheezing or difficulty breathing
- Rapid heart rate
- Nausea/vomiting or diarrhea
- Hives or rash
- Flushed or pale skin
- Loss of consciousness

If you are with someone experiencing an anaphylactic reaction:

- Call 9-1-1 immediately.
- Check to see if he/she is carrying an EpiPen. If the victim is able, have them inject themselves; if they are unable, assist them to use the EpiPen. EpiPen use is simple: Remember “blue to the sky, orange to the thigh”. Hold the pen firmly with the orange side pointing down. Remove the blue cap by pulling straight up- do not bend or twist. Push the orange tip firmly into the mid-outer thigh. You will hear a click- hold firmly in place for several seconds.
- Lay the victim down with the legs and feet elevated, loosen tight clothing and keep them warm.
- Monitor the patient closely. If the patient stops breathing or loses their pulse, start CPR and continue until help arrives.
The medication contained in EpiPens is potent but wears off quickly. Even if the victim feels better after receiving the injection of epinephrine, they must go to the hospital in case symptoms return.

**Minor Cuts and Puncture Wounds**

Cuts and puncture wounds are common injuries. First aid for these injuries includes:

- Control bleeding by application of pressure to the area (see the section on Bleeding).
- Elevate the injury.
- Apply a cold pack to reduce swelling and pain.
- Clean the wound thoroughly with soap and water and apply a topical antibiotic cream.
- Cover the wound with a Band-Aid or clean bandage.
- Change the dressing if it becomes soiled.
- If the wound is deep or large, seek medical care to determine if stitches are required. This must be done within the first few hours after injury.
- A tetanus shot may be necessary if you have not had one in the last ten years- check with your physician.
- Watch for signs of infection (redness, swelling, drainage, or pain that is getting worse instead of better) and get treatment if you think the wound is getting infected.