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**AMERICAN
SAFETY &
HEALTH
INSTITUTE**

CPR and AED

**Student Handbook
Preview**



CPR and AED

Student Handbook, *Version 7.0*

Purpose of this Handbook

This ASHI *CPR and AED Version 7.0 Student Handbook* is solely intended to facilitate certification in an ASHI CPR and AED training class. The information in this handbook is furnished for that purpose and is subject to change without notice.

ASHI certification may only be issued when an ASHI-authorized Instructor verifies a student has successfully completed the required core knowledge and skill objectives of the program.

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American Safety & Health Institute

1450 Westec Drive

Eugene, OR 97402 USA

800-447-3177

E-mail: response@hsi.com

Visit our website at hsi.com/ashi

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Preview



Section 1 – Sudden Cardiac Arrest

Respiratory and Circulatory Systems

Because the human body cannot store oxygen, it must continually supply tissues and cells with oxygen through the combined actions of the respiratory and circulatory systems.

The respiratory system includes the lungs and the “airway”, the passage from the mouth and nose to the lungs. Expansion of the chest during breathing causes suction, which pulls outside air containing oxygen through the airway and into the lungs. Relaxation of the chest increases the pressure within and forces air to be exhaled from the lungs.

The circulatory system includes the heart and a body-wide network of blood vessels. Electrical impulses stimulate mechanical contractions of the heart to create pressure that pushes blood throughout the body. Blood vessels in the lungs absorb oxygen from inhaled air. The oxygen-rich blood goes to the heart and then out to the rest of the body.

Large vessels called arteries carry oxygenated blood away from the heart. Arteries branch down into very small vessels that allow oxygen to be absorbed directly into body cells so it can be used for energy production. Veins return oxygen-poor blood back to the heart and lungs where the cycle repeats.

Sudden Cardiac Arrest

Sudden cardiac arrest, or SCA, can occur without warning to anyone, at any time. It is one of the leading causes of death among adults in the United States.

Sudden cardiac arrest happens when the normal electrical impulses in the heart unexpectedly become disorganized. The normally coordinated mechanical contraction of the heart muscle is lost, and a chaotic, quivering condition known as ventricular fibrillation can occur.

Blood flow to the brain and body abruptly stops. The lack of blood and oxygen to the brain causes the person to quickly lose consciousness, collapse, and stop breathing.

Brain tissue is especially sensitive to a lack of oxygen. When oxygen is cut off, brain death can occur quickly, within a matter of minutes. Without early recognition and care from a bystander, the person will not survive.

Cardiopulmonary resuscitation, or CPR, allows a bystander to restore some oxygen to the brain through a combination of chest compressions and rescue breaths.

Early Defibrillation

By itself, CPR is only a temporary measure that can buy time until more advanced care can be provided. The most effective treatment for ventricular fibrillation is defibrillation.

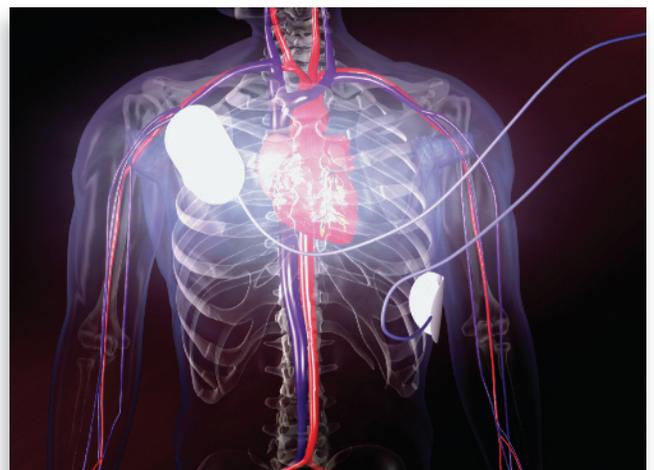
To defibrillate, electrode pads are applied to the chest and an electrical shock is sent between the pads through the heart. This shock stops ventricular fibrillation, so the heart’s normal electrical activity can return and restore blood flow.

Successful defibrillation is often dependent on how quickly a person is defibrillated. For each minute a person is in cardiac arrest, his/her chance of surviving decreases by about 10 percent. After as little as 10 minutes, defibrillation is rarely successful.



Causes of SCA

- Heart disease
- Electrical shock
- Severe blood loss
- Drug overdose
- Severe allergic reaction
- Drowning



The amount of time it takes to recognize a problem, activate EMS, and have EMS respond and defibrillate is usually longer than 10 minutes. In most cases, it's too late.

An automated external defibrillator, or AED, is a small, portable, computerized device that is simple for a minimally trained bystander like you to operate.

Turning on an AED is as simple as opening a lid, or pushing a power button. Once it is on, an AED will provide voice instructions to guide you through its use. An AED automatically analyzes the heart rhythm, determines if a shock is needed, and charges itself to be ready to defibrillate. An operator simply pushes a button to deliver the shock when told to by the AED.

In many cases of sudden cardiac arrest, if defibrillation can be delivered sooner, before EMS arrives, more people would survive. Immediate, high-quality CPR and defibrillation with an AED from a bystander can double or even triple the chance for survival.

Chain of Survival

The Chain of Survival is used to describe the most effective approach for treating sudden cardiac arrest. It consists of five interdependent links:

- Immediate recognition and activation of EMS quickly initiates the treatment process.
- Early CPR with effective chest compressions buys time for accessing an AED and improves the chance that defibrillation will work.
- Rapid defibrillation provides the best chance to return the heart to a normal rhythm.
- Effective advanced life support procedures and medications used by paramedics, nurses, or doctors help sustain the chance for recovery and survival.
- And finally, integrated post-cardiac arrest care increases the likelihood of long-term survival.

If any one of the links is weak or missing, the chances for survival are greatly reduced. The greatest chance for survival exists when all links are working together.

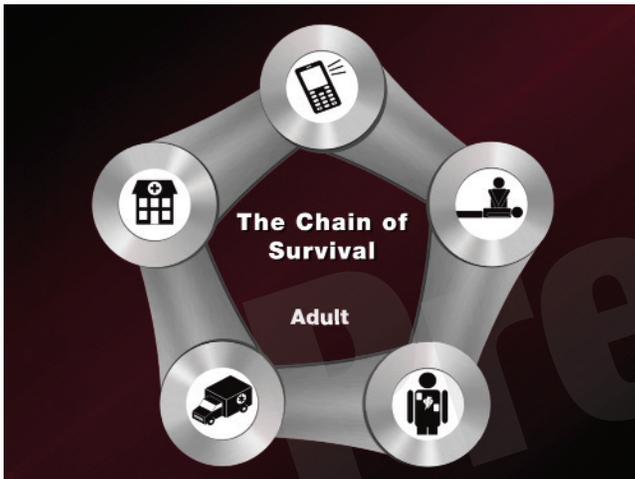
Chain of Survival for Children

When describing treatment guidelines for children:

- Someone younger than 1 year of age is referred to as an infant.
- Someone one to eight years old is referred to as a child.
- Anyone eight years old and above is considered an adult.

Sudden cardiac arrest occurs less frequently in children. Most cardiac arrests in children are not sudden and occur over time, usually due to the loss of an open airway or breathing, such as in drowning, choking, or a severe breathing problem. Without oxygen, the heart weakens, slows, and eventually stops.

When treating a child or infant suspected of being in cardiac arrest, be sure to ensure an open airway and effective rescue breaths when doing CPR; and always attach an AED.



The Chain of Survival for children includes the following links:

- Effective prevention of the typical causes for airway and breathing emergencies,
- Early CPR and defibrillation with an AED to reverse the effects of a weakened heart,
- Prompt activation of EMS to quickly get professional care,
- Rapid pediatric advanced life support procedures and medications used by paramedics, nurses, or doctors to help sustain the chance for recovery and survival, and
- Integrated post-cardiac arrest care to increase the likelihood for long-term survival.



Other Considerations

Heart Disease

Heart disease, through heart attacks and strokes, is the leading cause of death for men and women in the United States. Statistics indicate more than one in four deaths was related to heart disease; half of these deaths were women.

Lower risk for heart disease with a healthy lifestyle:

- A healthy diet can prevent or reduce high blood pressure and high blood cholesterol.
- Maintain a healthy weight.
- Control alcohol intake.
- Don't smoke.
- Exercise regularly.

Pain, Severe Pressure, or Discomfort in the Chest

Acute coronary syndrome, or ACS, occurs when there is reduced blood flow to the tissues of the heart. Often described as a heart attack, ACS is a serious condition that can result in significant damage to the heart.

Someone with ACS will generally experience pain, severe pressure, or discomfort in the chest. Women often do not experience these signs and will describe indigestion, weakness, or fatigue. Shortness of breath, nausea, and light-headedness can also occur. The person's skin may be pale, cool, and sweaty.

A person who has had previous heart problems is at risk for recurrence. Ask the person or any bystanders about prior problems, or medications being taken.

Activate EMS immediately, even if the person does not want you to. If an AED is available, have someone get it and keep it nearby. Do not try to transport the person to a hospital yourself.

Allow the person to find the most comfortable position in which to breathe. Loosen tight clothing. Calm, comfort, and reassure the person.

A person who is having a heart attack may deny it. This is a common occurrence in ACS. Accept it, but never let this alter your approach to care.

Someone with a heart condition may carry a prescribed medication known as nitroglycerin. Assist the person in taking it.



Section 3 – Basic CPR Skills

When breathing and circulation stop, there are two critical life-supporting skills you will learn to replace them: chest compressions and rescue breaths. First, we'll focus on mastering each skill individually. Then you'll learn how to link them together to perform CPR.

Chest Compressions

If the heart stops, it is possible to restore at least some blood flow through the circulatory system by way of external chest compressions. The most effective chest compressions occur with the rhythmic application of downward pressure on the center of the chest.

External compressions increase pressure inside the chest and directly compress the heart, forcing blood to move from the heart to the brain and other organs.

Always compress fast and deep when performing compressions. Without losing contact, allow the chest to fully rebound at the top of each compression.

Blood pressure is created and maintained with well-performed compressions. If compressions stop, pressure is quickly lost and has to be built up again. Minimize any interruptions when doing compressions.

When compressing properly, you may hear and feel changes in the chest wall. This is normal. Forceful external chest compression is critical if the person is to survive.

The compression technique for children is similar to that of adults. You can use either one or two hands to perform compressions on a child. For infants, compress with two fingers on the breastbone just below the nipple line.

Rescue Breaths

Rescue breaths are artificial breaths given to someone who is not breathing. They are given by blowing air into the mouth to inflate the lungs. The air you breathe contains about 21% oxygen. Your exhaled air still contains up to 16–17% oxygen. This exhaled oxygen is enough to support someone's life for a short time.

Before giving rescue breaths, you need to make sure there is an open airway. The "airway" is the only path for getting air into the lungs.

Someone who is unresponsive can lose muscle tone. If flat on his/her back, this can cause the base of the tongue to relax and obstruct the airway. This is the most common cause of a blocked airway in an unresponsive person.

The tongue is attached to the lower jaw. Moving the jaw forward lifts the tongue away from the back of the throat and opens the airway.

The head tilt, chin lift airway technique is the recommended way to open and maintain an airway. Place one hand on the forehead. Place the fingertips of your other hand under the bony part of the chin. Apply firm, backward pressure on the forehead while lifting the chin upward. This will tilt the head back and move the jaw forward.

Maintain the head-tilt with your hand on the forehead. Avoid pressing into the soft tissue of the chin with your fingers, as this can also obstruct the airway. Leave the mouth slightly open. If you remove your hands, the airway will close again. Open the airway each time you give rescue breaths.



Skill Guide 2

Chest Compressions

Adult

- Position person face up on flat, firm surface. Kneel close to chest. Place heel of one hand on center of chest.
- Place heel of second hand on top of first. You can interlace your fingers to help keep off chest.
- Position your shoulders directly above your hands. Lock your elbows and use upper body weight to push.
- Push hard, straight down at least 2 inches. Lift hands and allow chest to fully rebound.
- Without interruption, push fast at a rate of at least 100 times per minute.
- Do not compress over lowest part of breastbone. Keep up the force and speed of compressions.



Child

- Position child face up on flat, firm surface.
- Place heel of one hand on lower half of breastbone, just above the point where the ribs meet.
- Position your shoulder directly above your hand. Lock your elbow and use upper body weight to push.
- Push hard, straight down at least $\frac{1}{3}$ the diameter of the chest, or about 2 inches. Lift hand and allow chest to fully rebound.
- Without interruption, push fast at a rate of at least 100 times per minute. Keep up the force and speed of compressions.
- Compressions can be tiring. If desired, use two hands, as with adults.



Infant

- Position infant face up on flat, firm surface.
- Place tips of two fingers on the breastbone just below the nipple line.
- Push hard, straight down at least $\frac{1}{3}$ the diameter of the chest, or about 1 $\frac{1}{2}$ inches. Lift fingers and allow chest to fully rebound.
- Without interruption, push fast at a rate of at least 100 times per minute. Keep up the force and speed of compressions.



Section 4 – Basic Life Support Care

Unresponsive and Breathing – Recovery Position

Even if a person is breathing normally, a lack of responsiveness is still considered to be a life-threatening condition that requires immediate care.

There are a variety of things that can result in unresponsiveness, including medical conditions such as stroke or seizures, or external factors, such as alcohol or drug overdose. Regardless of the cause, the greatest treatment concern is the ability of the person to maintain a clear and open airway.

Positioning an uninjured, unresponsive person in the recovery position can help maintain and protect the airway. This position uses gravity to drain fluids from the mouth and keep the tongue from blocking the airway.

If an unresponsive person has been seriously injured, do not move the person unless fluids are collecting in the mouth and airway, or you are alone and need to leave to get help.

Unresponsive and Not Breathing – CPR

When a person is unresponsive and does not appear to be breathing or is only gasping, she is considered to be in cardiac arrest and requires CPR. CPR restores some oxygen to the brain through a combination of chest compressions and rescue breaths.

Once you start CPR, do the best you can. A person without breathing or circulation cannot survive. Nothing you do can make the outcome worse.

It is unlikely a person will improve with CPR alone. However, if a person starts moving, or shows other obvious signs of life, stop CPR and check for normal breathing. If normal breathing is present, place the person in the recovery position and monitor breathing.

If you are unable or unwilling to give rescue breaths, perform compression-only CPR. Without interruption, provide ongoing compressions at a rate of at least one hundred times per minute until an AED is ready, another provider or EMS personnel take over, or you are too exhausted to continue. If others are available, switch compressors about every two minutes.

Ongoing Assessment

Emergencies are dynamic events that can change at any time. Once you are involved, it is important to continually monitor a person's condition and the care you are providing. Make sure the situation remains safe for you to be there. Look for changes in a person's level of responsiveness, airway, and breathing. Reassess at regular intervals until another provider or EMS personnel take over.



Special CPR Situations

- **Fluids in Airway** — Roll person on side to quickly drain fluids. Roll without twisting, like a log. Remove any material still in mouth with a gloved finger.
- **Cold Environments** — Handle cold people gently to prevent cardiac arrest. If body is solid, do not start CPR.
- **Drowning** — As quickly and safely as possible, get person onto solid ground. Expect vomiting. Do not attempt to expel water using abdominal thrusts.
- **Serious Injury** — Someone in cardiac arrest due to injury is unlikely to survive. If it is clear injury has caused arrest, do not start CPR.
- **Electric Shock/Lightning** — Approach only if it is safe. Electric shock can cause ventricular fibrillation. When safe, perform CPR and use an AED.
- **Neck Breather** — Provide rescue breaths through surgical opening, or stoma, in neck using CPR mask or shield.

Unresponsive and Breathing — Recovery Position

Assess Person

- Pause and assess scene. *Scene is safe!*
- Tap or squeeze shoulder. Ask loudly, “Are you okay?” *No response!*
- Have someone alert EMS and get an AED.
- Look quickly at face and chest for normal breathing. Occasional gasps are NOT considered normal. *Normal breathing present!*



Prepare

- Extend arm nearest to you up alongside head.
- Bring far arm across chest and place back of hand against cheek.
- Grasp far leg just above knee and pull it up so foot is flat on ground.



Roll

- Grasp shoulder and hip and roll patient toward you. Roll in a single motion, keeping head, shoulders, and torso from twisting.
- Roll far enough for face to be angled forward.
- Position elbow and knee to help stabilize head and body.



Suspected Injury

- If person has been seriously injured, do not move unless fluids are collecting in airway, or you are alone and need to leave to get help.
- During roll, make sure head ends up resting on extended arm and head, neck, and torso are inline.



Section 6 – Foreign Body Airway Obstruction

Choking can occur when a solid foreign object, such as a piece of food, or small object, enters a narrowed part of the airway and becomes stuck. On inhalation, the object can be drawn tighter into the airway and block air from entering the lungs. Your help is required to save the person's life.

Approach

You must be able to recognize the difference between a mild blockage and a severe blockage.

With a mild blockage, a person can speak, cough, or gag. This type of blockage is typically cleared by coughing. Encourage someone with a mild blockage to cough forcibly. Stay close and be ready to take action if things worsen.

When a severe blockage occurs, a person cannot dislodge the object on his own. Signs of severe obstruction include very little or no air exchange, lack of sound, and the inability to speak or cough forcefully. The person may hold his hands to his throat as he attempts to clear the obstruction.

A forceful thrust beneath the ribs and up into the diaphragm can compress the air in the chest and build enough pressure to “pop” the object out of the airway. Direct compression of the chest over the breastbone can also create enough pressure to expel an object.

When someone is clearly pregnant or obese, use chest thrusts instead of abdominal thrusts.

If you are alone, try pressing your abdomen quickly against a rigid surface, such as the back of a chair. If one is not available, attempt abdominal thrusts on yourself.

Abdominal and chest thrusts can cause internal injury. Anyone who has been treated for choking with these maneuvers should be evaluated by EMS or a physician to ensure there were no injuries.

Children

Young children are particularly at risk for choking because of the small size of their air passages, inexperience with chewing, and a natural tendency to put objects in their mouths. For a choking child, the approach is nearly the same as for adults. Use less force on your thrusts.

It might be easier to kneel behind a choking child to deliver thrusts.

Since infants do not speak, it may be more difficult to recognize choking. A sudden onset differentiates it from other breathing emergencies. Signs include weak, ineffective coughs, and the lack of sound, even when an infant is clearly attempting to breathe.



Choking Prevention

- Cut large pieces of food into smaller pieces before eating.
- Avoid talking at the same time you are eating. Chew food well.
- Keep small objects away from children who may put objects into their mouths.

Adult Choking

Assess Person

- Ask, “Are you choking?”
- If person nods yes, or is unable to speak or cough — act quickly!
- If available, have a bystander activate EMS.



Position Yourself

- Stand behind person. Reach around and locate navel.
- Make a fist with other hand and place thumb side against abdomen, just above navel and below ribs.
- Grasp fist with other hand.



Give Thrusts

- Quickly thrust inward and upward into abdomen.
- Repeat. Each thrust needs to be given with intent of expelling object.
- Continue until person can breathe normally.



If Person Becomes Unresponsive...

- Carefully lower to ground. Position face-up on a firm, flat surface.
- If not already done, activate EMS.



Perform CPR

- Begin CPR, starting with compressions.
- Look in mouth for an object after each set of compressions, before giving rescue breaths. Remove any object if seen.
- Continue until person shows obvious signs of life, or another provider or EMS personnel take over.



AMERICAN SAFETY & HEALTH INSTITUTE

American Safety & Health Institute
1450 Westec Drive
Eugene, OR 97402 USA
800-447-3177 • 541-344-7099 • 541-344-7429 fax
hsi.com/ashi

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