CPR HEALTH-CARE PROVIDER WITH FIRST AID

STUDENT HANDBOOK

DAN® SOUTHERN AFRICA

CPR HEALTH-CARE PROVIDER WITH FIRST AID STUDENT HANDBOOK

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1 CPR Health-care Provider with First Aid Course Overview

According to the World Health Organisation, cardiovascular diseases are the most common cause of death worldwide, accounting for about one-third of deaths.[2] As our population ages, the prevalence of these diseases is expected to increase. This programme will help prepare participants to handle these events and other related life-threatening incidents.

The primary focus of the CPR Health-care Provider with First Aid (CPR:HCP) course is to develop cardiopulmonary resuscitation (CPR) skills at the health-care provider (HCP) level. This includes one- and two-person CPR for adults, children and infants. Also included is locating a pulse or determining that one does not exist, which is an additional skill that sets the HCP level of care apart from entry-level CPR courses. During this course, participants will become familiar with the signs and symptoms associated with cardiovascular diseases such as heart attack and respiratory arrest.

Because individuals taking this course may need a review of rudimentary first aid skills that may assist with preventing life-threatening conditions, this programme covers essential skills such as management of choking and shock, control of external bleeding, bandaging and splinting. More in-depth first aid training is available in the Basic Life Support: CPR and First Aid course.

Successful completion of the CPR:HCP course includes a demonstration of skill competency and passing a final knowledge assessment.

First-Responder Roles and Responsibilities

First aid is providing initial care for an injury or illness. The three key aims of first aid are to (1) preserve life, (2) prevent the condition from worsening and (3) promote recovery. All skills performed in an emergency should be within the scope of one's training.

Reading this handbook without instruction and skill practice will not make someone competent to provide CPR or first-aid assistance.

Prerequisites
There are no course prerequisites for participation in the CPR:HCP course.

Retraining
Since emergency-response skills deteriorate with time, retraining is required every two years to maintain CPR:HCP provider certification. In addition, regular practice is encouraged, when possible, to retain skill proficiency.

Continuing Education
Continuing education is encouraged in the form of taking additional training courses, participating in supervised practice sessions, reading current literature and undergoing refresher training. Your CPR:HCP Instructor can provide information about these programmes.

How to Use this Handbook
Each chapter in this student handbook contains two distinct features.
- The beginning of each chapter has a list of questions to assist with learning. This is the information you should look for as you read the material, complete the knowledge-development sections and participate in class discussions
- Boxes labelled "Note" provide explanations that are important for understanding the material just presented

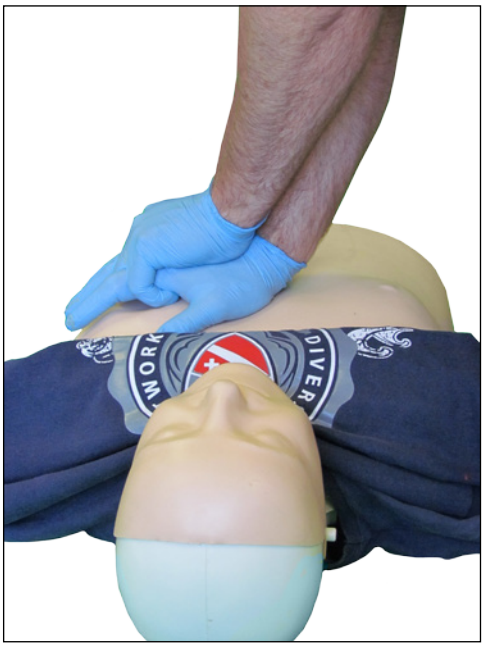
Terminology
The CPR:HCP student handbook introduces medical terms that may be unfamiliar to some readers. Familiarity with basic medical terminology will enhance the quality of communication with emergency and health-care workers. A glossary of terms is provided in the back of this handbook.

2 Nervous System Overview

CHAPTER 2 OBJECTIVES

1. What is the goal of CPR?
2. Why is asking permission necessary before rendering care?
3. What are the five links in the chain of survival in the proper sequence?
4. What is the first step for a rescuer once unresponsiveness has been established?
5. What are the warning signs of heart attack?
6. What is the first step for a rescuer if the injured person is a child, infant or the victim of a drowning incident?
7. What CPR protocol is to be followed for drowning victims?
8. What can a rescuer do to deal with emotional stress?

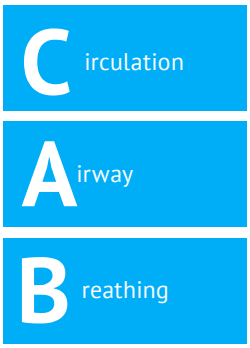
Maintenance of tissue oxygen supply is vital for life. While establishing and keeping an open airway is a critical step when caring for an unconscious or non-breathing person, initiating and maintaining circulation with chest compressions is the primary step. Airway obstruction impedes or prevents oxygen delivery to the lungs, which then prevents oxygen delivery to the blood and subsequently to tissues.



When oxygen supplies to body tissues are interrupted, whether due to a heart attack or a drowning incident, vital organs will suffer and eventually die. Without oxygen, particularly vulnerable tissues, such as the brain, may start dying after 4-6 minutes. Therefore, immediate action is crucial. During CPR, rescuers provide and maintain blood circulation with chest compressions, while ventilations provide oxygen.

Key steps in CPR for the HCP-level rescuer include the following:

1. Check for responsiveness and activate emergency medical services (EMS).
2. Check for a pulse and normal breathing (approximately 10 seconds).
3. If the patient is not breathing normally and a definite pulse is not felt, provide chest compressions to take over the function of the heart temporarily and circulate blood.
4. Open the airway and provide rescue breaths so as to deliver air to the lungs.



The goal of CPR is not to restart the heart but to provide critical blood flow to the heart and brain, and to keep oxygenated blood circulating. CPR delays damage to vital organs such as the brain and improves the chances of successful defibrillation.

NOTE

The exhaled air used during rescue breathing contains about 16% oxygen, compared to 21% in the normal air we breathe. Despite this reduction in oxygen concentration, rescue breaths still provide adequate oxygen supplies to sustain vital organs.

Precipitating Conditions

The need for CPR and other basic life-support measures frequently involves the following conditions. Other conditions may also precipitate a need for life support, but those conditions are not covered here. Awareness that something is wrong is the primary concern.

Heart Attack

A heart attack — acute myocardial infarction (AMI) or acute coronary syndrome (ACS) — is the term used to describe the symptoms associated with blockage of the arteries that lead to the heart. If the heart attack is severe enough to cause the heart to stop functioning or to stimulate a life-threatening arrhythmia, first responders may need to initiate CPR and use an automated external defibrillator (AED).

When someone suffers a heart attack but is still conscious and breathing, your role is more supportive. In this situation, keep the person in a position of comfort and activate EMS. Some people with a history of heart problems may carry nitroglycerine, which is available as either pills or a sublingual spray. You may need to assist the person with taking his own medicine, but do not attempt to give nitroglycerine to anyone who does not have a prescription. When assisting someone with nitroglycerine, do not handle the pills with bare hands because the medication can be absorbed through the skin. Nitroglycerine is administered under the tongue to be absorbed and not swallowed. It can be administered as frequently as every five minutes for a total of three doses. Do not administer more than three doses, regardless of the person's condition.

Not all heart attacks are painful and there are many variables to look for with heart conditions.

Possible symptoms of heart attack:

- heavy pressure or squeezing pain in the centre of the chest or centre of the back
- shoulder, arm, neck or jaw pain
- shortness of breath
- sweating
- nausea and vomiting
- indigestion and/or heartburn
- sense of impending doom

Symptoms vary between men and women as well as among individuals with pre-existing medical conditions.

NOTE

The term "massive heart attack" is often used to describe a sudden cardiac arrest.

Special Circumstances with Resuscitation[3]

Pregnancy

While cardiac arrest is rare in pregnant women, it appears the rate may be increasing for women who are in the second half of their pregnancies. There are several potential causes but these are irrelevant to the first aid responder. To perform effective compressions when the top of the uterus is above the mother's umbilicus, the recommendation is to manually displace the uterus to the mother's left to reduce the uterus' direct compression on the large blood vessels returning to the heart while compressions are performed. For quality compressions to be delivered, a second rescuer is required. Activate EMS immediately regardless because additional measures will be required in a hospital setting.

Opioid Overdose

In 2012, opioid overdose became the leading cause of death for people 25-60 years of age in the United States. Most of these deaths are associated with prescription medications. Because of its presentation, opioid overdose can be confused with unconsciousness and can be difficult to ascertain as the cause of death. An opioid overdose progresses from central nervous system (CNS) depression to respiratory arrest to cardiac arrest. For first-aid purposes, this situation is referred to as an opioid-associated, life-threatening emergency.

Naloxone is a medication that interferes with the action of opioids in the brain, spinal cord and gastrointestinal system. Because there are no known harmful side effects when this medication is used with or without opioid intoxication present, the U.S. Food and Drug Administration has approved a naloxone auto-injector as well as an inhaled nasal mist for use by lay rescuers in the first-aid setting.

As with all life-threatening emergencies, check to see if the patient is breathing or gasping. Begin CPR if the person is not breathing or is gasping. If naloxone is available, administer 0.4 mg with an auto-injector and continue CPR. The dose may be repeated every four minutes. Watch for purposeful movements or regular breathing as these are signs that the patient is becoming responsive.

Continue to monitor breathing and responsiveness until EMS arrives. Resume CPR if the person's condition relapses and administer additional doses of naloxone.

If the patient does not respond, continue CPR and verify that EMS is on the way.

Drowning

Drowning is defined as submersion/immersion in a liquid that impairs respiration and can be fatal or non-fatal. In the event that the heart stops or experiences an arrhythmia due to submersion with a resulting loss of circulating oxygenated blood, immediate intervention with CPR can provide the victim with the support necessary for survival. However, multifaceted medical intervention is required, so CPR alone is usually not sufficient. As with heart attacks, CPR for a drowning victim is merely the aid that facilitates access to advanced care.

After determining unresponsiveness of a drowning victim, initiate CPR with rescue breaths (not compressions). This protocol, with the acronym A-B-C, is used due to the hypoxic condition of drowning. Perform CPR for two minutes, then activate EMS if not already done. Continue CPR with two rescue breaths followed by 30 chest compressions.

A irway

B reathing

C irculation

Hands-only CPR is not appropriate in this circumstance.

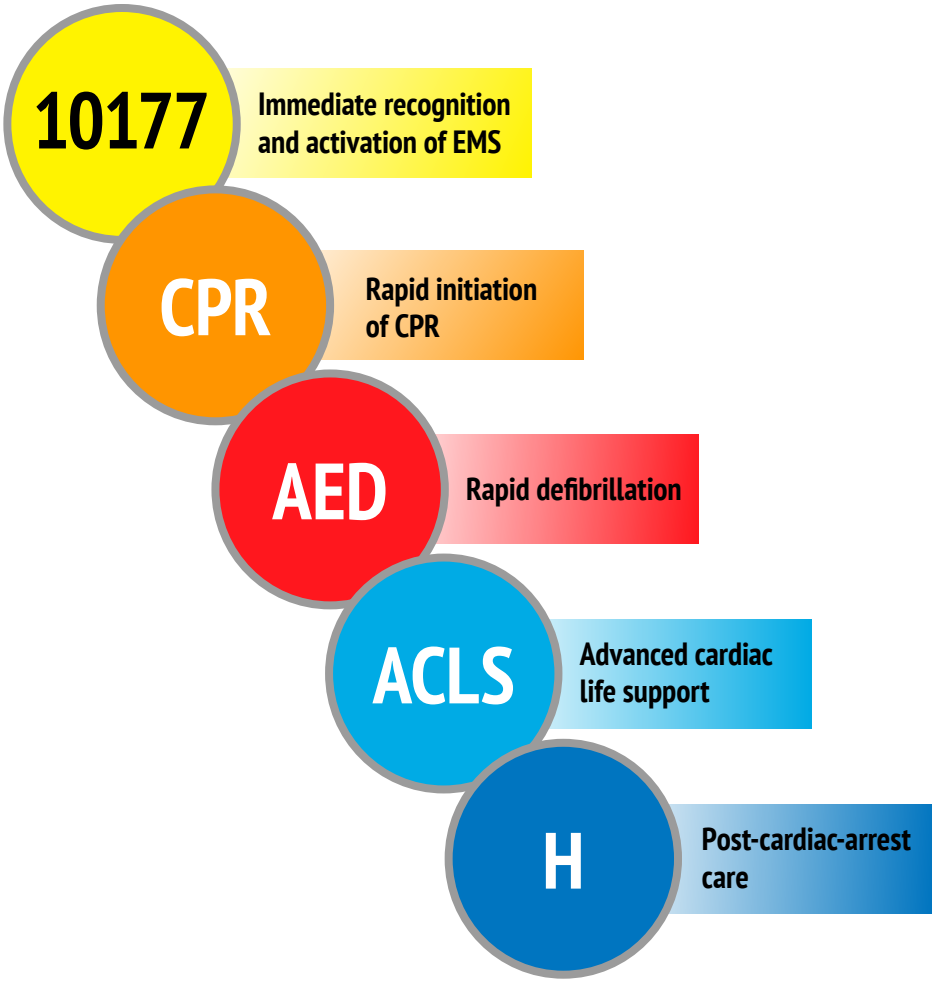
Non-fatal drowning refers to a situation in which someone almost died from being submerged and unable to breathe. While non-fatal drowning victims may revive quickly, lung complications are common and require medical attention.

Symptoms of non-fatal drowning may include difficulty breathing, bluish discolouration of lips, abdominal distention, chest pain, confusion, coughing up pink, frothy sputum, irritability and unconsciousness. Victims may also be anxious or cold and would benefit from removal of wet clothes and possible treatment for hypothermia.

As a first responder, your primary role is to monitor vital signs and be prepared to start CPR, provide supplemental oxygen and ensure transportation for the victim to the nearest medical facility as soon as possible.

Chain of Survival

There are five key steps in the chain of survival.



Immediate Recognition and Activation of EMS

In the event of an emergency, the critical first step is recognising that an emergency exists. Follow the recognition of a medical problem with prompt action. Responses include evaluating the severity of the emergency, assessing available resources and using those resources. After establishing unresponsiveness, call EMS. By activating local EMS, the chance of survival increases. Either call EMS yourself or ask a bystander or another rescuer to do it.

If you are alone, EMS can be activated using your cell phone on speaker setting. This practice minimises lost time and can reduce any delays that otherwise may occur in starting CPR. If you are not alone, have someone else activate EMS while you begin CPR.

There are two scenarios in which the solo rescuer should initiate CPR before activating EMS:
- child or infant victim
- drowning victim

In these cases, the cause of cardiac arrest has a high probability of being respiratory rather than cardiac in origin. If a cell phone is unavailable, the lone rescuer should perform two minutes or five cycles of CPR before calling for help. This slight alteration in procedural order is recommended because infants, children and drowning victims may spontaneously recover if CPR is initiated immediately. In contrast, acute coronary syndromes (heart attacks) often cause unstable heart rhythms that respond best to rapid defibrillation. Since most people do not have AEDs readily available, having a defibrillator and advanced medical care (EMS) on the way provides the best chance of re-establishing a life-sustaining heart rhythm. Do not delay CPR for an AED if one is not immediately available.

Regardless of who calls EMS, the person relaying information to them should state the following:
- caller's name
- number of patients
- exact location
- call-back phone number
- condition of the patient(s)
- what happened
- care provided

Do not hang up until the operator releases you. It is important to answer all of the dispatcher's questions to assure an appropriate response team and resources are sent to the site.

The operator may repeat critical information before ending the call, which ensures that the message was received and key facts were conveyed. If someone else is calling EMS, be sure to have that person return to the scene after making the call to verify that help is on the way. Remember, the sooner you make the call, the sooner advanced life support will arrive.

Rapid Initiation of CPR

Early CPR significantly improves the chance of survival. Chest compressions temporarily take over the function of the heart, manually circulating blood in the body. Rescue breaths deliver air to the lungs and ensure a supply of oxygen for the body, especially in critical areas such as the heart and brain. Rescuers should initiate CPR within 10 seconds of recognising cardiac arrest.

Rapid Defibrillation
Cardiac arrest often results from a non-life-sustaining rhythm known as ventricular fibrillation (VF). This rhythm disturbance results in the cessation of blood flow to vital organs and is therefore life-threatening.

Defibrillation (the process of delivering an electrical shock to the heart in an attempt to establish a normal cardiac rhythm) is the single most important intervention in the case of an unstable cardiac rhythm. It provides the greatest chance of survival. While CPR will not restart the heart, it may delay tissue damage associated with inadequate oxygen supplies while the patient waits for an AED to arrive. It is crucial to defibrillate a person with suspected sudden cardiac arrest as soon as possible. Delays of as little as 7-10 minutes greatly reduce the chance of survival.

Advanced Cardiac Life Support
CPR and defibrillation may not restore a normal cardiac rhythm. In those cases, medical interventions such as advanced airway management and the delivery of medications may increase resuscitation success. Should CPR and/or defibrillation be successful, advanced life support will help stabilise the person and make the patient ready for hospital transport. Remember: Advanced cardiac life support will not arrive until local EMS is activated.

Post-Cardiac-Arrest Care
If a spontaneous heart rhythm resumes and effective circulation is restored, the patient still requires supportive care and immediate medical attention. Maintain airway support and continually monitor the patient until help arrives to provide additional care and transportation to a hospital. Unstable heart rhythms that can lead to unconsciousness or death may recur without warning.

Duty of Care
As a bystander, you have no legal obligation to provide medical care. However, in some areas, you may have an obligation to notify authorities that someone is in need of medical assistance. If you engage in basic life support, be sure to provide care within your scope of training.

NOTE
Health-care providers acting in the capacity of their profession may have a legal duty to respond. Other professionals such as dive instructors or dive-safety team members may also have a duty to respond.

Ask a patient for permission before you provide care. This can be done by saying: "My name is _____. I am a first-aid provider. May I help you?"

If responsive, the patient should give permission before care is provided. Not asking for permission or forcing care against a victim's will exposes you to potential legal action for involuntary assistance or battery. If a person is unresponsive, permission to provide medical assistance is implied.

Emotional Stress and Fear of Doing Something Wrong

Helping others in need can be satisfying, but it might also create emotional stress before, during and after the rescue. Anxiety is a normal emotion during an emergency for both the rescuer and patient. Some potential rescuers may avoid such situations to avoid making mistakes or providing imperfect care.

When a person has an accident or is in sudden cardiac arrest, bystanders commonly wait for someone to take charge and provide aid.

Hesitation is often caused by:

- fear of doing something wrong, causing harm or not being able to bring back life
- fear of being sued
- fear of infection (the next section instructs how to avoid infection)

The hard truth regarding cardiac arrest is that in most cases CPR, even when coupled with advanced techniques, does not restart the heart or restore a life-sustaining rhythm — even when performed perfectly. CPR increases the chances of survival but does not guarantee it. But remember, there is nothing worse than no circulation. CPR can improve the victim's chance of survival.

Unsuccessful rescues may cause emotional distress. Rescuers may blame themselves for not saving a life and/or think they did something wrong. Some rescuers may benefit from a critical-incident stress debriefing or professional counselling to help work through such concerns. Your local fire department, EMS or health department may be a source of information on critical-incident stress debriefing.

A key point to remember if you ever have to perform CPR is that a person in cardiac arrest (with no signs of life) is in the worst possible condition. If no one initiates CPR, someone in cardiac arrest is certain to die; you cannot make the victim any worse. CPR is only one link in the chain of survival.

CHAPTER 2 REVIEW QUESTIONS

1. **The goal of CPR (without defibrillation) is to maintain adequate circulation of oxygenated blood to vital organs such as the**
   a. spleen, pancreas
   b. stomach, kidney
   c. heart, brain
   d. liver, muscles

2. **Exhaled air contains about 10% oxygen**
   a. True
   b. False

3. **To avoid legal problems, always ask a patient for _____ before you provide first aid. This may be done by stating: _____**
   a. permission, "My name is... I am a first aid provider. May I help you?"
   b. autograph, "My name is... I am a first aid provider. May I help you?"
   c. certification card, "My name is... I am a first aid provider. May I help you?"

4. **What CPR protocol should be used when responding to a victim of drowning?**
   a. A-B-C
   b. B-A-C
   c. C-A-B
   d. C-B-A

5. **The correct order for the five links in the chain of survival are**
   a. 10177, CPR, AED, Advanced Cardiac Life Support, Post-cardiac-arrest Care
   b. CPR, 10177, AED, Advanced Cardiac Life Support, Post-cardiac-arrest Care
   c. AED, Advanced Cardiac Life Support, Post-cardiac-arrest Care, 10177, CPR
   d. Post-cardiac-arrest Care, Advanced Cardiac Life Support, 10177, CPR, AED

6. **When calling EMS you should tell them**
   a. what happened and the condition of the injured person
   b. the location of the emergency and a call-back number
   c. how many persons are involved
   d. your name and the first aid provided
   e. all of the above

7. **During CPR, the functions of the heart and lungs are temporarily taken over by**
   a. chest compressions and ventilations
   b. cardiac defibrillation and an oxygen bottle
   c. advanced medications and ventilator machines

8. **Heart attack symptoms may**
   a. vary between men and women
   b. differ in individuals who have pre-existing medical conditions
   c. include heavy pressure or squeezing in the centre of the chest or back
   d. include nausea and vomiting
   e. all of the above
   f. only c and d

9. **In most cases, the heart restarts after someone performs CPR**
   a. True
   b. False

10. **In the case of children and drowning victims, once unresponsiveness has been established, the single rescuer should**
    a. check for injuries
    b. check the mouth for foreign bodies
    c. activate EMS
    d. perform CPR for 2 minutes and then call EMS

11. **Emotional stress may occur before, during or after a rescue**
    a. True
    b. False

Review answers are on Page 91.

3 Respiration and Circulation

CHAPTER 3 OBJECTIVES

1. What is hypoxia?
2. Why is oxygen necessary for life?
3. Where does gas exchange occur in the body?
4. What body structures comprise the respiratory system?
5. What body structures are included in the cardiovascular system?

It has already been noted that CPR takes over the function of the heart and lungs when someone is in cardiac arrest. A basic understanding of respiration and circulation is beneficial to understanding how CPR can help as well as the impact of injury first aid.

Cardiovascular System

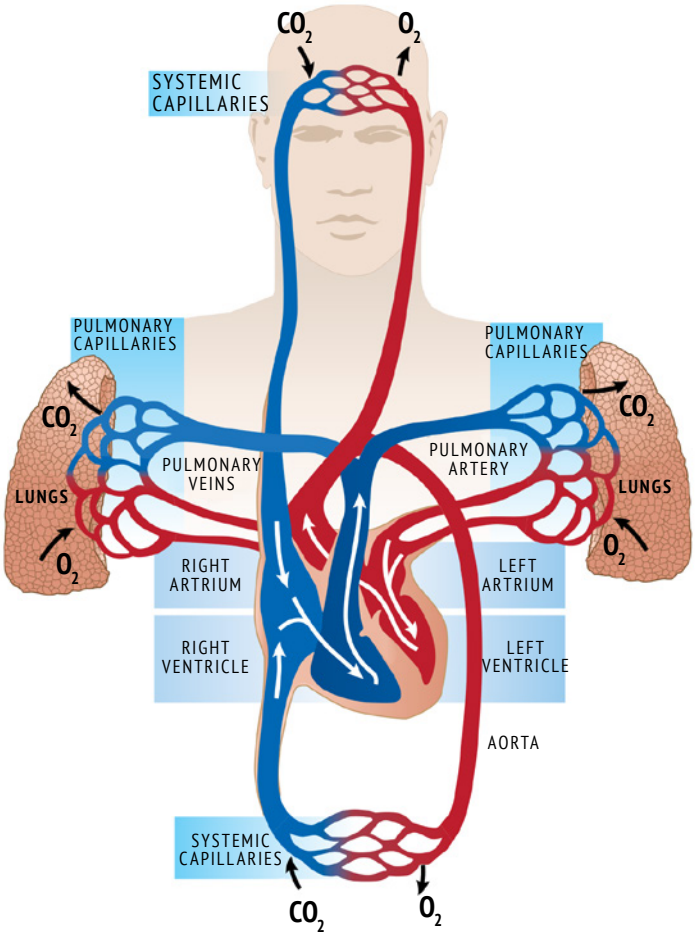
The cardiovascular system includes the heart and blood vessels. It is a closed-circuit system with the primary purpose of pumping blood, transporting oxygen and nutrients to tissues, and removing waste products.

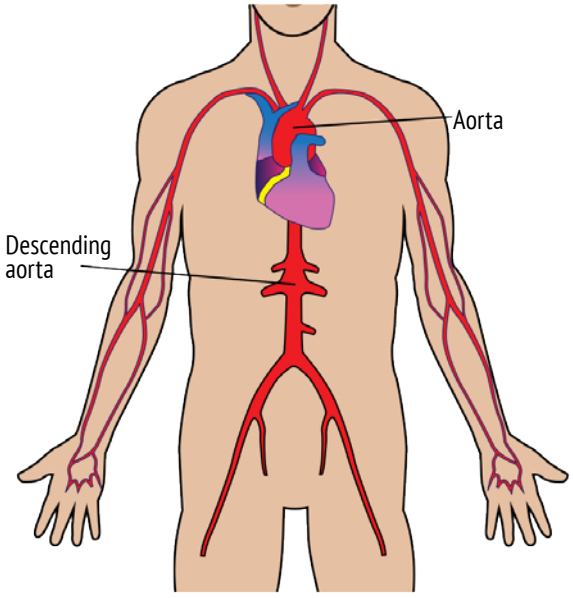
The heart is a hollow, muscular organ situated in the thoracic cavity between the lungs, in a space called the mediastinum. A thin, connective tissue sac called the pericardium surrounds it. The pericardium reduces friction between the heart and surrounding structures.

The heart is a strong, muscular pump that, in the average adult, has the capacity to beat spontaneously at a rate of about 70 times per minute (the normal resting heart rate is 60-100 beats per minute and may be as low as 40 beats per minute in athletes[4]). Every minute, approximately 6 litres of blood is pumped throughout the body. When exercising, this output may double or triple depending upon the amount of exertion.

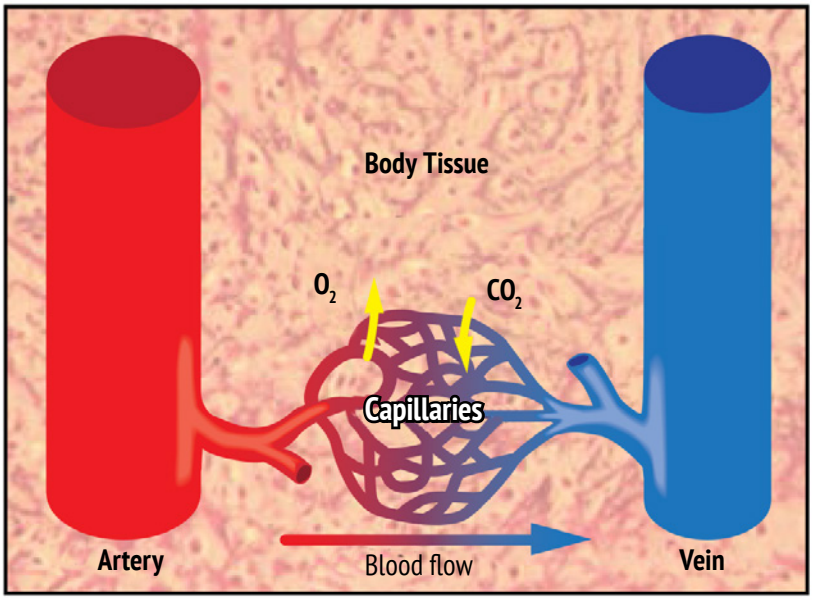
The heart is divided into a right- and left-pump system (also known as the right heart or pulmonary circuit and the left heart or systemic circuit). The right heart receives deoxygenated blood from the venous system and pumps it to the pulmonary circuit to exchange gasses. Oxygenated blood is returned to the left heart, where it is pumped to the systemic circuit. Transportation of blood through both circuits completes a circulatory cycle.

Blood leaves the left ventricle via the aorta, which then branches into smaller arteries to supply the head, arms, torso and legs. The blood vessels make up the vascular tree, with each branch leading to progressively smaller branches, which give rise to capillaries, the smallest of all blood vessels. Through these thin capillary walls, gasses, nutrients and metabolic waste products are exchanged. Functionally, the heart and large blood vessels represent a pump-and-distribution system for the capillaries, which are responsible for supplying tissues with oxygen and nutrients, and removing CO_2 and other metabolic waste products.





From the peripheral capillaries, the blood is gathered into small, thin-walled veins and returned via larger veins to the atria of the heart. Most veins direct blood flow by means of one-way valves that prevent blood from travelling in the wrong direction or pooling due to gravity.

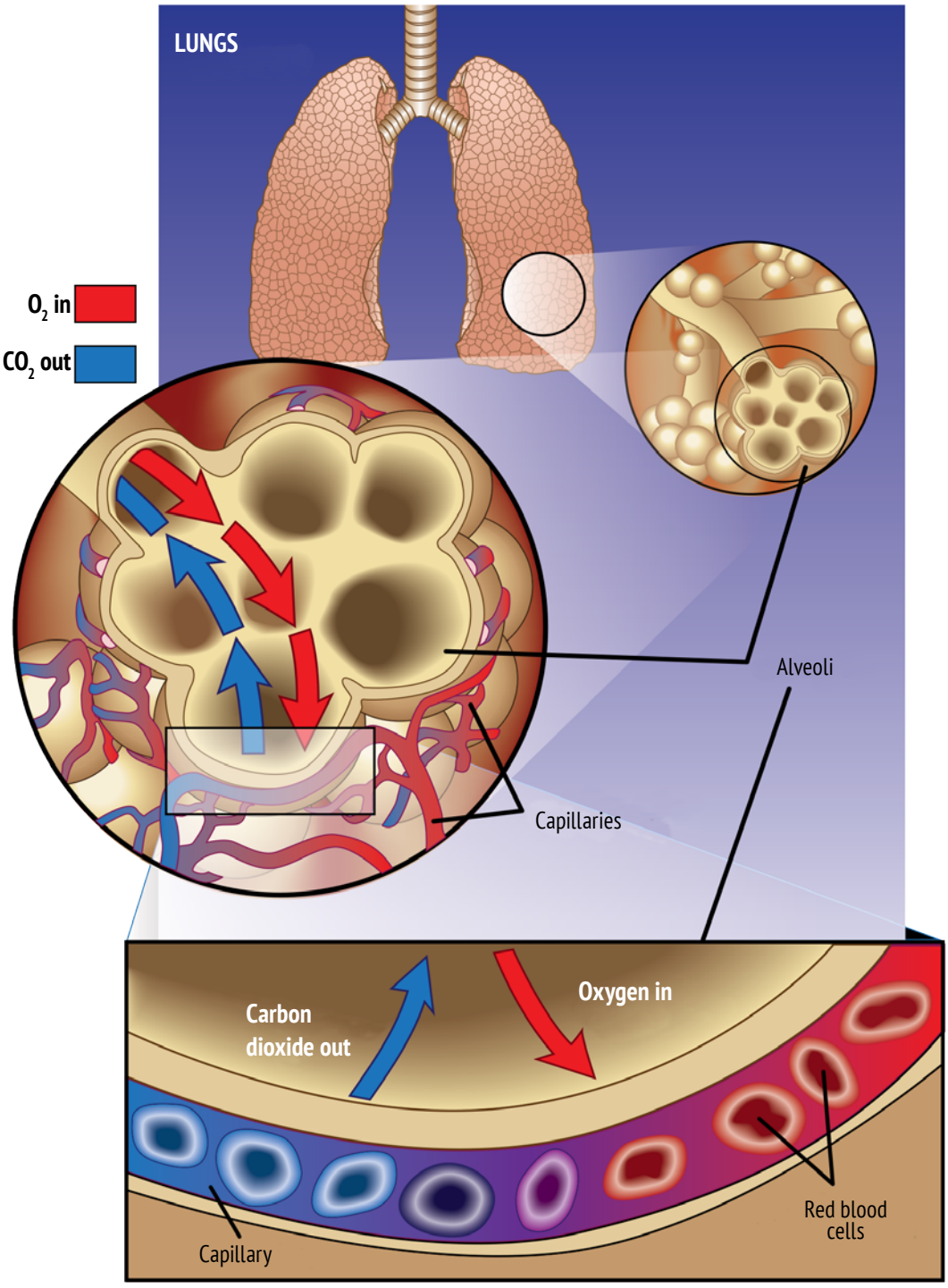


Respiratory System

The respiratory system comprises the upper airways (mouth, nose and pharynx), the trachea (windpipe) and the lungs. Key supporting structures include the chest wall (ribs and intercostal muscles) and diaphragm (a muscle critical to respiration that separates the thorax from the abdomen). Surrounding the lungs and lining the inside of the chest wall is a thin membrane called the pleura. Although this is one continuous membrane, its coverage of both the lungs and chest wall forms a double layer. Between these two pleural membranes is a potential space that contains a thin layer of fluid which acts as a lubricant, allowing efficient movement of the lungs during breathing. Air is drawn into the mouth and nose, and passes into the pharynx. The pharynx divides into two distinct passages: The trachea and the oesophagus.

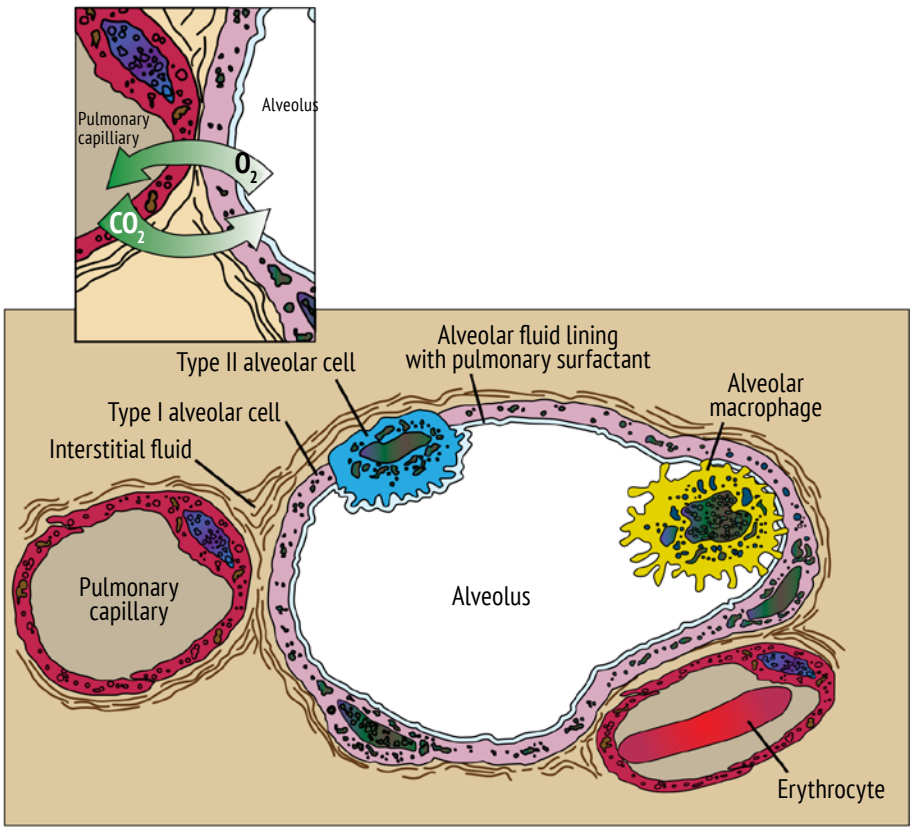
The opening to the trachea is protected from food (solids and liquids) during swallowing by a flexible flap of tissue called the epiglottis. The oesophagus, located behind the trachea, is a conduit for food and fluids making their way to the stomach. It is the proximity of these two structures that makes appropriate lung volume during CPR critical. Overventilation can lead to stomach distention and regurgitation of stomach contents. If this happens, stomach contents can enter the lungs and compromise recovery.

In contrast to solids and fluids, air travels from the pharynx and through the larynx (voice box), into the trachea. The trachea consists of a series of semi-circular, cartilaginous rings that prevent collapse. The trachea passes down into the chest cavity and branches into the right and left bronchi, which enter the right and left lungs, respectively. The bronchi progressively divide into smaller and smaller tubes, and finally into the alveoli. This branching pattern is commonly referred to as the bronchial tree.



The alveoli, located at the end of the smallest branches of the bronchial tree, have extremely thin walls and are surrounded by the pulmonary capillaries. The alveoli have been likened to tiny balloons or clusters of grapes. In both lungs, millions of alveoli cover a combined surface area of around 70 m^2 – roughly the size of a tennis court.

The average adult alveolus has an estimated diameter of 200-300 micrometers and is only a cell layer thick. Alveoli lie adjacent to capillaries that are also one cell layer thick, and this proximity enables the rapid exchange of CO_2 and O_2. The thin alveolar-capillary membrane separates the content of the lungs from the bloodstream. If this membrane tears or becomes compromised due to trauma, it may enable gas to pass out of the alveoli and into the bloodstream. Gas entering the vascular system can travel throughout the body as an air embolism.



CHAPTER 3 REVIEW QUESTIONS

1. **The respiratory system includes the**
   a. heart, lungs, brain
   b. arteries, spinal cord, nose
   c. nose, trachea, lungs
   d. bones, muscles, skin

2. **The cardiovascular system includes the**
   a. veins, arteries, heart
   b. mouth, lungs, stomach
   c. skin, bones, muscles
   d. nose, lungs, pharynx

3. **Gas exchange takes place at the**
   a. vein-artery interface
   b. long bone joints
   c. alveolar-capillary membrane
   d. muscle-nerve junctions
   e. lungs

Review answers are on Page 91.

4 Scene Safety Assessment

CHAPTER 4 OBJECTIVES

1. What is S-A-F-E?
2. What are some hazards that need to be assessed before providing first aid?
3. Why is exposure protection critical for rescuers?
4. What are some examples of personal exposure protection equipment?

Rescuer safety comes first. The ability to provide first aid is impaired if the rescuer is injured when approaching the victim or rendering care. Taking the time to assess the scene and circumstances surrounding the victim may prevent compromising the rescuer and causing further injury to the victim. Before providing BLS, assess the scene and take steps to avoid or remove any sources of potential injury.

Scene Safety Assessment

Before providing aid, take a moment to remember the mnemonic **S-A-F-E.**

S-A-F-E is a reminder to

- **Stop:** Take a moment to think and then act
- **Assess the scene:** Before assisting another person, determine if the scene is safe. Dangers may include:
  - fire
  - chemicals
  - electricity or gas
  - traffic
  - animals (tentacles from a jellyfish or a pet that feels threatened)
- **Find** your first aid kit, oxygen unit and AED
- **Exposure** protection: Avoid contact with blood and other body fluids
  - Locate and don barriers such as gloves, eye shields and resuscitation masks

S Stop
- Stop
- Think
- Act

A Assess the scene
- Scene safe?
- Safe to approach?
- Any hazards?
- Additional risks?

F Find the first aid kit, oxygen unit and AED, and take them to the injured person
- First aid kits contain critical supplies such as barriers

E Exposure protection
- Use barriers such as gloves and mouth-to-mask barrier devices
- Don gloves and inspect them for damage

Risk of Infection

Anyone in a position to provide medical care may come into contact with body fluids or other potentially infectious tissue. Personal protection is a critical aspect of first aid and should be exercised in all situations and for all people – this is the principle of standard precautions.

For individuals who may provide CPR and first aid as part of their work-related duties, the U.S. Occupational Safety and Health Administration (OSHA) has created a blood-borne pathogen standard to help minimise exposures. This standard addresses the immediate safety of those who may come in contact with human blood, body fluids, body tissues, human waste, vomitus or organs.

If you believe you potentially have been exposed to a blood-borne pathogen through an open wound, follow these steps:

- Milk the wound, encouraging it to bleed
- Wash the wound with soap and water
- For splashes in your face, flush potentially contaminated material from the mucous membranes of your eyes, nose and mouth, using large amounts of running water
- Wash potentially contaminated material off your skin as quickly as possible with soap and water. This is especially important when your skin has cuts, rashes or scrapes
- Seek medical evaluation and counselling regarding exposure at a local medical facility (emergency department)

If the incident occurred in the course of work activity, report the exposure immediately to your supervisor and follow your employer's exposure control plan.

There are three main blood-borne infection concerns: Viral hepatitis types B and C, and human immunodeficiency virus (HIV).

Hepatitis B[5]

Hepatitis B virus (HBV) is an infection that attacks the liver and may cause both acute and chronic disease. The virus is transmitted through contact with infected blood and other body fluids, but not through casual contact. HBV is 50 to 100 times more infectious than HIV. Those infected with HBV are themselves potentially infectious, although only about a quarter of them actually show symptoms. Approximately 5 to 10% of people infected with HBV as adults go on to have chronic disease. Between 15 and 25% of people with a chronic infection will die of either liver failure or liver cancer.

Symptoms

HBV can cause an acute illness that lasts several weeks. Symptoms may include:

- yellowing of the skin and eyes (jaundice)
- dark urine
- extreme fatigue
- nausea
- vomiting
- abdominal pain

For some people, symptoms may persist for several months or up to a year.

Transmission

HBV is transmitted via blood and other bodily tissues through methods such as blood transfusions, needle sticks, intravenous (IV) drug use and sexual intercourse (vaginal fluids and semen).

HBV is very stable on surfaces outside the body. It can last for up to seven days, making decontamination and clean up very important. An HBV vaccine is available that is 97% effective and is required of most health-care workers.

***Hepatitis C*[6]**

Hepatitis C virus (HCV) is another blood-borne pathogen that can cause severe liver damage.

Of those infected with HCV, about 40% recover fully. Those who do not clear the virus become chronic carriers. Of these, 20% develop cirrhosis and up to 20% of those who develop cirrhosis develop liver cancer.

HCV may cause a relatively mild acute illness or jaundice (in about 10% of those infected) and many people do not know they are infected until many years later. Most people are completely asymptomatic and go on to have a chronic disease that leads to cirrhosis and liver cancer (hepatocellular carcinoma). It may take 20 years or more to develop symptoms.

Symptoms

People infected with HCV are potentially infectious even if asymptomatic. Symptoms for HCV can include:

- nausea
- abdominal pain
- loss of appetite
- fatigue
- itchy skin
- jaundice

Transmission

Routes of transmission/infection for HCV are the same as for HBV. The most common source of infection is IV drug users who share needles. People also have contracted HCV from blood transfusions (prior to July 1992), needle pricks in health-care settings and through sexual intercourse.[7]

The likelihood of an infection from HCV — a 1 in 20 risk — is less than with HBV. HCV can remain viable outside the body, but it is not as sturdy as HBV. Currently, no immunisation is available for HCV.

HIV/AIDS[8]

HIV, which causes acquired immunodeficiency syndrome (AIDS), attacks the immune system and impairs the body's ability to fight infections.

Symptoms

People infected with HIV may remain asymptomatic for up to 10 years but can still pass the infection to others. Once infected, it usually takes about three months for the HIV enzyme-linked immunosorbent assay (ELISA) blood test to turn positive.

Some of the potential signs and symptoms of infection include:

- loss of appetite
- weight loss
- fever
- night sweats
- skin rashes
- diarrhoea
- fatigue
- reduced infection resistance
- swollen lymph nodes

Transmission

HIV can be transmitted from person to person through contact with infected blood and bodily fluids. The chance of infection from HIV is much less than from other blood-borne pathogens. A puncture-wound exposure from an infected source has an infection risk of 1 in 300. No immunisation or known cure for HIV is currently available.

Standard Precautions

The first-aid provider must be aware of possible disease transmission. Blood, semen and vaginal secretions have the highest risk of transmitting bloodborne pathogens. Saliva, sweat, urine and faeces have a lower risk. Casual social contact will not transmit these infections.

When providing care to an injured person, be aware of any active bleeding, and protect yourself from possible exposure. Use appropriate personal protective equipment (PPE), including non-latex gloves, face shields, protective eyewear and ventilation masks. In some instances you may consider gowns for added protection. Many employers provide PPE in locations where high-risk exposures are likely.

Additional Safety Precautions

- Avoid contaminated sharp objects such as needles or scalpel blades. Promptly dispose of sharp objects in an approved container after use
- Thoroughly wash hands after providing first aid

NOTE

In the event of an accidental needle prick or cut from a potentially infected sharp object, immediately wash the area with copious irrigation and warm, soapy water. Further medical attention is warranted to determine if an infection occurred.

Responsibility for standard precautions lies with the rescuer. To minimise your risk, carry protective barrier devices in every first aid kit. Gloves should be a standard part of your emergency response kit and should be donned before providing care. Replace them if they become torn, punctured, contaminated or compromised.

When removing gloves, avoid contact with the contaminated exterior of the gloves. Remove them in a manner that keeps the outer surfaces of the gloves from touching your bare skin. The skills-development section provides details about how to remove gloves safely.

NOTE

Gloves protect a rescuer but may become contaminated while providing aid. Be careful to avoid skin contact with bodily fluids when removing gloves.

CHAPTER 4 REVIEW QUESTIONS

1. **Potential hazards that should prompt caution when approaching the scene of an accident include**
   a. fire and animals
   b. expired first aid certifications
   c. electricity, gas and traffic
   d. a and c

2. **The S-A-F-E mnemonic helps us remember**
   a. to activate EMS
   b. scene safety assessment
   c. to use personal protective equipment
   d. b and c
   e. none of the above

3. **Personal protective equipment is a critical part of keeping yourself safe while providing care**
   a. True
   b. False

4. **Protective equipment includes**
   a. non-latex gloves
   b. eye shields
   c. resuscitation masks
   d. all of the above

5. **When removing gloves after providing first aid, it is important to keep the outer surface of the glove from touching your skin**
   a. True
   b. False

Review answers are on Page 91.

5 Initial Assessment and Positioning for Care

CHAPTER 5 OBJECTIVES

1. What are the steps to the assessment sequence?
2. How is a pulse located on an adult, a child and an infant?
3. What technique assists the rescuer in placing an unresponsive person on his back?
4. What is agonal breathing?
5. When should the recovery position be used?
6. When should the recovery position not be used?

The assessment sequence consists of these primary steps:

- Assess for responsiveness, including rapid presence of a pulse
- Adjust the patient's position for assessment of normal breathing and the ongoing care, if necessary
- Initiate CPR
- Activate EMS

Assessing Responsiveness and Checking for a Pulse

Once a rescuer ensures the scene is safe, assess the victim's level of responsiveness. Tap the victim's collarbone and shout, "Are you OK?" Remember to introduce yourself, state you are trained in first aid and express your desire to help. Reassure the patient by showing a caring attitude and talk to him about what is happening. The rescuer should also try to keep bystanders at a distance to avoid added stress. Enlist the assistance of others, if necessary.

If the victim does not respond, quickly check for normal breathing. To check for a pulse, use the first two fingers of either hand to press gently on the appropriate artery. For adults and children, check for the presence of a pulse at the carotid artery in the neck. Locate the carotid artery by placing your first two fingers on the "Adam's apple" of the victim's throat, and slide your fingers toward you and slightly upward into the groove on the side of the neck. Allow at least five seconds but no more than 10 seconds to determine if a pulse is present. Some pulses may be difficult to identify if thick tissue is present in the neck. Adjust the pressure of your fingers as necessary but avoid excessive pressure because blood vessels can be collapsed, obscuring a pulse. If no pulse is present or you are unsure, activate EMS immediately or send a bystander to call for help.

To establish responsiveness with infants, rub or tap the soles of their feet, or tap their shoulder or chest. Do not shake an infant. Check for a pulse in infants at the brachial artery in the upper arm. Locate the brachial pulse by placing your fingers on the inner arm just under the armpit and in the groove formed by the muscles of the arm. Use gentle pressure here as well, adjusting as required to find a pulse, if present. Allow at least five seconds but no more than 10 seconds to determine if a pulse is present. If no pulse is present and you are alone, begin CPR (CPR for infants is described later in this course). Conduct CPR for two minutes, then activate EMS if not already done.

If the victim can answer, leave him in the position in which he was found. Call EMS and then, if there is no evidence of injury, place the victim in the recovery position or a position of comfort. The rescuer should reassure the patient and try to find out what happened.

NOTE

Abnormal respirations are commonly associated with cardiac arrest. Breathing efforts may be infrequent, irregular, diminished or characterised as noisy gasps known as agonal breathing. This type of breathing is quite different from that seen in a normal resting or sleeping person and is not adequate to support life.

NOTE

For individuals with a definite pulse or showing signs of life (movement) but not breathing normally, chest compressions are not required. Provide rescue breaths to supplement abnormal or absent breathing. This skill is addressed later in this course.

Repositioning a Patient for Care

Use the recovery position for a breathing patient. To turn a patient from a face-down position onto his back for CPR, use the log-roll technique.

Recovery Position

If normal breathing is present or resumes, place the unresponsive, injured person in the recovery position to ensure an open airway. This helps to prevent blood and vomit from obstructing the airway or flowing into the lungs. Should vomiting occur or if blood or other fluids are present in the mouth, gravity will aid in their removal and minimise the chance of aspiration.

Remember to call local EMS. Until help arrives, continually check that the victim is still breathing.

The recovery position is accomplished from a supine position.

- Kneel beside the patient, making sure that both of his legs are straight. Place the patient's arm nearest to you at right angles to his body, with the elbow bent and palm facing upward
- Bring the far arm across the patient's chest and hold the back of his hand against the cheek nearest to you
- Place your other hand under the patient's leg farthest from you, just above the knee, or grab the pant leg of his clothing and pull the knee up, keeping the foot on the ground
- Keeping the patient's hand pressed against his cheek, pull the far leg to roll him toward you and onto his side
- Adjust the top leg to form 90-degree angles at both the hip and knee
- Tilt the patient's head back to ensure the airway remains open
- Adjust his hand under his cheek, if necessary, to keep the head tilted
- Check breathing regularly

NOTE

Do not place people with suspected spinal or pelvic/hip injuries in the recovery position because movement increases the risk of further injury.

If you use the recovery position, monitor the peripheral circulation of the patient's lower arm and keep the duration of pressure on this arm to a minimum.

Log Roll

If the patient is not on his back, you need to roll him into that position.

To minimise the risk of neck and back injury or in the case of suspected spinal trauma, use the log-roll technique.

- Kneel at the patient's side
- Carefully straighten the injured person's arms and legs. Place the arm closest to you above the person's head and place the other arm against his torso
- Support the head and neck with one hand
- Place the other hand on the opposite elbow and pull it gently into his side
- Roll the victim toward you, while avoiding twisting his head, neck and back
- Use a smooth, continuous movement to roll the patient to his side and then onto his back
- Keep twisting movements to a minimum throughout the entire roll

NOTE

When two rescuers are present, one should immobilise the patient's head while the second person rolls him on his back. The rescuer at the head controls the action by directing when to roll the patient.

CHAPTER 5 REVIEW QUESTIONS

1. **Initial assessment includes**
   a. assessing for responsiveness and activating EMS
   b. adjusting the patient's position for care
   c. initiating CPR
   d. all of the above
   e. a and c only
   f. b and c only

2. **To check for a pulse on an adult or child, use gentle finger pressure on the**
   a. carotid artery
   b. brachial artery
   c. femoral artery
   d. radial artery

3. **To check for a pulse on an infant, use gentle finger pressure on the**
   a. carotid artery
   b. brachial artery
   c. femoral artery
   d. radial artery

4. **Any breathing sounds at all are considered normal**
   a. True
   b. False

5. **Placing an unconscious, breathing victim in the recovery position is important for maintaining an open airway and minimising the potential of blood and vomit obstructing the airway**
   a. True
   b. False

6. **Persons with back or neck injuries should not be placed in the recovery position**
   a. True
   b. False

Review answers are on Page 91.

6 Starting CPR: Supporting Circulation

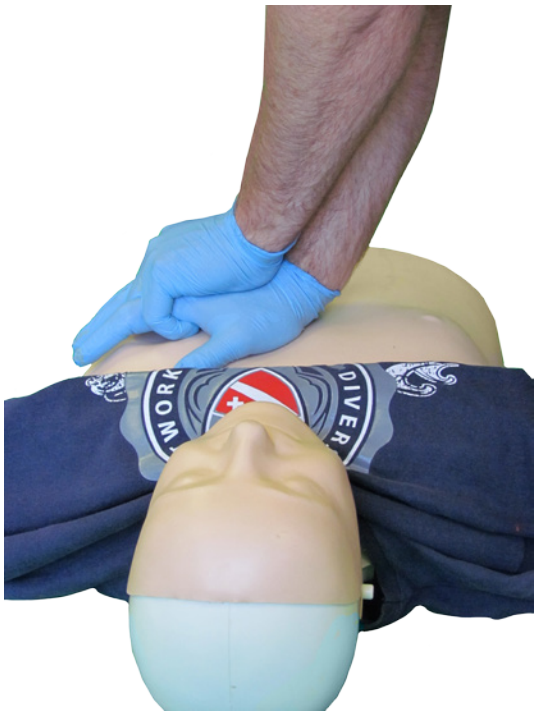
CHAPTER 6 OBJECTIVES

1. What is S-A-F-E?
2. What are some hazards that need to be assessed before providing first aid?
3. Why is exposure protection critical for rescuers?
4. What are some examples of personal exposure protection equipment?

Starting CPR: Support Circulation

In many circumstances when normal breathing or a definite pulse is not present, a single rescuer initiates CPR, while another individual (if available) activates EMS. The individual who activates emergency services should inform them that the patient is not breathing normally and has no pulse.

The single rescuer should ensure the patient is on a hard surface and then begin CPR, starting with 30 compressions followed by two breaths. If a second rescuer is not available, the single rescuer should call EMS and secure an AED, if readily available, before beginning CPR on an adult. After starting chest compressions, limit interruptions to less than 10 seconds. The next chapter will cover rescue-breathing techniques.



NOTE

For drowning victims, perform CPR beginning with rescue breaths, as noted earlier, for two minutes before getting help if you are alone.

Chest Compressions on Adults

Begin chest compressions by locating the centre of the victim's chest, which can be accomplished by drawing an imaginary line between the nipples. After determining the site for compressions, stack your hands with the fingers of both hands interlocked and raised off the chest wall with the heel of the bottom hand on the centre of the chest between the nipples. Position your shoulders directly over your hands, keeping your elbows straight. Keep your fingers raised off the chest wall, and compress the chest 30 times at a rate of 120 per minute. Pivoting from the hips for compressions allows the rescuer to use his body weight to assist with compressions and facilitates a smooth, rhythmic motion.

Compression depth should be 5-6 cm. Compressions should be to this full depth and should allow for complete recoil of the chest. It is important to release the pressure on the chest between the compressions but without losing contact between the patient's chest and your hands. The skills-development section covers the exact hand position and compression technique in more detail.

During compression, blood is pushed out of the left side of the heart and then throughout the body. At the same time, deoxygenated blood is squeezed from the right side of the heart to the lungs, where it will take oxygen from the lungs. When releasing the pressure on the chest, blood flows from the body into the right side of the heart, and oxygenated blood returns from the lungs to the left side of the heart.

When compressions are too fast, the heart does not have time to refill with blood, thus decreasing the resulting volume that flows out of the heart. Rescuer fatigue occurs quickly and results in decreased compression effectiveness. When compressions are too slow, the amount of circulating oxygen available to tissues decreases. When compressions are not deep enough, blood flow is reduced and the amount of blood pushed out of the heart may be inadequate to support tissue oxygen demands.

After each cycle of 30 compressions, provide two rescue breaths (the next chapter covers rescue breathing).

Two-Person Adult CPR

When a second trained rescuer is available, the two rescuers should perform CPR as a team. Use the same compression and rescue-breathing techniques described for one rescuer but with one rescuer performing compressions and the other performing rescue breaths using the same 30:2 ratio. The first rescuer begins chest compressions, while the second rescuer monitors compression rate and depth, and maintains an open airway. At the completion of the 30th compression, the first rescuer pauses while the second rescuer administers two breaths (approximately one second per breath). Following the second breath, the first rescuer immediately resumes compressions without delay. Reducing the interruption of compressions is a critical element of CPR. Do not interrupt compressions for more than 10 seconds, other than during use of an AED.

NOTE

Pause compressions during administration of rescue breaths to minimise air moving into the stomach (gastric distension).

Rescuers should switch roles every two minutes or five cycles of compressions and ventilations to minimise rescuer fatigue.

Chest Compressions on Children

Evaluate unresponsiveness in a child just as you would with an adult. Tap the collar bone and shout, "Are you OK?" while looking for any movement or signs of life, including normal breathing. Feel for a pulse at the carotid artery in the neck of a child. If in doubt about the presence of a pulse and the child shows no signs of life, begin chest compressions.

Performing CPR on a child is very similar to CPR on an adult. Children are generally considered to be between one-year old and puberty, but the physical size of the child, not his age, will determine how CPR is performed.

NOTE

The lone rescuer should perform CPR on a child or infant for approximately two minutes before going for help or calling EMS. If a cell phone is available, activate EMS using the phone's speaker setting while beginning CPR.

With small children, using a single hand for compressions with the same technique as for an adult may be all that is necessary for adequate compressions. Large children, however, may require techniques similar to those used on an adult.

Compression depth on a child is approximately 5 cm or approximately one-third of the thickness of the child's chest. The compression rate remains 120 per minute. A single rescuer should use the 30:2 CPR compression-to-ventilation ratio for children.

Two-Person Child CPR

When a second rescuer is available to perform CPR on a child, the compression-ventilation ratio changes to 15:2, maintaining a rate of 120 compressions per minute. The more frequent ventilation rate compensates for the slightly faster natural respiratory rate of children. As with adults, one rescuer performs 15 compressions to a depth of 5 cm, then pauses while the second rescuer administers two rescue breaths. The first rescuer immediately resumes compressions for another count of 15. The cycle of compressions and rescue breaths then repeats.

Chest Compressions for Infants

Infants are generally considered to be younger than one-year old. To begin chest compressions on an infant, draw an imaginary line between the nipples to identify the compression site. With two fingers positioned vertically on the breastbone in the centre of the chest between the nipples, compress straight down about one-third of the chest depth. A lone rescuer should perform 30 compressions followed by two small breaths (puffs of air from the rescuer's cheeks), then repeat.

Two-Person Infant CPR

With the addition of a second rescuer, the preferred method for compressions on an infant is to use two thumbs for compressions with the hands encircling the chest. This method is less tiring for the rescuers and may allow for more consistent force and depth, resulting in better blood flow and higher blood pressures. Monitor the thumb positions to avoid their migration off the compression site.

The rescuer performing compressions should be positioned at the infant's feet. Draw an imaginary line between the nipples and place both thumbs on the infant's chest at this line, with the thumbs either overlapping or side by side. Encircle the infant's body with both hands, using fingers to support the infant's back. Press and release the chest with your thumbs, being careful not to squeeze the sides of the chest. Allow the chest to recoil fully between compressions. As with children, two rescuers with an infant should perform 15 compressions followed by two breaths, switching positions about every 10 cycles (approximately every two minutes).

NOTE

The technique of two thumbs with hands encircling the infant's chest should be used only with two rescuers. A single rescuer should continue using fingers to facilitate rapid movement between compressions and breaths.

CHAPTER 6 REVIEW QUESTIONS

1. **The recommended rate of compression for CPR on all ages is**
   a. 60-80 per minute
   b. 120 per minute
   c. at least 140 per minute
   d. rate is not important as long as compressions are being done

2. **The recommended depth of chest compressions for an adult is**
   a. 2.5-5 cm
   b. 5-6 cm
   c. 7-8 cm
   d. depth is not important as long as compressions are being done

3. **The recommended depth of compressions for infants and children is**
   a. 1/3 of chest depth
   b. 5 cm
   c. 2.5 cm

4. **The compression-to-ventilation ratio for two-person CPR on children and infants is**
   a. 30:2
   b. 30:3
   c. 15:2
   d. 15:1

Review answers are on Page 91.

7 Continuing CPR: Supporting Respiration

CHAPTER 7 OBJECTIVES

1. What barrier devices (exposure protection) are recommended when doing rescue breathing?
2. How long should rescue breaths last?
3. What is the compression-ventilation ratio for a single rescuer on an adult? For two rescuers?
4. What is the compression-ventilation ratio for a child?
5. When providing ventilations only, how often should rescue breaths be delivered for an adult? For a child? For an infant?

Rescue Breathing

Rescue breaths deliver oxygen to the lungs to oxygenate the blood and are an important part of CPR. For effective rescue breaths, tilt back the victim's head and extend the jaw by lifting the chin. This opens the airway and prevents the tongue from creating an obstruction.

A seal must be created with either a barrier device or directly on the victim's mouth. Barriers are recommended to minimise exposure risk. Disposable face shields are available in packets that can be carried in a wallet. Larger barriers such as oronasal resuscitation masks and devices are often included in first aid kits. Mouth-to-mouth ventilations may be an option if no barrier aids are available.

When providing rescue breaths with mouth-to-mouth ventilations, the victim's nose must be pinched closed to ensure effective, adequate ventilations.

Alternatively, in the absence of a barrier device, you may perform hands-only CPR if you are unwilling to or uncomfortable with performing unprotected rescue breaths. Compression-only support is acceptable in the case of a witnessed collapse of an adult who stops breathing normally. However, for drowning victims or scuba diving injuries, full CPR with ventilations is always recommended. This course teaches full CPR, which forms part of the requirements for certification.

Deliver each rescue breath for one second while watching for a rise in the patient's chest. Avoid using excessive volumes of air with rescue breathing for all age groups. The chest rise should be gentle and just visible. Excessive volumes of air and a pronounced chest rise increase the risk of regurgitation and and a possible obstruction of the airway.

Allow the chest to fall (exhalation) for about one second, then deliver a second breath. If rescue breaths do not cause the chest to rise, reposition the victim's head. If efforts do not make the chest rise after two attempts, return to compressions. Check for visible obstructions after completing an additional cycle of 30 chest compressions and/or try to ventilate again. Each pause from chest compressions to ventilation should not last more than 10 seconds. The skills-development section provides full technique descriptions.

Do not delay compressions if rescue breaths are ineffective. The priority is CPR chest compressions as they keep blood circulating.

NOTE
Remove the victim's dentures only if they cannot be kept in place. In all other situations, keep them in the victim's mouth because they will make it easier to create a seal.

Rescue Breathing for Children
For children, use a head-tilt, chin-lift method (similar to the adult technique) and a rescue breath volume that will achieve a gentle chest rise as you deliver the breaths. Avoid overexpansion of the child's lungs by adjusting your volume to the correct amount for the size of the child.

Rescue Breathing for Infants

The technique for providing rescue breaths for an infant requires less extension of the infant's neck and a smaller volume of air. Gently tip the infant's head to straighten the neck and airway into a neutral position. Overextending the neck, as with adults and children, will collapse an infant's airway. The volume of air required to provide rescue breaths to an infant can be met by simply using the air from the puffed cheeks of the rescuer. Breaths should not be long or forceful because infants' lungs are very small.

Deliver rescue breaths to an infant using either an oronasal resuscitation mask or by placing your mouth over the infant's mouth and nose. If using an oronasal mask, achieve a better seal by turning the mask 180 degrees from how it would be used on an adult or child. A seal still needs to be maintained for effective rescue breathing. When using mouth-to-mouth on an infant, both the infant's mouth and nose must be covered to ensure an adequate seal.

Victim	One Rescuer	Two Rescuers	How to Compress	Depth
Adult	30:2 ratio	30:2 ratio	Two hands stacked	5-6 cm
Child	30:2 ratio	15:2 ratio	Heel of one hand or two hands stacked	5 cm or 1/3 chest depth
Infant	30:2 ratio	15:2 ratio	Two or three fingers (one rescuer); two thumbs (two rescuers)	3.5 cm or 1/3 chest depth

NOTE: 120 compressions per minute are optimal.

Rescue Breaths without Compressions

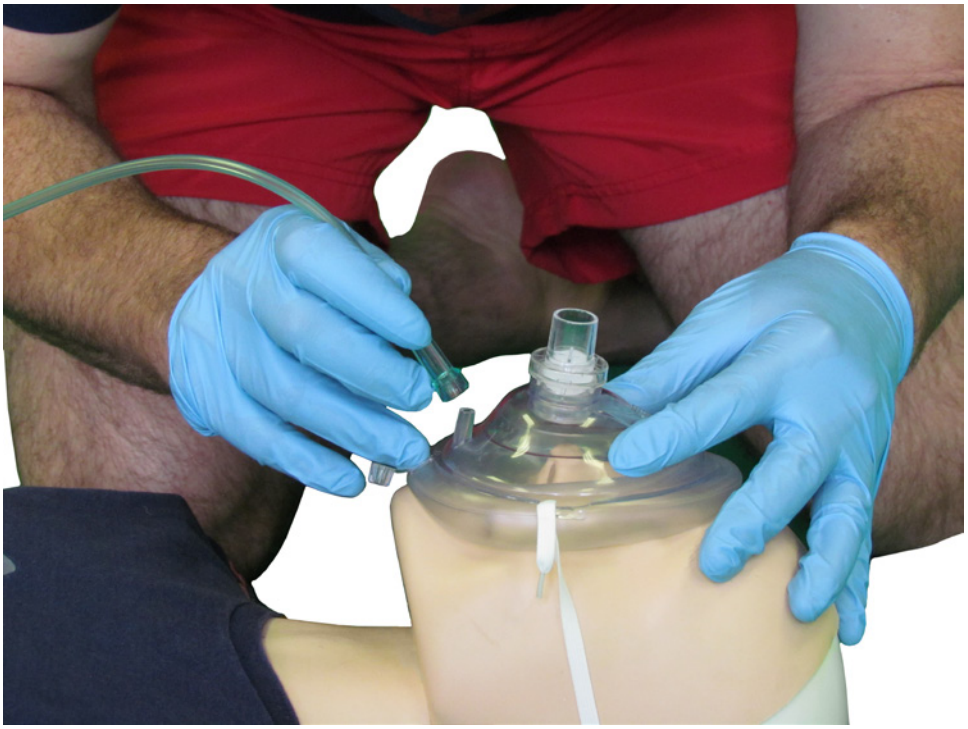
If a pulse is present but the victim is either not breathing or not breathing normally, the HCP-level rescuer should provide rescue breaths. For all age groups, begin rescue breaths with a single ventilation. Continue with one breath every five to six seconds for adults and children, and every three to five seconds for infants. Use the same techniques as when providing rescue breaths during full CPR.

Maintain the airway and monitor the patient for regurgitation or spontaneous return of breathing. Continue to monitor the pulse as well, checking every two minutes to ensure circulation is continuing. Remain prepared to initiate CPR if the pulse disappears.

Use of Oxygen During Resuscitation

The use of oxygen is especially important for infants, children and victims of drowning and scuba diving accidents, where hypoxia is a major concern. In the case of prolonged asphyxia (not breathing) or reduced cardiac and lung function due to submersion, oxygen therapy may be crucial. It improves the delivery of oxygen to tissues during resuscitation. When used effectively, the concentration of delivered oxygen may increase to levels approaching 100%. Therefore, oxygen should be present at every swimming pool and dive site. CPR:HCP providers are encouraged to complete the Emergency Oxygen for Scuba Diving Injuries course.

Full CPR (performing both compressions and rescue breaths) is recommended for all victims of immersion incidents (drowning and scuba diving accidents).



CHAPTER 7 REVIEW QUESTIONS

1. **Each rescue breath should last about**
   a. 2 seconds
   b. 1 second
   c. 5 seconds

2. **The volume of rescue breaths for children should be adjusted to accommodate their size to avoid overexpansion of their lungs**
   a. True
   b. False

3. **When delivering rescue breaths to an infant, the head should**
   a. be extended as it would for an adult or child
   b. not be extended at all
   c. be extended gently, but not as far as you would for an adult or child

4. **When delivering only rescue breaths (no compressions) on an adult, the rate of ventilations is one breath every**
   a. 10 seconds
   b. 5-6 seconds
   c. 3 seconds

5. **Rescue breaths only (no compressions) on an infant should be delivered every 3-5 seconds**
   a. True
   b. False

6. **Full CPR is always recommended for**
   a. drowning victims
   b. scuba diving injuries
   c. both a and b

Review answers are on Page 91.

8 Use of AEDs During CPR

CHAPTER 8 OBJECTIVES

1. Why are AEDs recommended?
2. What are the considerations for using an AED on children or infants?

Use of AEDs During CPR

The heart has an inherent electrical system that stimulates heart muscle contractions. As these electrical impulses fire and the muscles contract, blood is pumped from the heart to either the lungs or systemic circulation via arteries.

When something upsets these electrical impulses and breaks the heart's rhythm, sudden cardiac arrest (SCA) may occur. The most common life-threatening rhythm disturbance (arrhythmia) that occurs during an SCA is ventricular fibrillation (VF). Fibrillation refers to disorganised and ineffective muscular contractions. When this occurs in the ventricles (the chambers responsible for pumping blood to the lungs and body) circulation essentially stops and a person will die.

The most effective way to re-establish a normal heart rhythm is with defibrillation. While CPR helps to oxygenate blood and circulate it throughout the body, CPR cannot re-establish a normal heart rhythm. Only defibrillation can do that.

Defibrillation sends an electric shock through the heart and essentially hits a "reset" button. The electric shock overrides the misfiring rhythm and allows the body's natural pacemaker to restore a normal rhythm.

Prior to the advent of AEDs, only highly trained professionals could use defibrillators. Fortunately, AEDs available to the general public are simple to use and reduce the time from initial collapse to initial shock delivery. Take time to notice AED locations in stores and other areas you frequent so you will know where to find one in the event one is needed.

All AEDs provide audible user prompts and an easily recognisable light that indicates when to deliver the shock. Turn on the AED and follow the directions provided by the unit. In the skills-development section, your instructor will introduce you to the process using an AED training unit.

CPR combined with the use of an AED provides the highest rate of survival. When defibrillation is provided in conjunction with CPR within the first few minutes after VF begins, the person's chances for survival increase. Survival rates drop about 7-10% for every minute a person is in VF without CPR.[9] The longer a person remains in an unstable rhythm, the lower the chances of successful defibrillation.

It is recommended that the lone rescuer retrieves any readily available AED unit while concurrently using a cell phone to activate EMS, thereby reducing the time for emergency care arrival and providing for quick implementation of the AED. Place the cell phone on speaker function and keep it close, allowing for constant contact with EMS dispatch while you are initiating care.

When a second rescuer is available, perform CPR while the second rescuer locates and sets up the AED unit. Interrupt CPR only after the AED pads are in place so the unit can evaluate the patient's heart rhythm.

To use an AED, the patient's chest must be bare. Place the AED pads on reasonably dry skin, following the diagrams on the pads — one on the upper-right chest and the other wrapped around the lower-left side of the rib cage. If the pads are switched, the AED will still work.

Software within the AED performs heart-rhythm analysis and advises the rescuer if a "shockable" rhythm is detected. If a non-shockable rhythm is detected, the unit will provide a "no shock advised" message. The rescuer should then continue CPR uninterrupted until EMS arrives or another rescuer takes over.

If a shockable rhythm is detected, the AED unit will prompt rescuers to clear the area ("Do not touch the patient") and then will deliver the shock. Once the AED delivers the shock, immediately resume chest compressions. The heart still needs the support of chest compressions, so resume them immediately after a shock is delivered. There is no lingering charge from the use of an AED that will cause harm to the rescuer. Continue CPR for two minutes or until the AED unit advises it is analysing the heart rhythm again. The unit may advise for additional shocks, so be prepared to deliver multiple shocks based on the AED prompts.

NOTE

While AEDs can be used in an aquatic setting (near water or where water is on or around the victim), you must dry the chest before placing the pads on the patient. Place AED pads on the patient's chest according to the diagrams on the pads.

AED Pad Placement

AED use requires placement of the pads on the chest in a manner that allows the current administered during the shock to travel through the heart muscle. On an adult, place one pad on the right side of the chest, below the clavicle (collar bone), and the other pad on the left side of the chest wall, under the patient's arm (see photo). Placing the left pad too far forward on the chest wall may allow the current to bypass the heart. Illustrations on the pads will aid in correct placement. If the pad positions are switched, the AED will still work.

AED pads should be placed on children the same way as for an adult. Use paediatric pads if they are available. However, if an adapter is not available, use the AED with adult pads at full power. There is no clinical evidence of damage to the heart tissue from AED use, so use on infants is approved. As with children, use an adapter to reduce the amount of current flow. However, in the absence of an adapter, using an AED may still be helpful. On an infant, apply the pads on the centre of the chest and the centre of the back.

Cautions

While AEDs can be used in wet environments, they should not be used in standing water. Move a patient away from pools of water, if necessary.

If supplemental oxygen is being used in the patient's care, discontinue it and move it away from the person. Once the shock has been delivered, resume use of oxygen.

Troubleshooting

AEDs typically are trouble-free, but when problems occur they frequently involve the pads. When the AED unit detects problems, it will provide prompts to check for issues such as poor pad placement or attachment. Chest hair or wet skin may interfere with pad adhesives, so be sure the chest is free of excessive moisture. It may be necessary to shave off heavy chest hair for adequate pad contact.

The vibrations caused by running boat engines may make it difficult to use an AED on moving boats.

Maintenance

Check the AED status indicator daily. If the battery is low, replace it with a new or freshly recharged one. Do not use an AED with a low battery charge.

AED pads have expiration dates. Check components regularly and replace items as necessary.

Carefully handle pads using the provided tabs or the space where the wires attach. If the pads appear damaged or if wires are loose, a new set of pads may be required for the AED to operate properly.

Be aware that rules and regulations concerning AED use vary from region to region. Check for laws that may apply in your area or ask your CPR:HCP Instructor about possible restrictions on AED use where you live or work.

CHAPTER 8 REVIEW QUESTIONS

1. **The use of an AED is often helpful but may decrease the chance of survival**
   a. True
   b. False

2. **Every minute the heart is in fibrillation, survival rates decrease by**
   a. 3-5%
   b. 7-10%
   c. 12-15%
   d. 20-25%

3. **All cardiac arrests can benefit from the shock delivered by an AED**
   a. True
   b. False

4. **The charge from a delivered shock should be allowed to dissipate before touching the patient to resume CPR**
   a. True
   b. False

5. **AEDs with adult pads may be used on infants and children**
   a. True
   b. False

6. **AED pad placement on adults is**
   a. on the right chest and left side
   b. on the centre of the chest and centre of the back
   c. under both arms, centring the heart between them

7. **AED pad placement on infants is**
   a. on the right chest and left side
   b. on the centre of the chest and centre of the back
   c. under both arms

Review answers are on Page 91.

9 Foreign-body Airway Obstruction (FBAO)

CHAPTER 9 OBJECTIVES

1. What is the most common cause of choking in adults?
2. How can a partial airway obstruction be identified?
3. How should a rescuer respond to a partial airway obstruction?
4. How can a complete airway obstruction be identified?
5. What action should be taken if a choking victim becomes unconscious?
6. When can a finger sweep be used?
7. What is the maximum time suctioning may be used on an adult? On an infant?

Foreign bodies are the main cause of blocked airways and choking. Food is the most frequent culprit in adults. In children it may be toys, coins, nuts or other small objects. Airway obstruction prevents normal airflow into the lungs and may result in respiratory arrest and eventually cardiac arrest.

Airway obstruction may be partial or complete. A choking victim may suddenly become silent or grasp at his throat – this is the universal sign of choking. Ask the victim, "Are you choking?" People who are able to move air will usually cough to dislodge the object and may not require an intervention.

Of greater concern is a severe obstruction, when a person is unable to breathe at all and can only nod his head to your question. He cannot cough or speak. This person is unable to move air and will become unconscious without intervention. If possible, provide assistance before unconsciousness occurs.

First Aid for Choking Adults and Children

In the case of a partial or mild airway obstruction (the victim can speak, cough, make sounds), the rescuer should encourage the choking victim to cough but should do nothing else.

If the victim shows signs of a severe airway obstruction and is conscious, perform abdominal thrusts (often called the Heimlich manoeuver) in the following way

- Stand behind the victim and put both of your arms around the upper part of the abdomen
- Clench your fist and place it between the navel and bottom tip of the sternum with the thumb side of your fist against the choking victim's abdomen
- Grasp your fist with your other hand, and pull sharply inward and upward
- Repeat until the object is expelled or the person loses consciousness

If the victim at any time becomes unconscious

- Carefully lower the victim to the ground
- Activate EMS
- Begin CPR (chest compressions followed by rescue breaths)
- Look in the mouth for the obstruction before each pair of breaths. Use a finger sweep to remove any visible objects

Finger Sweep

When you can see solid materials in the airway, use a gloved finger to remove the foreign matter. Do not perform a finger sweep if you cannot see an obstruction or foreign object in the mouth. If the removal of a foreign object enables spontaneous breathing, continue to monitor the patient and call EMS. If spontaneous breathing does not start with the removal of foreign material, initiate CPR.

First Aid for Choking Infants

Infants have very small airways that can easily become obstructed. Because they often explore with their mouths, aspiration of small objects is a very real concern.

To dislodge an object from a responsive infant's airway, begin by placing the infant face down on your forearm, supporting the infant's head with the hand of the same arm. Allow the infant's legs to straddle your arm and keep his head lower than his body. Deliver five back blows between the infant's shoulder blades. Immediately turn over the infant by sandwiching him between your forearms, continuing to support the infant's head and keeping it low. Deliver five chest compressions using the same two-finger technique as in CPR. Check the infant's mouth for the dislodged object. If not visible, turn over the infant and repeat the back blows and chest thrusts until the object is successfully dislodged.

If the infant becomes unresponsive, initiate CPR, beginning with chest compressions. Look in the mouth for the obstruction before each pair of breaths.

As with all life-threatening emergencies, activate EMS as soon as you recognise a problem. Even if the object is successfully removed without EMS assistance, medical evaluation is recommended.

Victims of Drowning: Aspiration of Water

The aspiration of water can be suspected in cases of drowning. It is usually only a small amount, however, and its removal is not part of first-aid treatment as it is usually a much smaller volume than expected. There is no need to clear the airway of aspirated water before starting CPR.

Regurgitation of stomach contents is common during drowning resuscitation and can make it difficult to maintain a clean and open airway. Using the appropriate force and volume for rescue breaths will reduce the chance of regurgitation. Therefore, the proper ventilation technique can be critical. Whenever regurgitation occurs, turn the victim on his side using the recovery-position technique and wipe or suction vomitus using a finger sweep or suction device.

Suctioning

Suctioning to remove foreign matter can aid in clearing the airway, but it should not interfere with other definitive care. Limit use of a suction device to 15 seconds on an adult, 10 seconds on a child and five seconds on an infant to avoid depletion of oxygen supplies in the airway. Prolonged suctioning can result in decreased oxygen, leading to further complications.

Once the airway is clear, return the victim to his back and resume CPR or rescue breaths if indicated.

CHAPTER 9 REVIEW QUESTIONS

1. **The most common cause of airway obstruction and choking in adults is**
   a. tongue
   b. food
   c. dentures

2. **With infants and children, airway obstruction and choking can also be caused by**
   a. food
   b. foreign bodies (toys, coins, nuts)
   c. fingers

3. **Grasping the throat is a common sign made by choking victims**
   a. True
   b. False

4. **If you suspect that someone is choking**
   a. look in the mouth
   b. check for responsiveness
   c. ask, "Are you choking?"
   d. ask a doctor

5. **With complete airway obstruction, the victim will be unable to _____ but might nod his head in response to your question. If the victim is unable or has a limited ability to move air, he may soon lose _____**
   a. yell for help, his breath
   b. talk, his breath
   c. breathe/cough/speak, consciousness

6. **In the case of a partial airway obstruction, the rescuer should encourage the choking victim to cough but should do nothing else**
   a. True
   b. False

7. **If the victim at any time becomes unconscious, the rescuer should _____**
   a. drop the victim in the hope that the fall will dislodge the foreign body
   b. ease the victim to the ground, remove the foreign body if visible and start CPR
   c. ease the victim to the ground and initiate supplemental oxygen therapy

8. **What must you do when a victim regurgitates?**
   a. Roll the patient on his side and wipe or suction out the mouth
   b. Blow vomit back into the stomach
   c. Remove gloves and wipe away vomit with bare hands

9. **An obstructed airway in a responsive infant should be cleared with back blows, alternating with chest compressions**
   a. True
   b. False

Review answers are on Page 91.

10 Control of External Bleeding

CHAPTER 10 OBJECTIVES

1. What is the primary function of blood?
2. What is the body's response to bleeding?
3. How can the rescuer help control bleeding?
4. When and how should a tourniquet be placed?

The primary function of blood is to supply nutrients and oxygen to body tissues, and to remove waste products such as carbon dioxide. Blood consists of approximately 55% plasma (liquid) and 45% cells or solid particles (44% red blood cells, and 1% white blood cells and platelets).

The circulating blood volume in an adult is approximately 5 litres. Actual blood volumes vary depending on body size. Acute blood loss may result in hypovolemic shock, a condition in which decreased blood volume causes inadequate tissue oxygen supply. Severe bleeding (haemorrhaging) must be stopped to avoid hypovolemia, which is especially important in children, because they have less circulating blood volume than most grown adults.

The body has two mechanisms for limiting blood loss. Vasoconstriction (narrowing of blood vessels) occurs in response to injury and helps to reduce blood loss. Platelet activation initiates blood clotting. For minor bleeding, this process works extremely well and with little support will stop blood loss. When bleeding is more severe, additional intervention may be needed.

First responders can aid the clotting process by applying firm, direct pressure on the wound using an absorbent bandage.

When approaching an injured person, perform the following steps:

- Remember S-A-F-E
- Ensure that the person is breathing
- If the injury requires medical attention, activate EMS
- Ask permission to provide first aid
- Don gloves/personal protective equipment

Direct Pressure

Direct pressure over a bleeding site is usually sufficient to control most bleeding. This is accomplished by using an absorbent pad or dressing and gloved hands. If the bleeding continues and seeps through the pad, add additional absorbent material on top of the original pad. Do not remove the original pad. Dressing removal may remove clotting blood and disrupt the clotting process. Continue to hold direct pressure until the bleeding stops.

Secure the pad with a clean or sterile bandage. The bandage should be big enough to cover the pad, extending past the edge (2.5-5 cm if possible). Wrap the bandage from the distal side (farthest from the heart) of the wound site toward the heart.

The bandage should help maintain direct pressure but should not prevent circulation. You can check circulation by squeezing the nail beds and looking for the pink colour under the nails to return quickly after pressure is released. It should return to its normal pink colour in 2-3 seconds. In cold conditions, colour refill may take slightly longer. If colour does not return in a timely manner, loosen the bandage and rewrap.

Tourniquets

If direct pressure fails to control massive bleeding, the next step may be to use a tourniquet if the injury is on an extremity. Tourniquets are a primary intervention when the bleeding is a massive arterial (spurting) bleed and is life-threatening. A tourniquet is a wide band placed tightly enough around an arm or leg to stop blood flow. It must be applied with sufficient force to stop arterial bleeding, not just venous bleeding. Arteries are deeper in the body and therefore require forceful pressure to stop blood flow, which is accomplished by using a windlass device (part of a commercial tourniquet or makeshift in an improvised tourniquet). Double check the effectiveness of a tourniquet by assessing distal pulses, which should not be present if the tourniquet is applied tightly enough.

A tourniquet should be:

- used only when direct pressure is not effective
- wide (at least 5cm wide if an improvised tourniquet is used)
- well-padded (six to eight layers of a bandaging material)
- placed 2.5-5 cm proximal to the wound

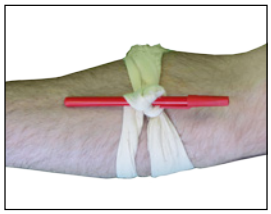
NOTE

A tourniquet should NOT be:

- placed directly over knees, elbows or other joints. If there is no room to place a tourniquet between a wound and a joint, place the tourniquet 2.5-5 cm proximal to the joint
- made of wire or rope. A narrow, excessively tight or insufficiently padded band may cause local damage to tissues in minutes

Applying a Tourniquet

Before applying a tourniquet, inspect the wound to ensure direct pressure was being applied directly to the site of the bleeding. If not, attempt direct pressure once more. Wrap the tourniquet proximal to the wound several times and secure it in place with an overhand knot. Place a stick or similar object on top of the knot and tie a second overhand knot over it. Twist this "handle" just until the bleeding stops. Secure the handle in place by wrapping it with a second bandage. Using a marker, write on the patient's forehead "T" or "TK" (for "tourniquet") and the time the tourniquet was placed. This ensures subsequent caregivers are aware the tourniquet is there and how long it has been on. The tourniquet should not be removed until advanced medical care is available.



NOTE

- Death of tissue below the tourniquet is possible after two or more hours
- Tourniquets may cause pain in the extremity

Haemostatic Dressings

A final option to control bleeding that is not responding to a tourniquet or is located in an area where a tourniquet cannot be used is a dressing impregnated with haemostatic agents.

Remove any other dressing materials so the agents can have direct contact with the bleeding site. Cover the entire bleeding surface with the haemostatic dressing and continue to apply direct pressure. Apply additional layers of haemostatic dressings if necessary. Hold dressings in place with a pressure bandage.

Advise medical personnel that a haemostatic agent was used to assist with control of bleeding. Retaining the dressing's packaging material may be helpful to emergency personnel. Haemostatic dressings should not be left in place more than 24 hours.

CHAPTER 10 REVIEW QUESTIONS

1. **The primary function of blood is to supply nutrients and oxygen to the body tissues, and to remove carbon dioxide and waste products**
   a. True
   b. False

2. **Which of the following is the first line of action to control external bleeding?**
   a. Direct pressure
   b. Tourniquets
   c. Haemostatic dressings

3. **Should the first dressing become soaked, you should**
   a. remove the dressing and replace it with a fresh dressing
   b. place additional dressings on top of the existing dressing as needed
   c. remove the dressing and irrigate the wound
   d. leave it as is

4. **A tourniquet should be placed**
   a. if the wound exhibits massive arterial bleeding
   b. if bleeding is not stopped by direct pressure over the wound
   c. 5-6 cm above the wound
   d. all of the above

5. **A tourniquet should be removed after two hours, regardless of continued bleeding**
   a. True
   b. False

Review answers are on Page 91.

11 Bandaging and Wound Management

CHAPTER 11 OBJECTIVES

1. What is the key role of first aid when a wound is bleeding?
2. When should a bandage be applied?
3. When should impaled objects be removed?
4. What is the purpose of a splint?

Our skin creates an important barrier between the external environment and our body. Breaks in the skin often result in bleeding and may enable bacteria that either live on the skin or are introduced through the wound to enter our body and cause infection. The key role of first aid for wound management is to minimise wound contamination and control bleeding.

General Approach

After ensuring scene safety and obtaining permission to provide care, use standard precautions and don gloves before rendering aid. Your next priority is to clean, wipe or wash away obvious dirt and then cover the wound to provide protection from further injury and to stop bleeding. Depending on what materials are available, this may require the use of non-medical equipment such as any clean absorbent material (e.g., towels, T-shirts). Use whatever materials you have on hand, and adapt your methods to the situation as long as you meet some basic recommendations.

Dressings, the material used to cover a wound, should be as clean as possible. Sterile dressings are ideal but are not a requirement. Keep dressings free from dirt and debris, and keep the wound as clean as possible. Apply direct pressure, using additional dressing material if necessary.

Once bleeding has stopped, bandage the dressing so the wounded area remains covered. Be careful not to wrap a limb too tightly because this may interfere with circulation. Check circulation by squeezing the nail beds and looking for the pink colour under the nails to return quickly after pressure is released. The nail bed should return to its normal pink colour in 2-3 seconds. In cold conditions, refill may take slightly longer. If colour does not return in a timely manner, loosen the bandage and rewrap.

The dressing material you use should completely cover the wound to include a margin of normal skin beyond the wound. When applying a bandage to an arm or leg, begin wrapping from the farthest point away from the heart. Remove rings or other jewellery that are present in the affected area. Local injury can cause swelling; if rings are still in place, they may cause finger constriction and additional injury.

Special Circumstances

Bandaging Joints

When applying bandages across joints, maintain the area in a comfortable position, and try to keep the joint immobilised to minimise further discomfort or bandage displacement.

Eyes

With eye injuries, it may be necessary to cover the injured eye to minimise pain and to provide comfort. To patch an eye, fold clean gauze over the closed eyelids and then place tape over the eye with anchors at the forehead and cheek. Bandage both eyes to prevent the injured eye from moving with the uninjured eye.

As an alternative, wrap a bandage around the head to hold eye coverings in place.

Impaled Objects

If the injury includes an impaled object, leave the item in place. Secure it with dressings and bandages, and transport the patient to advanced medical care.

Object removal is generally not advised because it may cause additional injury. An exception to this protocol is when the object penetrates the cheek and into the mouth. In this case removal is advised if it will not result in further harm. Objects that have penetrated into the mouth may cause airway obstruction or impede airway management and it is therefore best to remove them. Once the object is removed, apply absorbent material (gauze) to both sides of the wound.

Abdominal Wounds

Abdominal injuries that result in exposure of internal organs are medical emergencies and should prompt immediate activation of EMS. If faced with an abdominal injury in which internal organs are exposed or protruding, do not touch the organ or push it back into the abdominal cavity. Simply cover it with a dressing moistened with sterile or clean drinking water and protect the patient from further harm. Provided the patient has not suffered a spinal injury, you may also flex the patient's knees and hips to relax the abdominal muscles.

Fractures

Bone fractures or breaks often cause considerable pain and may result in limb deformity. Fractures that cause a bone to stick through the skin are referred to as open fractures. Open fractures are at high risk for infections, including bone infections, and should be covered with sterile dressings as soon as possible and the limb should be immobilised. Although such wounds will bleed, avoid applying excessive pressure.

Check the patient's pulse, capillary refill and sensation in the injured limb. Also see if movement of the fingers and toes is possible, and if the victim has normal sensation distal (farthest from the heart) to the injury. Repeat these checks every 15 minutes after you apply the splint to ensure that circulation has not been impaired. Make note of your periodic circulation checks with time and results. Pass these notes on to the health-care providers who take over care of the injured person.

A properly applied splint or cast will secure the injured area and will also immobilise the joints above and below the injury. For example, when splinting a forearm, immobilise both the wrist and elbow.

Apply a splint any time you think it might be helpful, but do not attempt to push bones back into place. Pad the injured area to provide both security and comfort, and prepare to evacuate the patient to the nearest appropriate medical facility.

Splinting

When dealing with bone or joint injuries, a splint will enable immobilisation and pain reduction. If EMS is readily available, protect and stabilise the injury, and wait for help. If you are in a remote location or emergency services are delayed, prepare a splint to prevent movement of the bones or joints that could cause further injury and pain.

NOTE

Splint the injured limb in the position it was found. Do not attempt to straighten a deformed limb.

You can use just about anything to immobilise an injured limb. Commercial splints may be made for a specific purpose, but splint materials can be improvised.

Prior to splint application, remove all jewellery and ensure adequate visualisation of the areas. This may involve cutting away clothing. Apply a splint while keeping the injured limb in the position in which it was found. Do not attempt to straighten or adjust the limb in any way.

Once the splint is in place, continue to monitor circulation and sensation.

CHAPTER 11 REVIEW QUESTIONS

1. **When should you bandage a dressing in place?**
   a. After the bleeding has stopped and continual, direct pressure is no longer necessary
   b. Immediately
   c. After allowing the wound to air out
   d. Never

2. **You should always remove an impaled object**
   a. True
   b. False

3. **When applying a splint, make sure the joints above and below the injury move freely**
   a. True
   b. False

Review answers are on Page 91.

12 Shock Management

CHAPTER 12 OBJECTIVES

1. What is shock?
2. What are some causes of shock?
3. What are the signs and symptoms of shock?
4. What is the first-aid treatment for shock?

What is shock?

Shock is a life-threatening condition resulting from inadequate blood supply to the brain and other vital organs. Clinical signs of shock are expressions of the body's attempt to compensate for reduced circulating blood volume. Increased heart and respiratory rate, peripheral vasoconstriction (narrowing of blood vessels), cold, mottled skin and reduced blood pressure are all compensatory mechanisms or signs of the body's attempt to redirect available blood to vital organs.

Shock requires medical intervention. First-aid providers can serve a vital role by recognising signs of shock, providing first aid and activating emergency services. Without medical assistance, the patient's condition may worsen.

Several kinds and causes of shock

Hypovolemic shock is due to any cause of prolonged or severe fluid loss, including severe bleeding, vomiting, diarrhoea and burns.

Cardiogenic shock is due to inadequate pumping of the heart. This may occur after a heart attack, heart failure or arrhythmia.

Septic shock is due to circulatory insufficiency caused by infection (such as blood poisoning). Severe sepsis can cause systemic vasodilation and cause profound drops in blood pressure.

Anaphylactic shock is caused by a severe allergic reaction. Defined as involving two or more body systems, anaphylactic shock is characterised by swelling, rash and possible airway compromise. It may also involve gastrointestinal symptoms. Common causes include reactions to bee stings, nuts, penicillin and shellfish.

Insulin shock is seen in diabetics who have injected too much insulin and is caused by severe hypoglycaemia (low blood-sugar levels).

Neurogenic shock is caused by damage to the central nervous system. Such injuries may cause systemic vasodilation and insufficient blood pressure to perfuse tissues.

Signs of shock

- pale, cold, clammy skin
- thirst
- anxiety, restlessness, confusion
- nausea and vomiting
- rapid, shallow breathing
- weakness and unconsciousness
- rapid heart rate, weak pulse

NOTE

Although a person in shock may be extremely thirsty, use caution if providing oral fluids. The patient may have an altered mental status and may thus be more prone to aspiration and choking. In general, oral fluid administration is not recommended.

Administration of IV fluids is recommended but can be given only by professional health-care providers.

Treatment of Shock

The principal role of the first responder is to assess for signs of shock and activate EMS. In addition, address underlying causes of shock such as active bleeding. You may also be called upon to assist in the administration of personal medications (such as inhalers, nitroglycerin or epinephrine auto-injectors) or food (in the case of insulin shock).

Rescuers should also do the following:

- Assess if the scene is safe
- Support the airway and breathing
- Keep the victim calm
- Position the victim lying on his back. If neither trauma, spine nor pelvic injury are suspected, consider elevating the legs 15-30 cm. Do not elevate the legs if it causes pain
- Help the victim maintain a normal body temperature. People in shock may become cold. Use isothermal blankets or other materials (such as a sweater or jacket) to protect the victim from excessive heat loss. The rescuer must also prevent the victim from becoming overheated. Strive for a comfortable temperature
- Activate EMS
- Do not give the victim anything by mouth

NOTE

Do not force a person to lie down if he is not comfortable in that position.
People in shock require assessment by medical professionals and may require hospitalisation.

CHAPTER 12 REVIEW QUESTIONS

1. **What is shock?**
   a. A dramatic drop in blood sugar
   b. A life-threatening condition resulting from inadequate blood supply to the brain and vital organs
   c. A feeling of nausea brought on by the rocking motion of a boat

2. **Which of the following is not a type of shock?**
   a. Hypovolemic
   b. Cardiogenic
   c. Cryogenic
   d. Insulin
   e. Anaphylactic

3. **Signs and symptoms of shock include**
   a. pale, clammy skin, thirst
   b. anxiety, restlessness, confusion
   c. rapid, shallow breathing
   d. any of the above

4. **Adding blankets over someone in shock always helps to maintain a normal body temperature**
   a. True
   b. False

5. **Oral fluid administration is recommended in the case of shock**
   a. True
   b. False

6. **Persons in shock should receive prompt medical attention and may need to be hospitalised for further treatment**
   a. True
   b. False

Review answers are on Page 91.

13 Lifting and Moving

CHAPTER 13 OBJECTIVES

1. What are the general considerations for a rescuer when attempting to move a patient?
2. When should a patient be moved?

It is extremely rare that a rescuer would be called upon to move an injured person. In fact, moving a person is strongly discouraged due to the additional injury that is often caused to the patient during the attempt. Leave the person in the position in which he was found.

There are two exceptions to this protocol:

- The person needs to be moved onto his back for CPR
- The person is in imminent danger (e.g., fire, explosives or uncontrolled traffic)

Use discretion when moving a patient and avoid it if at all possible. However, if a situation presents in which a move is absolutely necessary, there are several ways to move someone.

Move the person in an orderly, planned and unhurried fashion to protect both the first aid provider and the patient. Plan ahead, and select the safest and easiest method(s) that involves the least chance of rescuer injury. Remember that rescuer safety comes first. Putting yourself in danger is not recommended.

Armpit-Forearm Drag (Rautek Manoeuver)

To perform the armpit-forearm drag (also known as the Rautek manoeuver), reach under the patient's armpits from behind, and grab his left forearm with your right hand and his right forearm with your left hand. Pull the patient in the direction of the long axis of the body.

Shirt Drag

If the patient is wearing a collared shirt, you can use it to support the patient's head and pull the patient by grabbing the shoulders and collar of the shirt. Support the patient's head at the base of his skull with your fists and pull along the long axis of the body. Be careful not to strangle the patient.

Coat or Blanket Drag

Another effective technique is to use a coat or blanket to drag the patient to safety. To get the patient onto the blanket, you will need to roll him onto his side and then tuck the blanket underneath him. Lay the patient back down and pull the other edge of the blanket out from beneath him. Gather the blanket into place under the patient's head and pull.

Lifts

When lifting, protect yourself and remember important principles of body mechanics, including maintenance of a straight, rigid back and bending at the hips and not at the waist. Keep your head in a neutral position and not flexed forward or extended backward. Use your legs to lift, not your back.

To lift a person off the ground, use a direct ground or an extremity lift. Use these techniques only when there is immediate danger to the patient; none of these techniques allows you to adequately protect the patient's spine in case of an injury to the head, neck or spine. With heavier patients, a long backboard is more effective and minimises potential injury to the victim and rescuer.

A direct ground lift requires two or more rescuers. They should be on the same side of the patient. One rescuer supports the patient's head, neck and lower back. The other rescuer supports the hips and legs.

The extremity lift also requires two rescuers. One rescuer lifts from behind the victim, reaching under the arms and grasping the patient's opposite wrists. The other rescuer lifts at the victim's knees by wrapping his arms around the patient's legs.

CHAPTER 13 REVIEW QUESTIONS

1. **Patient movement should be avoided except to move the person onto his back to perform CPR or when the current location places the victim or rescuer at risk of further injury**
   a. True
   b. False

2. **Body mechanics the rescuer should consider when lifting include**
   a. keep the back straight
   b. bend only from the hips
   c. keep the head neutral
   d. lift with the legs
   e. all of the above

Review answers are on Page 91.

14 Emergency Assistance Plan

CHAPTER 14 OBJECTIVES

1. Why should you have an emergency assistance plan?
2. Where should an emergency assistance plan be kept?
3. What information should be included in an emergency assistance plan?

An emergency assistance plan can be a vital resource when an accident or emergency occurs. It will save valuable time and may also enable others to engage emergency resources with the important details it contains.

Keep this information easily accessible and near emergency equipment, and teach your staff and other personnel what to do and who to call in an emergency.

An example of an emergency assistance plan is provided at the end of this chapter. You can personalise it for your use.

Firs Aid Kits

First aid kits should be appropriate for their intended use. Many first aid kits are available commercially or you can assemble one yourself.

The following items should be included, at a minimum, in a standard first aid kit:

- protective case (waterproof if used in wet environments)
- resuscitation barrier device (face shield or mask)
- examination gloves
- cleansing wipes
- sterile saline for wound irrigation
- bandages
- sterile dressings (various sizes)
- sterile gauzes
- sterile eye pads
- adhesive tape
- scissors (strong enough to cut away clothes)
- triangular bandage
- safety pins
- tweezers
- adhesive dressings (several sizes)

Optional, but recommended, items:

- wound-closure strips (Steri-Strips)
- isothermal blanket
- irrigation syringe
- infectious waste bag
- penlight
- splint to immobilise fractures
- thermometer
- NuMask® or oronasal resuscitation mask
- disposable razor
- first aid manual
- cold and hot compresses
- a list with emergency numbers

Regularly check for items that have been used or have expired and replace them.

Medications and ointments may be helpful but may require input from your doctor to ensure appropriate use. While this list suggests some common over-the-counter medications, first-aid providers are not legally authorised to dispense medications or share their own prescriptions.

Recommended medications include the following:

- antiseptic solution
- eyewash
- hydrocortisone ointment
- antihistamine tablets
- antibiotic ointment
- pain reliever

Home Emergency Plan

When you recognise that an emergency exists, dial:

_____

(Write your area's EMS number above)

The EMS dispatcher will ask you: "What is the emergency?"

Stay on the line, keep calm and follow instructions.

Your street address:

_____

Your phone number: _____

If possible, send someone outside to meet emergency personnel.

ADDITIONAL INFORMATION

National Poison Control Centre
Contact: _____

Family Doctor
Name: _____

Contact: _____

Neighbour
Name: _____

Contact: _____

Family Member
Name: _____

Contact: _____

15 CPR:HCP with First Aid Skills Development

CHAPTER 15 OBJECTIVES

1. **Scene Safety Assessment**
   - List the steps in performing a scene safety assessment
   - Perform a scene safety assessment in a scenario
   - Use appropriate first aid barrier devices in a scenario
2. **Donning and Doffing Gloves**
   - Demonstrate donning of gloves without tearing or compromising glove integrity
   - Demonstrate removal of gloves without contaminating exposed skin
3. **Initial Assessment**
   - Demonstrate the technique for establishing unresponsiveness in an adult or child
   - Demonstrate the technique for establishing unresponsiveness in an infant
   - Demonstrate the technique for determining the presence of a pulse in an adult or child
   - Demonstrate the technique for determining the presence of a pulse in an infant
4. **Recovery Position**
   - Demonstrate rolling a patient from his back into the recovery position, keeping the spine aligned
5. **Adult, Child and Infant Chest Compressions**
   - Demonstrate proper hand positioning for chest compressions on a manikin for both an adult and a child
   - Use proper body mechanics to accomplish chest compressions consistently to a depth of 5 cm on an adult CPR manikin, at a rate of 120 compressions per minute
   - Use proper body mechanics to accomplish chest compressions consistently to one-third the chest depth for a child, using one hand on a CPR manikin (adult or child), at a rate of 120 compressions per minute
   - Demonstrate proper finger/thumb placement for infant chest compressions
   - Use proper body mechanics to accomplish chest compressions consistently to one-third the chest depth on an infant CPR manikin, at a rate of 120 compressions per minute
6. **Rescue Breathing**
   - Demonstrate the proper rescue-breathing technique for an adult and child on a CPR manikin
   - Demonstrate the proper rescue-breathing technique on an infant manikin

7. **Full CPR: Adult, Child and Infant**
   - Perform two minutes of full CPR as a single rescuer on adult and infant CPR manikins, completing at least five cycles of 30:2 compressions/ventilations
   - Perform four minutes of full CPR as a two-person rescue team on an adult CPR manikin, completing at least 10 cycles of 30:2 compressions/ventilations
   - Perform four minutes of full CPR as a two-person rescue team on an infant CPR manikin, completing at least 20 cycles of 15:2 compressions/ventilations
8. **Automatic External Defibrillator (AED)**
   - Demonstrate proper AED pad placement for adults, children and infants on CPR manikins
   - Follow the prompts of an AED training unit to simulate care for a non-breathing patient on an adult CPR manikin
   - Use an AED training unit as part of CPR on an adult CPR manikin
9. **Foreign Body Airway Management**
   - Demonstrate proper management of an obstructed airway in a responsive adult and a responsive infant
10. **Suctioning**
    - Demonstrate the appropriate technique and duration for suctioning on an adult or child manikin and on an infant manikin
11. **Control of External Bleeding**
    - Demonstrate applying direct pressure to control bleeding on a simulated patient
    - Demonstrate bandaging to secure a dressing in place once bleeding has stopped on a simulated patient
12. **Applying a Tourniquet**
    - Demonstrate applying a tourniquet to control bleeding on a simulated patient
13. **Splinting**
    - Apply a splint to a simulated injured limb, immobilising the joints on either side of the injury. Use of either a professional splint or an improvised splint is acceptable
14. **Shock Management**
    - Demonstrate the proper technique for managing shock by placing the victim on his back or in a position of comfort and taking steps to maintain normal body temperature in a scenario
15. **Severe Allergic Reaction or Opioid Overdose**
    - Demonstrate the proper technique for assisting with an epinephrine and/or a naloxone auto-injector in a scenario

Scene Safety Assessment

Objectives

- *List the steps in performing a scene safety assessment*
- *Perform a scene safety assessment in a scenario*
- *Use appropriate first-aid barrier devices in a scenario*

Follow these steps to perform a scene safety assessment.

S-A-F-E

S – Stop

- Stop
- Think
- Act

A – Assess scene

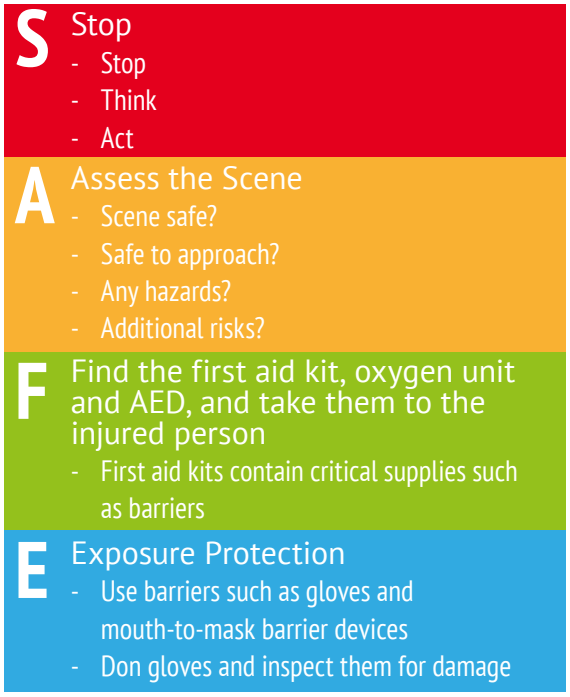
- Is the scene safe?
- Is it safe to approach the injured person?
- Is the ventilation adequate for oxygen?
- Are any other hazards present?

F – Find oxygen unit, first aid kit and AED, and take them to the injured person

- First aid kits contain critical supplies such as barriers

E – Ensure exposure protection

- Use barriers such as gloves and mouth-to-mask barrier devices

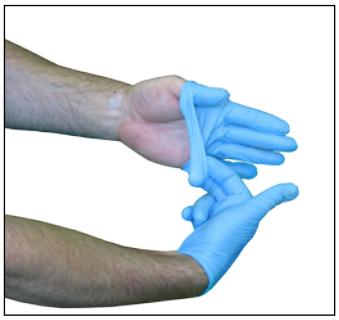


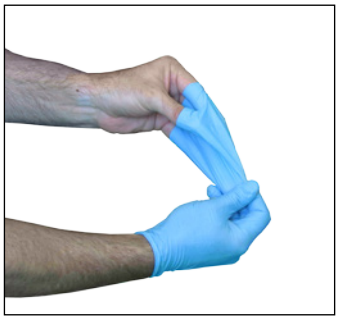
Donning and Doffing Gloves After Use

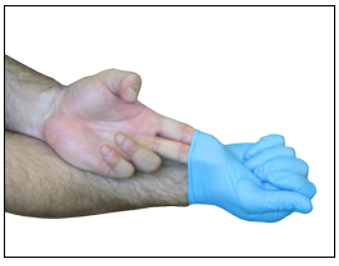
Objectives

- *Demonstrate donning of gloves without tearing or compromising glove integrity*
- *Demonstrate removal of gloves without contaminating exposed skin*

- Before donning gloves, remove rings or jewellery that may tear the gloves during use
- To doff gloves, grasp the first glove at the outside of the wrist and pull the glove toward the fingers of that hand
- Turn the glove inside out
- Use your protected hand to crumple the glove into a ball (making a fist with the gloved hand)
- When the removed glove is in the palm of the still-protected hand (fist), place an "unprotected" finger inside the second glove (between wrist and glove) and pull the glove toward the fingers as before
- This glove will also turn inside out and the first glove will be inside the second
- Avoid touching the outside of the glove with your unprotected hand as you remove it
- Place the gloves in a hazardous waste bag to avoid others having contact with the gloves
  - This bag can also be used for the disposal of all other infected materials after use







Initial Assessment

Objectives

- *Demonstrate the technique for establishing unresponsiveness in an adult or child*
- *Demonstrate the technique for establishing unresponsiveness in an infant*
- *Demonstrate the technique for determining the presence of a pulse in an adult or child*
- *Demonstrate the technique for determining the presence of a pulse in an infant*

Remember S-A-F-E.

Assess responsiveness

- State your name, training and desire to help
- Ask permission to help
- Tap the adult or child on the shoulder and say or shout, "Are you all right?"
  - Tap or rub the bottom of the feet for an infant and watch for a response

If the adult or child responds

- Have him remain where he is unless urgent evacuation is necessary to avoid further danger
- Try to find out what is wrong and get help if needed
- Reassess regularly

If the infant responds, move the infant to safety if required and continue to monitor for changes.

If the adult or child patient does not respond

- Shout for help or call EMS
- Turn the patient on his back
- Check for a pulse and normal breathing
  - To take a carotid pulse, place the tips of your index and middle fingers on the victim's "Adam's apple," then slide your fingers toward you and slightly upward into the groove between the muscles of the neck. Apply gentle pressure. Adjust the position of your fingers slightly if necessary to access the pulse. Check for at least five seconds but no more than 10 seconds. Normal adult pulse rates are between 60 and 100 beats per minute, and may be lower in athletes
- If the patient does not have a pulse or is not breathing normally, send someone for help. If you are on your own, leave him and alert EMS, then return and start CPR, beginning with chest compressions

If the infant patient does not respond

- Check the infant for a pulse
  - To check the pulse of an infant, place the tips of your index and middle fingers on the infant's inner arm, just under the armpit and in the groove formed by the muscles of the arm. Use gentle pressure, adjusting as may be required to find a pulse if present. Check for at least five seconds but no more than 10 seconds
- If a pulse is not present, conduct CPR for two minutes, then go call for help

Recovery Position

Objective

- *Demonstrate rolling a patient from his back into the recovery position, keeping the spine aligned*

- Kneel beside the patient and place the arm nearest to you at right angles to the patient's body, with the elbow bent and palm facing upward
- Bring the far arm across the chest and hold the back of the hand against the patient's cheek nearest to you
- Place your other hand under the leg just above the knee, or grab the pant leg of the victim's clothing, and pull the knee up, keeping the foot on the ground
- Keeping the hand pressed against the cheek, pull the far leg at the knee to roll the patient toward you and onto his side
- Adjust the top leg to form 90-degree angles at both the hip and knee
- Tilt back the head to ensure the airway remains open
- Adjust the hand under the cheek, if necessary, to keep the head tilted
- Check breathing regularly

Adult, Child and Infant Chest Compressions for CPR

C irculation

A irway

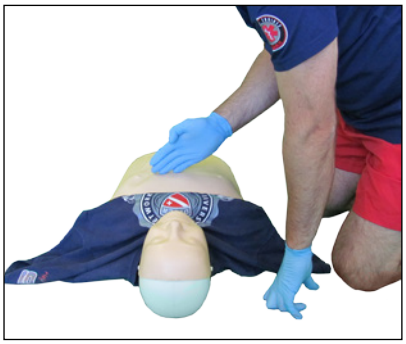
B reathing

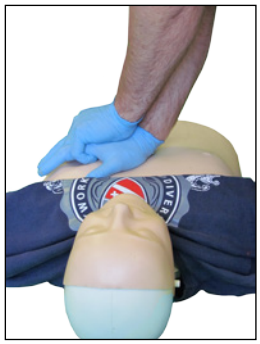
Objectives

- *Demonstrate proper hand positioning for chest compressions on a manikin for both an adult and a child*
- *Use proper body mechanics to accomplish chest compressions consistently to a depth of 5-6 cm on an adult CPR manikin, at a rate of 120 compressions per minute*
- *Use proper body mechanics to accomplish chest compressions consistently to one-third the chest depth for a child using one hand on a CPR manikin (adult or child), at a rate of 120 compressions per minute*
- *Demonstrate proper finger/thumb placement for infant chest compressions*
- *Use proper body mechanics to accomplish chest compressions consistently to one-third the chest depth on an infant CPR manikin, at a rate of 120 compressions per minute*

Chest Compressions: Adult and Child

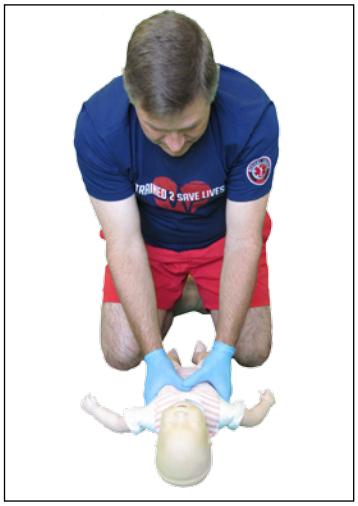
- Kneel by the patient's side
- Place the heel of one hand in the centre of the chest, between the nipples
- For adult patients, place the heel of your other hand on top of the first hand
- Interlock the fingers of your hands. Do not apply pressure on the bottom end of the sternum (breastbone) or the upper abdomen
- Position yourself vertically above the chest, with your arms straight and shoulders directly above your elbows and hands. Using your hips as a pivot point and the weight of your whole body, forcefully but smoothly press down on the lower half of the sternum to a depth of 5-6 cm for an adult, 5 cm for a child
- After each compression, release all the pressure on the chest without losing contact with the chest wall. Repeat at a rate of 120 per minute
- Compression and release should take the same amount of time
- For children, use only one hand if the size of the child permits



Chest Compressions: Infants (Single Rescuer)

- Position yourself at the infant's side
- Place two fingers side by side in the centre of the infant's chest, perpendicular to the nipple line
- Using vertical force from your shoulder through your fingertips, compress the chest one-third the depth of the infant's chest
- After each compression, release all the pressure on the chest without losing contact between your fingers and the sternum. Repeat at a rate of 120 per minute
- Compression and release should take the same amount of time



Chest Compressions: Infants (Two Rescuers)

- Position yourself at the infant's feet
- Circle the infant's chest with both hands, placing your thumbs in the centre of the chest, at the nipple line. Thumbs may be side by side or stacked on top of each other. Use your fingers to support the infant's back
- Squeeze the infant's chest, compressing it to one-third the depth of the chest, being careful to not squeeze the sides of the chest wall
- After each compression, release all the pressure on the chest without losing contact between your thumbs and the sternum. Repeat at a rate of 120 per minute
- Compression and release should take equal amounts of time

Rescue Breathing

Objectives

- *Demonstrate the proper rescue breathing technique for an adult and child on a CPR manikin*
- *Demonstrate the proper rescue breathing technique on an infant manikin*

Rescue Breathing for Adults and Children

- Remain at the victim's side
- Place the face shield or resuscitation mask on the patient's face, using the bridge of the nose as a guide for correct positioning
- Seal the mask by placing your index finger and thumb along the border of the mask. Use the hand closest to the top of the patient's head
- Use the thumb and first finger of the other hand to pinch the lower border of the mask to the chin (other techniques are acceptable but avoid pressing on the soft tissue of the throat under the chin)
- Press firmly and completely around the outside margin of the mask to form a tight seal
- Tip the head back so the chin is pointing up

- Seal your lips around the one-way valve and blow through it for one second. Watch the chest rise
- Take your mouth away from the mask and watch for the chest to fall as the breath is exhaled
- Deliver a second breath as before
- If rescue breaths do not make the chest rise
  - Reposition the head and reattempt to ventilate
  - Check the patient's mouth and remove any obstruction
  - Do not attempt more than two breaths each time before returning to chest compressions
  - When in doubt, ventilate less, not more

Rescue Breaths for Infants

- When using an oronasal mask on an infant, place the mask on the infant's face so the narrow portion of the mask covers the chin (placement is 180 degrees from placement on an adult)
- Seal the mask tightly with downward pressure along all edges and gently tipping back the infant's head. Avoid overextending the head and collapsing the airway
  - For infant rescue breaths, use of an oronasal mask is optional. When using mouth-to-mouth resuscitation on an infant, it may be necessary to cover both the mouth and nose
- Use gentle puffs of air from your cheeks to ventilate an infant
- Allow the chest to fall with the exhale before ventilating again

Full CPR: Adult, Child, and Infant

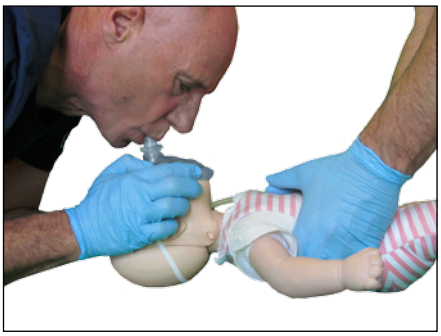
Objectives

- *Perform two minutes of full CPR as a single rescuer on adult and infant CPR manikins, completing at least five cycles of 30:2 compressions/ventilations*
- *Perform four minutes of full CPR as a two-person rescue team on an adult CPR manikin, completing at least 10 cycles of 30:2 compressions/ventilations*
- *Perform four minutes of full CPR as a two-person rescue team on an infant CPR manikin, completing at least 20 cycles of 15:2 compressions/ventilations*

Full CPR: Adult

- Using the compression and ventilation techniques from the previous skills sections, deliver chest compressions at a rate of 120 per minute followed by ventilations, using a ratio of 30:2, as a single rescuer for a minimum of five cycles/ two minutes
- Using the compression and ventilation techniques from the previous skills sections, deliver chest compressions at a rate of 120 per minute followed by ventilations, using a ratio of 30:2, as a two-rescuer team for two minutes
- Switch roles and continue for an additional two minutes of CPR

Full CPR: Infant



- Using the compression and ventilation techniques from the previous skills sections, deliver chest compressions at a rate of 120 per minute followed by ventilations, using a ratio of 30:2, as a single rescuer for a minimum of two minutes
- Using the compression and ventilation techniques from the previous skills sections, deliver chest compressions at a rate of 120 per minute followed by ventilations, using a ratio of 15:2, as a two-rescuer team for two minutes
- Switch roles and continue for an additional two minutes of CPR

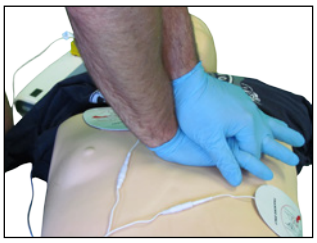
Victim	One Rescuer	Two Rescuers	How to Compress	Depth
Adult	30:2 ratio	30:2 ratio	Two hands stacked	5-6 cm
Child	30:2 ratio	15:2 ratio	Heel of one hand or two hands stacked	5 cm or 1/3 chest depth
Infant	30:2 ratio	15:2 ratio	Two or three fingers (one rescuer); two thumbs (two rescuers)	3.5 cm or 1/3 chest depth

NOTE: 120 compressions per minute is optimal

Automated External Defibrillator (AED)

Objectives

- *Demonstrate proper AED pad placement for adults, children and infants on CPR manikins*
- *Follow the prompts of an AED training unit to simulate care for a non-breathing patient on an adult CPR manikin*
- *Use an AED training unit as part of CPR on an adult CPR manikin*



Remember S-A-F-E.

If the person is unresponsive

- Shout for help or call EMS

If the person is not breathing normally

- Send someone for an AED or go for one yourself
- Perform CPR 30:2 until the AED is attached
- Turn on the AED and follow the prompts
- Attach the defibrillator pads to the victim and plug the cord into the AED, following the prompts of the specific unit in use
  - For adults and children, place the pads on the upper-right chest wall, below the shoulder and on the lower-left chest, extending onto the lateral surface
  - For infants, place the pads on the centre of the chest and on the centre of the back

NOTE

If paediatric AED pads are not available, it is OK to use adult pads.

- Allow the AED to analyse the heart rhythm
- Do not touch the victim during this analysis

If shock is required, follow the AED unit's prompts.

- Visually and physically clear the victim
- State: "I'm clear, you're clear, all clear."
- Administer shock
- Immediately resume CPR beginning with compressions. Continue CPR for two minutes

If no shock is required, resume CPR until the victim starts to breathe normally or EMS arrives.

Do not turn off the AED or remove the pads. The AED will reanalyse the victim's status every two minutes.

Foreign-Body Airway Obstruction

Objective

- *Demonstrate proper management of an obstructed airway in a responsive adult and a responsive infant*

In the case of a mild airway obstruction, encourage the choking victim to cough, but do nothing else.

If the victim shows signs of a severe airway obstruction and is conscious, perform abdominal thrusts.

- Stand behind the victim and put both arms around the upper part of the abdomen
- With one hand, locate the victim's navel
- Clench your other hand into a fist and place it just above your first hand between the navel and bottom tip of the sternum, with the thumb end of your fist against the choking victim's abdomen
- Grasp your fist with your other hand, and pull sharply inward and upward
- Repeat until the object is expelled or the victim loses consciousness

If the victim at any time becomes unconscious

- Carefully lower the victim to the ground
- Activate EMS
- Begin CPR (chest compressions followed by rescue breaths)
- Look in the mouth for obstruction prior to giving rescue breaths

Obstructed Airway in Infants

- Hold the infant face down on your lower arm, with your hand supporting the infant's head and the infant's legs straddling your arm. The infant's head should be lower than the body
  - Use your thigh to help support your arm with the infant, if desired
- Deliver five back blows between the infant's shoulder blades
- Place your other forearm over the infant along his back, cupping his head with your hand, "sandwiching" the infant between your arms
- Turn over the infant and quickly check for the obstruction. If visible, remove with a finger sweep
- If the obstruction is not visible, deliver five chest compressions using the same technique as for infant CPR
- Check for the obstruction. If visible, remove with a finger sweep
- If not visible, use the above technique to turn over the infant and deliver five back blows

Suctioning

Objective

- *Demonstrate the appropriate technique and duration for suctioning on an adult or child manikin and on an infant manikin*

When fluids or soft solids are present in the upper airway, suctioning may aid in clearing the airway so effective rescue breaths can be accomplished.

Suctioning an Adult or Child Airway (Using a Size-appropriate, Rigid Suction Catheter)

- Place the victim on his side
- Estimate the distance from the front of his mouth to his throat
  - Use your fingers to measure from the corner of his mouth to his ear lobe
  - Transfer the distance to the catheter. This is the maximum allowable distance for insertion
- Use a cross-finger technique to open the victim's mouth if needed
  - Using one hand, place one or more fingers on the front teeth of one jaw and the thumb on the front teeth of the other jaw
  - Push the teeth apart with a scissor-like action
  - Use this method to hold open the mouth while suctioning
- Insert the suction tip along the roof of the mouth to the back of the mouth and top of the throat
  - Do not insert the suction tip any farther than previously estimated
- Activate suctioning mechanism
  - Limit suctioning to no more than 15 seconds
- Visually inspect the mouth and airway for visible obstructions
  - Remove visible obstructions with a gloved finger or repeat suctioning
- Attempt to ventilate the victim

Suctioning an Infant

- Open the infant's mouth using a similar technique as used for adults and children, or use a jaw thrust as with two-person infant CPR
- Depress the suction bulb before inserting it in the infant's mouth
  - Suction the mouth and then nose
  - Limit suctioning to no more than five seconds
- Remove the suction bulb from the mouth or nose and depress it away from the infant to clear it
- Visually inspect the mouth and airway for visible obstructions
  - Remove any visible obstructions with gloved finger or repeat suctioning
- Attempt to ventilate the infant

Control of External Bleeding

Objectives

- *Demonstrate applying direct pressure to control bleeding on a simulated patient*
- *Demonstrate bandaging to secure a dressing in place once bleeding has stopped on a simulated patient*

To control bleeding, do the following:

- Cover the wound completely with a sterile or clean dressing and apply firm, direct pressure with your gloved hand until the bleeding stops. Use additional layers of dressing if the dressing becomes soaked. Do not remove any layers of dressing materials because it may disrupt the body's clotting mechanism
- Once bleeding has stopped, use a conforming bandage, roller gauze or tape to secure the dressing and make sure there are no loose edges
- Remove all jewellery or constricting clothing from the injured appendage
- Be careful not to interfere with circulation
  - Check capillary refill on appendage nail beds to ensure adequate circulation
  - Ask the patient if any tingling or numbness is present
  - Adjust bandage if necessary to ensure circulation
- Monitor the patient's pulse and motor function distal to the bandage before and after bandage application

NOTE

- Bandage small wounds several centimetres on either side to ensure coverage and even pressure distribution
- To bandage across a joint, apply the bandage in a comfortable position
- Keep the joint immobilised after bandage application

Applying a Tourniquet

Objective

- *Demonstrate applying a tourniquet to control bleeding on a simulated patient*

To apply a tourniquet, do the following:

- Inspect the wound to ensure direct pressure was being applied to the site of the bleeding. If not, attempt direct pressure once more
- Wrap the tourniquet 2.5-5 cm proximal to the wound
- Secure the tourniquet
- Turn the windlass device to stop bleeding
- Verify absence of pulse in the distal portion of the extremity
- Secure the windlass
- Note on the victim's forehead use of a tourniquet and time of placement
- Leave a tourniquet used in an actual injury in place until the victim is under medical care

CRITICAL NOTE

*When applying a tourniquet as part of skills practice for course requirements, the tourniquet does not need to be tightened to the point of distal pulse absence. **For safety and to prevent localised injury, do not tighten a tourniquet during practice beyond the point where your practice partner starts to feel changes in sensation. ***

Splinting

Objective

- *Apply a splint to a simulated injured limb, immobilising the joints on either side of the injury. Use of either a professional splint or an improvised splint is acceptable*

- Apply the splint, keeping the injured limb in the position it was found. Do not attempt to straighten it
- Place splinting material either along or on each side of the injured limb. Place splint so the joints both above and below the site of injury are immobilised
- Use padding (gauze, towels, clothing, etc.) to fill in voids under the splint and to provide additional support to the injured limb
- After the splint is in place, check circulation by squeezing the nail beds and looking for the pink colour under the nails to return quickly after pressure is released. If colour does not return in three seconds or less, loosen the bandage and rewrap
- Continually reassess the patient and monitor for signs of shock
- Activate EMS if not already done

Shock Management

Objective

- *Demonstrate the proper technique for managing shock by placing the victim on his back or in a position of comfort and taking steps to maintain normal body temperature in a scenario*

- Assess scene safety
- Support the airway and breathing if indicated
- Activate EMS
- Control external bleeding if present
- Provide comfort and reassurance
- Place the victim in a position of comfort or on his back
- Protect the victim from cold or heat; maintain normal body temperature
- Monitor the victim's level of responsiveness

NOTE

- *Use extreme caution if providing fluids to someone in suspected shock. If in doubt, refrain from providing oral fluids and activate EMS*
- *Do not force a person (especially someone with a heart or breathing problem) to lie down. Place him in the most comfortable (sitting) position*
- *Do not elevate his legs if it will make another injury worse*

Severe Allergic Reaction or Opioid Overdose

Objective

- *Demonstrate the proper technique for assisting with an epinephrine and/or a naloxone auto-injector in a scenario*

1. Ensure the patient's airway and breathing
2. Assist in the delivery of allergy medications such as antihistamines or an EpiPen® or Twinject® (epinephrine) that are carried by the injured person. Such medication should be administered only if it is prescribed for the individual having the reaction. If using a naloxone auto-injector, follow the prompts provided by the unit. A prescription is not necessary to administer naloxone
3. Activate EMS
4. Monitor the patient's response and administer a second dose if indicated

16 Summary

Prompt action is always important with any sudden illness or injury. However, remember to protect yourself and any other rescuers by completing a scene safety assessment before rendering aid. Using protective barriers is another critical step to rescuer safety.

Life-threatening conditions are the first priority of care. Circulation, airway and breathing are the initial steps for an unresponsive, non-breathing individual. For drowning victims, alter the sequence to airway, breathing and circulation. Use of an AED, if available, can increase the chances of survival for someone in cardiac arrest. Clearing an obstructed airway, controlling severe bleeding and managing shock can also be critical elements of first aid care.

Keep yourself prepared by reviewing CPR guidelines and practising bandaging skills. Finally, refresh your skills by regularly reviewing this handbook and recertifying as a CPR:HCP with First Aid provider every two years.

Glossary

acute – rapid onset or short-term duration

adaptic gauze – non-adhering dressing

agonal breathing – an abnormal pattern of breathing characterised by gasping, laboured breathing, accompanied by strange vocalisations and involuntary muscle twitching

ambient – surrounding on all sides

arrhythmia – a problem with the rate or rhythm of the heartbeat

aspiration – inhaling fluid or a foreign body into the bronchi and lungs, often after vomiting

asymptomatic – without symptoms

blood-borne pathogens – infectious microorganisms in human blood that can cause disease in humans

cardiopulmonary resuscitation (CPR) – an emergency procedure that is performed in an effort to manually preserve intact brain function until further measures are taken to restore spontaneous blood circulation and breathing in a person in cardiac arrest

defibrillation – a therapeutic dose of electrical energy to the affected heart with a device called a defibrillator, which depolarises a critical mass of the heart muscle, terminates the arrhythmia and allows normal sinus rhythm to be re-established by the body's natural pacemaker

distal – away from the centre of the body

hyperoxia – excess oxygen or higher than normal partial pressure of oxygen

hypovolemic – a state of decreased blood volume

hypoxia – inadequate oxygen content

oronasal – pertaining to the mouth and nose

peripheral – related to or located in the outer boundary of the body

proximal – nearer to the centre of the body

regurgitation – expulsion of material from the mouth, pharynx or oesophagus, usually characterised by the presence of undigested food or blood; vomiting

resuscitation – to revive from apparent death or from unconsciousness

sublingual – under the tongue

symptomatic – showing symptoms

ventricular fibrillation (VF) – a condition in which there is unco-ordinated contraction of the ventricles' cardiac muscles, making them quiver rather than contract properly

References

1. AMERICAN HEART ASSOCIATION. (2015) 2015 American Heart Association Guidelines Update for Cardiopulmonary resuscitation and Emergency cardiovascular Care. *Circulation* 2015 Nov, 132 (18), suppl 2.

2. WORLD HEALTH ORGANIZATION. *Cardiovascular Diseases.* Available from: http://www.who.int/mediacentre/factsheets/fs317/en/index.html.

3. AMERICAN HEART ASSOCIATION. (2015) 2015 American Heart Association Guidelines Update for Cardiopulmonary resuscitation and Emergency cardiovascular Care. *Circulation* 2015 Nov, 132 (18), suppl 2.

4. LASKOWSKI, E.R. MAYO CLINIC (2015) *What's a normal resting heart rate?* Available from: http://www.mayoclinic.com/health/heart-rate/AN01906.

5. WORLD HEALTH ORGANISATION. *Hepatitis B.* Available from: http://www.who.int/mediacentre/factsheets/fs204/en/index.html.

6. WORLD HEALTH ORGANISATION. *Hepatitis C.* Available from: http://www.who.int/csr/disease/hepatitis/whocdscsrlyo2003/en/index.html.

7. U.S. NATIONAL LIBRARY OF MEDICINE, NATIONAL INSTITUTES OF HEALTH. *Hepatitis C.* http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001329/

8. WORLD HEALTH ORGANISATION. *HIV/AIDS.* Available from: www.who.int/mediacentre/factsheets/fs360/en/.

9. LARSEN, M.P. et al. (1993) Predicting survival from out-of-hospital cardiac arrest: a graphic model. *Annals of Emergency Medicine.* 22 (11). p.1652-1658.

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NOTES:

NOTES:

Home Emergency Plan

When you recognise that an emergency exists, dial:

_____

(Write your area's EMS number above.)

The EMS dispatcher will ask you: "What is the emergency?"

Stay on the line, keep calm and follow instructions.

Your street address:

_____

Your phone number: _____

If possible, send someone outside to meet emergency personnel.

ADDITIONAL INFORMATION

National Poison Control Centre
Contact: _____

Family Doctor
Name: _____

Contact: _____

Neighbour
Name: _____

Contact: _____

Family Member
Name: _____

Contact: _____

Divers Alert Network Southern Africa

Divers Alert Network Southern Africa (DAN-SA) is an international, nonprofit organisation dedicated to improving dive safety through research, education, medical information, evacuation support, products and services.

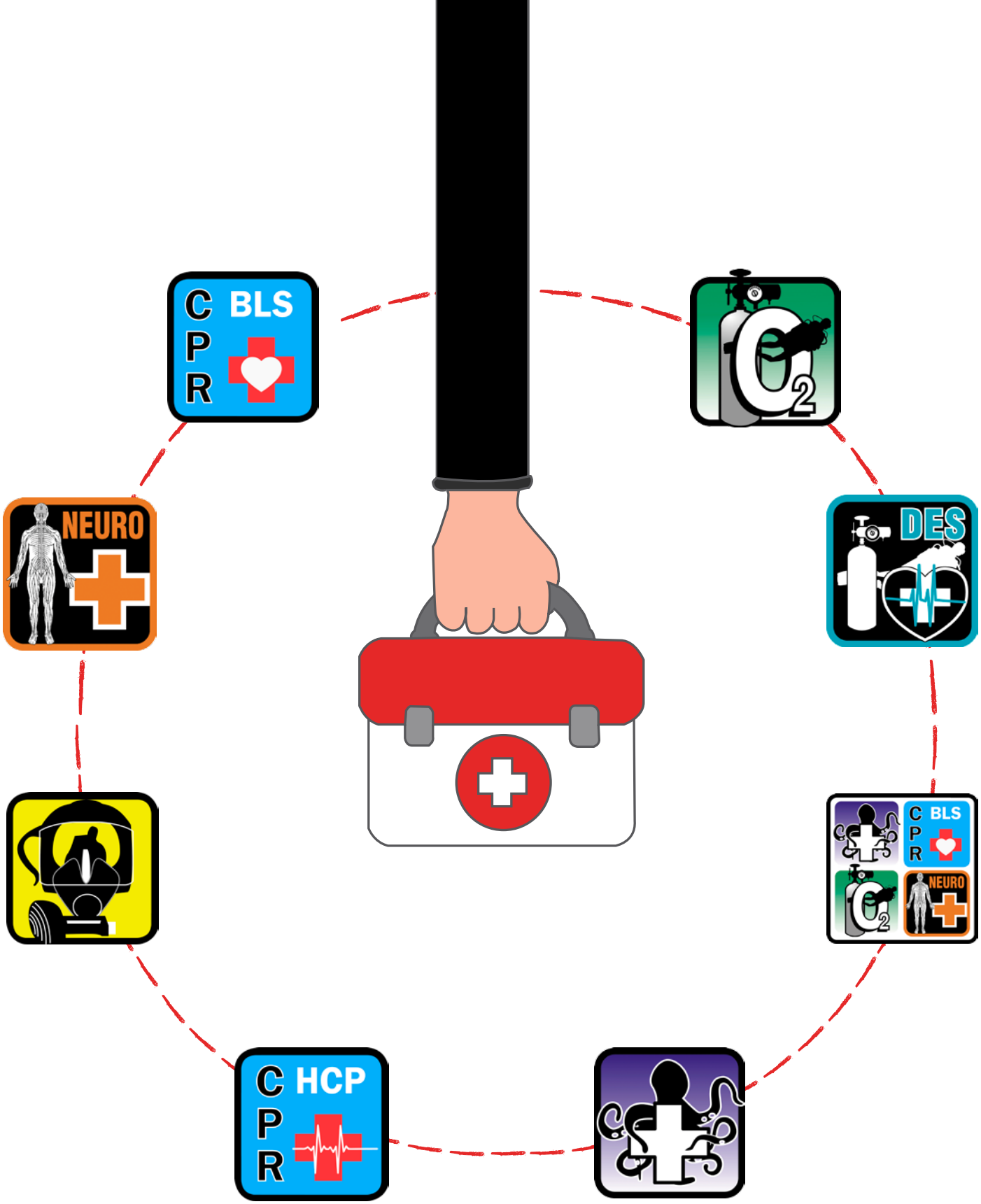
Among the services DAN-SA provides to the diving public is the DAN Emergency Hotline (0800 020 111 (local) or +27 828 10 60 10 (int.)). This hotline is available 24 hours a day, seven days a week for anyone who suspects a diving injury, requires assistance or needs to activate your ***DAN evacuation benefits*** (an exclusive benefit of DAN membership). Callers are connected directly with a member of DAN's Medical Services department, who can facilitate medical consultation with dive medicine specialists and co-ordinate evacuation to ensure appropriate care.

DAN-SA's non-emergency safety resources include the DAN Medical Information Line DAN-SA (0800 020 111 (local) or +27 828 10 60 10 (int.)), the online Health & Diving libary (http://dansa.org/dan-resources.htm) and ***Alert Diver*** magazine, the DAN Shop, the DAN-SA Podcast, a blog and more.

Membership dues and dive cover support DAN's nonprofit efforts. DAN members enjoy benefits such as access to the DAN Dive Accident Cover, medical evacuation support, access to the electronic *Alert Diver* magazine, safety guides and more.

Your participation in this DAN training course demonstrates your commitment to dive safety. Continue your education and your commitment by supporting **the industry's only organisation dedicated solely to improving dive safety**. Join DAN today.

To learn more about DAN and the multitude of resources it provides, or to become a member, please visit dansa.org.



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