

Adult Cardiopulmonary Resuscitation and Use of an AED

Course

Health Science

Unit VI

CPR/AED &
First Aid

Essential Question

What do you
need to know
and do during a
cardiac
emergency?

TEKS

130.204 (c) 8
(H)

Prior Student Learning

Students should
have completed
the unit of
Anatomy &
Physiology:
Cardiovascular
and Respiratory
system

Estimated time

4-5 hours
depending on
class size

Rationale

Healthcare professionals have a responsibility to respond appropriately to all situations, including emergencies. The student will respond to emergency situations consistent with their level of training.

Objectives

Upon completion of this lesson, the student will be able to:

- List the signs and symptoms of a heart attack
- Administer rescue breathing to an adult
- Administer CPR to an adult
- Demonstrate the steps for using an AED

Engage

Tell the students that with the knowledge and skills learned in this lesson they could save a life.

Key Points

*Note to teacher: This lesson is not designed to take the place of American Heart Association *Healthcare Provider* course. It is designed to introduce life-saving CPR techniques. You must complete the AHA BLS Instructor course in order to give your students a *Healthcare Provider* course completion card.

- I. Sudden cardiac arrest is the leading cause of death in the United States and Canada
 - A. The CDC estimates that about 330,000 people in the US die yearly from heart disease
 - B. About 250,000 of those deaths occur in an out-of-hospital setting
 - C. Cardiovascular disease is a leading cause of death for men and women worldwide
- II. There are five elements in the cardiac chain of survival
 - A. Early recognition of the signs of a heart attack
 - B. Early access to medical care (911)
 - C. Early CPR
 - D. Early defibrillation
 - E. Early advanced life support
- III. Signs and Symptoms of a Heart Attack
 - A. Some victims of a heart attack may deny the symptoms
 - B. Signs and symptoms vary depending on the amount of heart damage

- C. Heart attack victims may have all or just a few of the symptoms and signs associated with a heart attack or cardiac arrest
 - 1. Severe, painful pressure under the sternum with pain radiating to the shoulder, arms, neck and jaw
 - 2. Shortness of breath
 - 3. Mucous membranes appear pale or cyanotic
 - 4. Weakness
 - 5. Anxiety or apprehensiveness
 - 6. Nausea and/or vomiting
 - 7. Diaphoresis
 - 8. Loss of consciousness
 - D. If any combination of these symptoms are seen
 - 1. Encourage the victim to stay calm and relax
 - 2. Put the victim in a comfortable position
 - 3. Avoid unnecessary stress and movement
 - 4. Loosen tight clothing
 - 5. If the person takes medications for chest pain, have him or her do so
 - 6. If pain persists, call 911 or obtain medical help as soon as possible
 - E. If your victim becomes unresponsive or unconscious, start the steps of CPR
- IV. The unconscious victim
- A. Never attempt CPR on a person that is responsive
 - B. Establish unresponsiveness
 - 1. Shake and Shout
 - a. Tap the victim on the shoulder for a response
 - b. Shout, "Hey, are you okay?"
 - 2. If no responses from the victim, call 911 **or** have someone call 911 and get the AED for you.
 - a. Answer all the 911 dispatcher's questions
 - b. Wait till the dispatcher disconnects the phone connection before you hang up
 - 3. Anytime you have an unresponsive victim you should call 911, even if you don't know why the victim is unconscious.
 - 4. Be prepared to begin CPR
- V. Adult CPR
- A. Child CPR should be used on an unresponsive victim between the ages of one and puberty
 - 1. If you don't know the victim's age, look for signs of puberty.
 - 2. Signs of puberty include
 - a. Breast development in females
 - b. Underarm, chest, and facial hair on males

- B. Infant CPR is used when the unresponsive victim's age is birth to one year old

VI. Steps of adult CPR

- A. Make sure the scene is safe
 - 1. Is the victim in a dangerous place?
 - 2. Are there any obvious threats or dangers to you or the victim?
- B. Make sure the victim is lying on his back on a firm, flat surface
 - 1. If the victim is lying face-down, carefully roll him onto his back
 - 2. If the victim is face-up on a bed or another soft surface, place a board or other firm object under his back
 - a. A soft surface diminishes the effect of chest compressions
 - b. Effective chest compressions can only be performed on a firm surface
- C. Kneel at the victim's side and open the airway using the head tilt-chin lift method
 - 1. Tilt the head by pushing back on the forehead
 - 2. Lift the chin by putting your fingers on the bony part of the chin
 - 3. Do not press the soft tissues on the neck or under the chin
 - 4. Lift the chin to move the jaw forward
- D. Jaw Thrust
 - 1. If you suspect a cervical spine injury, open the airway with the jaw thrust
 - a. Place one hand on each side of the victim's head, resting your elbows on the surface on which the victim is lying
 - b. Place your fingers under the angles of the victim's lower jaw and lift, displacing the jaw forward
 - c. Pull the lower lip down if the lips close
 - 2. If the jaw thrust does not open the airway, use the head tilt-chin lift method
- E. Check for normal breathing (at least one breath every 5 seconds)
 - 1. Look, Listen and Feel
 - a. Put your ear next to the victim's mouth and nose
 - b. Look to see if the chest rises
 - c. Listen for breaths
 - d. Feel for breaths on your cheek
 - 2. If the victim is breathing normally
 - a. Roll the victim onto his side
 - b. Wait for trained help to take over

- c. If the victim stops breathing, start the steps of CPR from the beginning
- F. If there is no normal breathing, give 2 breaths
 - 1. Hold the airway open with a head tilt-chin lift
 - 2. Pinch the nose closed
 - 3. Take a normal breath and cover the victim's mouth with your mouth, creating an airtight seal
 - 4. Give 2 breaths, about 1 second each
 - 5. Watch for the chest to rise as you give each breath
 - 6. If the first breath does not go in, re-open the airway with a head tilt-chin lift and try again
 - 7. Room air is 21% oxygen
 - a. We only use part of the 21% O₂ we breathe in
 - b. We breathe out waste products and "leftover O₂"
 - c. It is enough O₂ to be of help to the non-breathing victim
 - 8. Risk of gastric inflation
 - a. Air can enter the stomach rather than the lungs
 - b. If you see the abdomen rising/inflating, you may be giving breaths too forcefully or too quickly
 - c. Complications of gastric inflation include
 - i. Vomiting
 - ii. Aspiration
 - iii. Pneumonia
 - d. Deliver enough air to make the chest rise, but not the abdomen
 - 9. ***Note to instructor:** Foreign body airway obstruction will be taught in a separate lesson
- G. Check for a pulse
 - 1. Healthcare providers are trained to check for a pulse while lay persons are not
 - 2. Check the carotid pulse
 - a. If heart activity is producing any pulse activity at all, there is a better chance of palpating the pulse if you check a central pulse
 - i. The carotid pulse is close to the heart
 - ii. Peripheral pulses such as the brachial and radial pulses are further away from the heart
 - b. Locate the trachea using 2 or 3 fingers
 - i. Slide these 2 or 3 fingers into the groove between the trachea and the muscles at the side of the neck
 - ii. Feel for the throb of the carotid pulse for at least 5 seconds, but no more than 10 seconds
 - iii. If you can feel a pulse, continue with rescue breathing

- a) 1 breath every 5 seconds for adults
 - b) 1 breath every 3 seconds for child and baby
 - iv. If you do not feel a pulse, begin chest compressions
- H. Remove clothes from the front of the chest
 - 1. Clothing is removed so that you can see the landmark for placing your hands in the correct position
 - 2. Clothing gets in the way when using the automated external defibrillator (AED)
- I. Give 30 chest compressions
 - 1. Put the heel of one hand on the center of the victims chest
 - a. The center of the chest is between the nipples
 - b. This puts your hands on the lower part of the sternum, but away from the xiphoid process
 - 2. Put the heel of your other hand on top of the first hand
 - 3. Push hard and fast
 - a. Push straight down on the chest 1 ½ to 2 inches with each chest compression
 - b. Push at a rate of 100 compressions a minute
 - 4. After each compression, release pressure on the chest to let it come back to its normal position (recoil)
 - 5. A chest compression is an artificial heart beat
 - a. Compressions pump blood to the brain and heart
 - b. When the heart stops beating, the sooner you start compressions, the better
 - i. Blood is still oxygen-rich at the time the heart stops
 - ii. Each compression will be delivering oxygen-rich blood to the body organs
- J. Keep giving CPR
 - 1. 30 chest compression/2 breaths
 - 2. Until the AED arrives;
 - 3. The victim starts to move; or
 - 4. Trained help takes over (i.e. EMT, nurse, doctor)

VII. What is an AED

- A. Automated external defibrillator
- B. A machine with a computer inside
 - 1. Recognizes cardiac arrest that requires a shock
 - 2. Tells the rescuer when a shock is needed
 - 3. Gives the shock if needed
 - 4. Can stop some abnormal heart rhythms and allow a normal rhythm to return
 - 5. A machine that is accurate and easy to use
 - a. Uses visual and audible prompts

- b. Simple, easy to follow steps

VIII. When to use an AED

- A. The person performing CPR continues until the AED arrives
- B. As soon as the AED arrives and is set up, CPR stops and the AED is put into use
 - 1. If the person arriving with the AED is trained in CPR/AED use, that person will set up the AED
 - 2. The person administering CPR continues CPR until the AED is ready to be used
- C. AED use is indicated only when three criteria are present
 - 1. No response from victim
 - 2. No breathing seen in the victim
 - a. Agonal breaths are occasional gasps of air in an cardiac arrest victim
 - b. Agonal gasps are not effective breathing
 - 3. No pulse can be palpated in the victim

IX. Steps in using an AED

- A. Turn the AED on
 - 1. Push the “ON” button or open the lid
 - 2. Follow the visual and audible prompts
- B. Attach the pads
 - 1. Choose the correct pads
 - a. Some AEDs can deliver a smaller shock dose for children if you use child pads or a child “key” or switch
 - b. Always use the larger adult pads and adult dose for an adult victim
 - 2. DO NOT use child pads or a “child dose” on an adult
 - 3. Open the AED pad package and peel away the plastic backing
 - 4. Attach the sticky side of the pads directly to the victim’s bare chest
 - 5. The picture on the pad will show you where to put the pads
- C. Clear the victim
 - 1. Make sure no one is touching the victim, not even you
 - 2. The victim’s body must be motionless for the AED to analyze the heart rhythm or give a shock
- D. Allow the AED to check the heart rhythm
 - 1. Many AEDs audibly say “Analyzing Now”
 - 2. The AED will say “Shock Advised or “No shock needed”
 - 3. If “Shock Advised” is said, then you will hear the AED charging
- E. Push the SHOCK button if the AED tells you to do so
- F. The AED may tell you to resume CPR
 - 1. Do not recheck for a pulse

2. Immediately start chest compressions

X. Special Situations when using the AED

A. Water

1. DO NOT deliver shock if victim is
 - a. Lying in water
 - b. Covered with water
 - i. Victim is covered with sweat
 - ii. Victim has just been pulled from a pool of water
 - iii. If the victim is lying in a small puddle of water or snow but the chest is not covered with water, you can give shocks
2. Move the victim away from standing water
3. Quickly wipe the victim's chest before you attach the pads
4. Water may cause the shock to flow over the skin from one pad to the other: energy won't go to the heart

B. Medicine patch

1. Do not put an AED pad over a medicine patch
 - a. The patch may block some of the shock dose
 - b. The patch may burn the victim if pads are placed over a medicine patch
 - c. Wear gloves when you remove a medicine patch
2. Wipe the chest where the patch was before you put on the pad

C. Pacemaker or Internal Defibrillator

1. Look for a lump under the skin of the chest that looks smaller than a deck of cards
2. If you see this lump where the pads should to, put the pads at least 1 inch away from the lump
3. You may use the AED on victims with pacemakers or internal defibrillators as long as you keep the AED patch 1 inch away from the device

D. Hairy chest

1. If the pads stick to the hair instead of the skin, press down firmly on each pad
2. If the AED still tells you to check the pads, quickly pull off the pads to remove the hair
3. If a lot of hair still remains where you will put the pads, shave the area with the razor in the AED carrying case
4. Put on a new set of pads then follow the AED's visual and audible prompts

XI. 2-rescuer CPR

A. Performing CPR can be a shared process

B. One rescuer performs chest compressions

1. Give 30 chest compressions

2. Pause after the 30th compression to give time for the second rescuer to give 2 breaths
- C. One rescuer gives rescue breaths
 1. Give two 1-second breaths
 - a. Mouth-to-mouth, as already discussed
 - b. Mouth-to-mask
 - c. Bag mask

XII. Bag Mask Method

- A. The apparatus consist of a bog attached to a face mask
- B. The most common method of providing positive pressure ventilations in out-of-hospital situations
- C. Bag Mask Technique
 1. Position yourself directly above the victim's head
 2. Place the mask on the victim's face, covering the nose and mouth
 3. Perform a head tilt
 4. Use the thumb and index finger of one hand to make a "C", pressing the edges of the mask to the face
 5. Use the remaining fingers (3 fingers form an "E") to lift the angles of the jaw and open the airway
 6. Squeeze the bag to give breaths
 7. Watch for the chest to rise and fall

XIII. Recovery Position

- A. Used to manage unresponsive victims who have adequate breathing
- B. Used to manage a victim that has been revived at any point during the CPR process
- C. It is a side-lying position (fluid can easily drain from mouth)
 1. Roll the victim to his side
 2. Position the victim to maintain an open airway
 3. Check the victim's breathing often
 4. If breathing stops, get the AED, roll the victim onto his back and start CPR

XIV. Instructor will demonstrate each step of CPR and use of AED

*Note to teacher: You may choose to demonstrate each step of CPR/AED as you explain each part, and then show the complete sequence at the last part of the lesson.

Activity

- I. Students will practice the steps of CPR/AED on a practice manikin.

Assessment

Students will perform the steps of CPR and the use of an AED.

Rubric

Materials

One CPR manikin for every 3 students

Manikin cleaning supplies

Manikin mouth shields

CPR Face Mask

Bag mask (ambu bag)

AED trainer

Accommodations for Learning Differences

Students needing reinforcement will receive one-on-one coaching during CPR practice.

For enrichment, the student will practice to compete in the HOSA CPR/FA event.

National and State Education Standards

National Healthcare Foundation Standards and Accountability Criteria:

Foundation Standard 2 Communications

2.11 Interpret verbal and nonverbal communication

2.14 Recognize the elements of communication using a sender-receiver model.

2.15 Apply speaking and active listening skills

2.22 Use medical abbreviations to communicate information

Foundation Standard 10: Technical Skills

Healthcare professionals will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

10.1 Technical Skills

10.12 Apply skills to obtain training or certification in cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO) and first aid. Additional technical skills may be included in a program of study based on career specialties.

TEKS

130.204 (c)(8)(H) demonstrate first aid, vital signs, cardiopulmonary resuscitation, and automated external defibrillator skills in a laboratory setting.

Texas College and Career Readiness Standards

Science Standard,

I. Nature of Science C. Collaborative and safe working practices

Demonstrate skill in the safe use of a wide variety of apparatuses, equipment, techniques, and procedures.

Cross-Disciplinary Standards,

I. Key Cognitive Skills D. Academic Behavior: 1. Self-monitor learning needs and seek assistance when needed, 3. Strive for accuracy and precision, 4. Persevere to complete and master task. E. Work habits: 1. Work independently, 2. Work collaboratively
II. Foundation Skills A. 2. Use a variety of strategies to understand the meaning of new words. 4. Identify the key information and supporting details.

I. Key Cognitive Skills

D. Academic Behavior:

1. Self-monitor learning needs and seek assistance when needed,
3. Strive for accuracy and precision,
4. Persevere to complete and master task.

E. Work habits:

1. Work independently,
2. Work collaboratively

II. Foundation Skills

- A. 2. Use a variety of strategies to understand the meaning of new words.
4. Identify the key information and supporting details.

Health Science
**Health Professional One- and Two-rescuer
 Adult CPR/AED Checklist**

Steps	Action	Successfully completed
Step 1	Check for response: Tap the victim and ask loudly, “Hey are you okay?”	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 2	Tell someone to call 911 and get the AED	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 3	Open the airway with the head tilt-chin lift	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 4	Look, listen, and feel for breaths	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 5	Give two 1-second breaths (keeping the airway open).	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 6	Bare the victim’s chest and place the hands in the proper position to begin CPR	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 7	Give 30 compressions at the rate of 100 beats per minute and about 1½ -2 inches deep	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 8	Give two 1-second breaths	<input type="checkbox"/> completed <input type="checkbox"/> skipped
<i>Rescuer two arrives with the AED</i>		
Step 9	Rescuer one (R1) continues CPR as rescuer two (R2) sets up the AED for use	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 10	R2 turns on the AED	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 11	R2 selects and applies the proper pads correctly (R1 continues with CPR steps)	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 12	R2: Clear the victim to analyze. R1: Stops CPR	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 13	If shock is advised, R2 clears the victim for shock and presses the shock button.	<input type="checkbox"/> completed <input type="checkbox"/> skipped

Step 14	R2: Resumes CPR, starting with chest compressions, if the AED instructs you to continue CPR. (NO pausing to recheck for pulse)	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 15	R1: Gives two 1-second breaths (keeping the airway open).	<input type="checkbox"/> completed <input type="checkbox"/> skipped
Step 16	R2: Gives 30 compressions at the rate of 100 beats per minute and about 1½ -2 inches deep. Continue CPR until the AED is ready to reanalyze the victim, the victim is revived, or emergency medical personnel arrive to take over.	<input type="checkbox"/> completed <input type="checkbox"/> skipped

16 steps completed = 100

15 steps completed = 92

14 steps completed = 87

13 steps completed = 70 and needs remediation

Comments:
