



CarePlus

CPR and AED

MEDIC First Aid

CarePlus

CPR and AED

Student Book

Version 8.0

Purpose of this Guide

This MEDIC First Aid *CarePlus Version 8.0 Student Book* is solely intended to facilitate certification in a MEDIC First Aid CarePlus CPR and AED training class. The information in this book is furnished for that purpose and is subject to change without notice.

MEDIC First Aid certification may only be issued when a MEDIC First Aid–authorized Instructor verifies a student has successfully completed the required core knowledge and skill objectives of the program.

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MEDIC FIRST AID International, Inc.
1450 Westec Drive ■ Eugene, OR 97402
800-447-3177 ■ 541-344-7099

E-mail: response@hsi.com ■ Visit our website at hsi.com/medicfirstaid

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Table of Contents

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CARDIAC ARREST

Oxygen and the Human Body	1	Chain of Survival	3
Sudden Cardiac Arrest	2	Secondary Cardiac Arrest	4
Cardiopulmonary Resuscitation (CPR)	2	Opioid Overdose	4
Early Defibrillation	2	Children and Infants	5

PREPARING TO HELP

CPR and AED Provider	6	Legal Considerations	12
Recognizing an Emergency	6	Implied Consent	12
Personal Safety	7	Abandonment	12
Deciding to Help	7	Good Samaritan Laws	12
Protecting Yourself	9	Calling for Help	14
Infectious Bloodborne Diseases	9	Emergency Medical Services (EMS)	14
Standard Precautions	9		
Personal Protective Equipment	10		
Skill Guide 1 —			
Removing Contaminated Gloves	11		

CPR AND AED

Chest Compressions	16	Automated External Defibrillation	25
Children and Infants	17	AED Operation	25
Skill Guide 2 —		Children and Infants	26
Chest Compressions — Adults	18	AED Troubleshooting & Considerations	27
Skill Guide 3 —		Skill Guide 6 —	
Chest Compressions — Children and Infants	19	Using an AED — Adults	29
Rescue Breaths	20	Skill Guide 7 —	
Establishing an Airway	20	Using an AED — Children and Infants	30
Using Barrier Devices	21	Primary Assessment — Unresponsive Person	31
Delivering Breaths	21	Recovery Position	32
Children and Infants	22	Skill Guide 8 —	
Skill Guide 4 —		Primary Assessment — Unresponsive Person	33
Rescue Breaths — CPR Mask	23	Skill Guide 9 —	
Skill Guide 5 —		Recovery Position	34
Rescue Breaths — CPR Shield	24		

CPR AND AED (CONTINUED)

Caring for Cardiac Arrest	35	CPR Summary	43
Children and Infants	37	CPR Algorithm	44
Skill Guide 10 —		Choking	45
Caring for Cardiac Arrest —		Mild Obstruction	45
Adults	38	Severe Obstruction	46
Skill Guide 11 —		Children and Infants	46
Caring for Cardiac Arrest —		Skill Guide 14 —	
Children	39	Choking — Adults	47
Skill Guide 12 —		Skill Guide 15 —	
Caring for Cardiac Arrest —		Choking — Children	48
Infants	40	Skill Guide 16 —	
Multiple Provider Approach to CPR	41	Choking — Infants	49
Skill Guide 13 —			
Multiple Provider Approach			
to CPR	42		

SUPPLEMENTAL TOPICS

Pain, Severe Pressure, or Discomfort in Chest	50	Hemostatic Dressings	55
Stroke	52	Skill Guide 17 —	
Control of Bleeding	54	Control of Bleeding	56
Tourniquets	55	Shock	57
		Internal Bleeding	58

ADDITIONAL CONSIDERATIONS

Emotional Considerations	59
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ADDITIONAL INFORMATION

Glossary	61	Knowledge Check Answers	66
Sources	65	Class Evaluation	69
Endnotes	65		

Cardiac Arrest

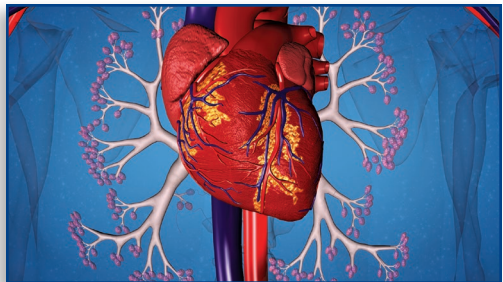


Because the human body cannot store oxygen, it must continually supply tissues and cells with oxygen through the combined actions of the respiratory and circulatory systems.

Oxygen and the Human Body

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 used air to be exhaled from the lungs.

The circulatory system includes the heart and a body-wide network of blood vessels. Electrical impulses stimulate 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, 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.

The brain is especially sensitive to a lack of oxygen. When oxygen is cut off, brain cell damage and death can occur within a matter of minutes.

Sudden Cardiac Arrest (SCA)

Cardiac arrest is the loss of the heart's ability to pump blood to the body. The most dramatic occurrence, sudden cardiac arrest, can happen with little or no warning. Victims abruptly become unresponsive and collapse. Abnormal gasping can occur. Breathing may stop completely.

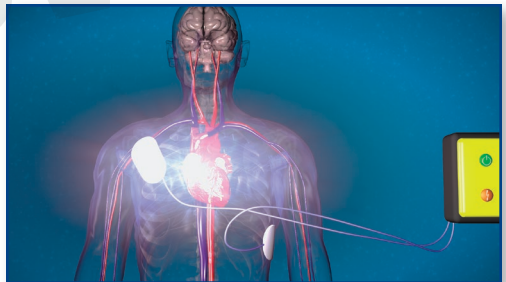
The most likely cause of sudden cardiac arrest is an unexpected disruption to the heart's electrical system, in which normally organized electrical pulses within the heart become disorganized and a chaotic quivering condition known as ventricular fibrillation occurs. Blood flow to the body, along with the oxygen it carries, stops. Without blood flow, brain damage occurs rapidly and quickly leads to death.

Cardiopulmonary Resuscitation (CPR)

Cardiopulmonary resuscitation (CPR) is the immediate treatment for a suspected cardiac arrest. CPR allows a bystander to restore limited oxygen to the brain through a combination of chest compressions and rescue breaths. However, CPR alone is not enough.

Early Defibrillation

The most effective way to end fibrillation is defibrillation, using a defibrillator and electrode pads applied to the chest. A controlled electrical shock is sent through the heart to stop ventricular fibrillation, allowing the heart's normal electrical activity to return and restore blood flow.



Successful defibrillation is highly dependent on how quickly defibrillation occurs. For each minute in cardiac arrest, the chance of survival goes down by about 10%. After as few as 10 minutes, survival is unlikely.

Simply activating EMS will not help. Even in the best EMS systems, the amount of time it takes from recognition of the arrest to EMS arriving at the side of the injured or ill person is usually longer than 10 minutes.

An automated external defibrillator (AED) is a small, portable, computerized device that is simple for anyone to operate. Bystander use of AEDs has been growing steadily, with common placements of the devices in public locations such as airports and hotels, and workplaces in general.



Turning on an AED is as simple as opening a lid or pushing a power button. Once it is on, an AED provides voice instructions to guide you through its attachment and 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 prompted by the AED.

Chain of Survival

Sudden cardiac arrest can strike at any age, but primarily affects adults. The chain of survival is often used to describe the best approach for treating sudden cardiac arrest. Each link in the chain is essential for a person to survive. If a single link is weak or missing, the chances for survival are greatly reduced. The greatest chance for survival exists when all the links are strong:

- Early recognition of cardiac arrest and activation of EMS
- Immediate CPR with high-quality chest compressions
- Rapid defibrillation, or electrical shock, to the heart
- Effective basic and advanced EMS care and transport
- Effective post-cardiac arrest care at a hospital



Secondary Cardiac Arrest

Unlike sudden cardiac arrest, in which the heart is the primary problem, cardiac arrest can also be the end result of the loss of an airway or breathing. This is secondary cardiac arrest.

Problems such as hazardous breathing conditions in a confined space, drowning, and drug overdoses can result in secondary cardiac arrest. With no incoming oxygen, the heart progressively becomes weaker until signs of life become difficult or impossible to assess.



If the heart is simply too weak to create obvious signs of life, immediate CPR, with an emphasis on effective rescue breaths, may be the only chance to restore them.

Opioid Overdose

The abuse of opioid drugs to get a euphoric high is a serious and growing health problem. Increasing prescriptions for opioid pain relievers, such as hydrocodone and oxycodone, have made them more commonly available. The use of heroin, a highly addictive opioid, also contributes to the problem.

As a result, the number of overdoses and deaths from prescription opioids and heroin has increased dramatically. Opioids, taken in excess, can depress and stop breathing. Opioid overdose is a clear cause of secondary cardiac arrest.



Naloxone, also known as Narcan, is a medication that can temporarily reverse the life-threatening effects of opioids. It is easy to administer, either through an auto-injector device or through an aerosol that is sprayed into the nose. Naloxone is becoming more readily available to lay providers.

It is reasonable to provide education and training on responding to suspected opioid overdoses, including

the administration of naloxone, to those most likely to be involved with this type of emergency. Laws regarding first aid administration of naloxone vary by city and state. As with Good Samaritan laws, know the laws in your area.

Children and Infants

Children are more likely to experience secondary cardiac arrest instead of a primary one. This is an important consideration in how you approach a child or infant you think may have arrested.

When describing age groups in relation to CPR, an infant is younger than 1 year of age. A child is 1 year of age until the onset of puberty. Puberty can be estimated by breast development in females and the presence of armpit hair in males. An adult is from the onset of puberty and older.

The chain of survival for children and infants includes the following links:

- Prevention of airway and breathing emergencies
- Early CPR, with an emphasis on effective rescue breaths, and, if needed, defibrillation with an AED
- Prompt activation of EMS
- Effective basic and advanced EMS care and transport
- Effective post-cardiac arrest care at a hospital



Knowledge Check

The chain of survival is often used to describe the best approach for treating sudden cardiac arrest. The first three links of the chain are typically the responsibility of a trained CPR provider. Describe those links.

Chest Compressions



External compression of the chest increases pressure inside the chest and directly compresses the heart, forcing blood to move from the chest to the lungs, brain, and the rest of the body.

Quality matters. The better you compress, the greater the influence on survival. Focus on high-quality techniques:

- Compress deeply, more than 2 inches. It is likely you will not compress deep enough. While injury could occur from deeper compressions, do not let the fear of this affect compression depth.
- Compress fast, between 100 and 120 times per minute. Do not let a higher compression speed result in shallower compression depth.
- Allow the chest wall to fully recoil, or rebound, between compressions. Avoid leaning on the chest at the top of each compression.



When compressing properly, you may hear and feel changes in the chest wall. This is normal. Forceful external chest compressions may cause chest injury, but are critical if the person is to survive. Reassess your hand positioning and continue compressions.

Children and Infants

The compression technique for children is similar to that of adults. You can use the heel of one hand on the lower half of the breastbone to compress the chest of a child. If this is difficult, or you are getting tired, use two hands to perform compressions.



Use the tips of two fingers on the breastbone, just below the nipple line, to compress the chest of an infant.



Knowledge Check

What are the 3 measures of high-quality chest compressions for an adult?

Preview

Chest Compressions — Adults



Position Your Hands

- Position person face up on a firm, flat surface. Kneel close to chest.
- Place heel of one hand on center of chest, on lower half of breastbone.
- Place heel of your other hand on top of and parallel to first. You can interlace your fingers to keep them off chest.



Position Your Body

- Bring your body up and over chest so your shoulders are directly above your hands. Straighten your arms and lock your elbows.



Compress

- Bending at the waist, use upper body weight to push straight down at least 2 inches.
- Lift hands and allow chest to fully return to its normal position. Move immediately into downstroke of next compression.
- Avoid leaning on chest at the top of each compression.
- Continue compressions at a rate of 100–120 times per minute.

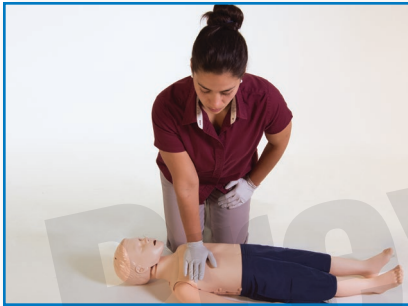
Chest Compressions — Children and Infants



Child

Positioning

- Position child face up on a firm, flat surface. Kneel close to chest.
- Place heel of one hand on lower half of breastbone, just above point where ribs meet. Use both hands if needed.
- Bring your body up and over chest so your shoulders are directly above your hand. Straighten your arm and lock your elbow.



Compress

- Bending at waist, use upper body weight to push straight down $\frac{1}{3}$ depth of chest, or about 2 inches.
- Lift your hand and allow chest to return fully to its normal position. Move immediately into downstroke of next compression.
- Avoid leaning on chest at top of each compression.
- Continue compressions at a rate of 100–120 times per minute.



Infant

Positioning

- Position infant face up on a firm, flat surface.
- Place 2 fingertips on breastbone just below nipple line.



Compress

- Compress at least $\frac{1}{3}$ depth of chest, or about $1\frac{1}{2}$ inches.
- Lift fingers and allow chest to return fully to its normal position. Move immediately into downstroke of next compression.
- Continue compressions at a rate of 100–120 times per minute.

Primary Assessment — Unresponsive Person



The primary assessment is a simple way to quickly identify if a life-threatening condition is present. It is the initial approach to anyone suspected of being ill or injured.

The steps of the primary assessment are always the same:

- If it is safe to provide care, check for responsiveness.
- If unresponsive, activate EMS and get an AED, if one is available.
- Check for normal breathing.

If you determine a person is unresponsive, send a bystander to activate EMS and get an AED. If you are alone, do this yourself and quickly return to the person.

When alone with an unresponsive child or infant, provide about 2 minutes of CPR before leaving to call for EMS and get an AED.

If you have a mobile phone, use it to activate EMS. The speaker function will allow you to follow instructions from an EMS dispatcher while providing care.

To check for normal breathing, quickly look at the face and chest. Take no longer than 10 seconds. Normal breathing is effortless, quiet, and regular. If you are unsure, assume breathing is not normal.

Weak, irregular gasping, snorting, or gurgling sounds can occur early in cardiac arrest. These actions provide no usable oxygen. This is not normal breathing.

If the person is not breathing, or only gasping, perform CPR, beginning with compressions.

When an unresponsive person is breathing normally, and uninjured, place him or her in a side-lying recovery position to help protect the airway.

Recovery Position

The recovery position helps protect the airway by using gravity to drain fluids from the mouth and keep the tongue from blocking the airway.

Frequently assess the breathing of anyone placed in the recovery position. The person's condition could quickly become worse and require additional care.



Knowledge Check

A fellow employee collapses near you during a staff meeting. As a trained CPR provider, you move to help. You kneel next to him, squeeze his shoulder, and loudly ask, "Are you all right?" He is unresponsive, so you direct other employees to activate EMS and get the company's AED. You look closely at the face and chest for breathing; he makes a brief gasping snort, but then remains still. What do you do next?

Primary Assessment — Unresponsive Person



Assess Scene

- Pause and assess scene for safety.
- If unsafe, or if it becomes unsafe at any time, GET OUT!



Check for Response

- Tap or squeeze shoulder and ask loudly, "Are you all right?"
- If unresponsive, have someone activate EMS and get an AED.



Look for Normal Breathing

- Position person face-up on a firm, flat surface.
- Look at face and chest for normal breathing. Take no longer than 10 seconds. If unsure, assume breathing is not normal.
- Weak, irregular gasping, snorting, or gurgling is not normal breathing.



Provide Indicated Care

- If person is not breathing, or only gasping, perform CPR, beginning with compressions.
- If normal breathing is found, place an uninjured person in recovery position.

Recovery Position



Prepare

- Place arm nearest 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 the foot is flat on ground.



Roll

- Grasping shoulder and hip, roll person toward you in a single motion, keeping head, shoulders, and body from twisting.
- Roll far enough for face to be angled toward ground.



Stabilize

- Position elbow and legs to stabilize head and body. Ensure there is no pressure on chest that restricts breathing.
- Make sure head ends up resting on extended arm and head, neck, and body are aligned.
- If person has been seriously injured, do not move unless fluids are in airway, or you need to leave to get help.

Pain, Severe Pressure, or Discomfort in the Chest



Acute coronary syndrome (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, pressure, or discomfort in the chest, although women often do not experience chest pain and may describe indigestion, weakness, or fatigue. Shortness of breath, nausea, and lightheadedness can also occur. The person may experience pain in the arms or back. The person's skin may become pale, cool, and sweaty.

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

If you suspect a heart-related problem, do not try to transport the person to a hospital yourself. Activate EMS immediately, even if the person does not want you to. While waiting for EMS to arrive, follow these guidelines:

- If an AED is available, have someone get it so that it's nearby if needed.
- 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 this situation. Accept it, but never let this alter your approach to care.
- The early administration of aspirin can be life-saving for a person having a heart attack. Encourage the person to chew and swallow 1 adult (325 mg), or 2 to 4 low-dose (81 mg) “baby” aspirin.
- Do not encourage aspirin use if the person has an allergy to aspirin, evidence of a stroke, a recent bleeding problem, the pain does not appear to be related to the heart, or if you are uncertain or uncomfortable with giving the aspirin.
- Someone with a heart condition may carry a prescribed medication known as nitroglycerin. If so, assist the person in the self-administration of it.



Whenever a heart attack is suspected, be prepared for the possibility of sudden cardiac arrest, and the need for CPR and the use of an AED. Continue to reassure the person until another provider or EMS personnel take over.

HEART DISEASE

Heart disease, resulting in heart attacks and strokes, is the leading cause of death in the U.S., attributing to about 1 in every four deaths. This affects women and men almost evenly. A healthy lifestyle can lower the risk of heart disease:

- Eat a healthy diet
- Maintain a healthy weight
- Get enough physical activity
- Don't smoke or use other forms of tobacco
- Limit alcohol use
- Manage your medical conditions:
 - Check your cholesterol
 - Control high blood pressure
 - Monitor your diabetes



Knowledge Check

True or false? A person who is having a heart attack may deny it.

MEDIC First Aid

MEDIC FIRST AID International, Inc.
1450 Westec Drive
Eugene, OR 97402 USA
800-447-3177 ■ 541-344-7099 ■ 541-344-7429 fax
hsi.com/medicfirstaid

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