



SECTION 5

Trauma

14 Bleeding, Shock, and Soft-Tissue Injuries

15 Injuries to Muscles and Bones

Bleeding, Shock, and Soft-Tissue Injuries

National EMS Education Standard Competencies

Pathophysiology

Uses simple knowledge of shock and respiratory compromise to respond to life threats.

Shock and Resuscitation

Uses assessment information to recognize shock, respiratory failure or arrest, and cardiac arrest based on assessment findings and manages the emergency while awaiting additional emergency response.

Trauma

Uses simple knowledge to recognize and manage life threats based on assessment findings for an acutely injured patient while awaiting additional emergency medical response.

Bleeding

Recognition and management of

- › Bleeding (pp 276–282)

Head, Facial, Neck, and Spine Trauma

Recognition and management of

- › Life threats (pp 288–290)

Chest Trauma

Recognition and management of

- › Blunt versus penetrating mechanisms (pp 289–290)
- › Open chest wound (pp 289–290)
- › Impaled object (p 290)

Abdominal and Genitourinary Trauma

Recognition and management of

- › Blunt versus penetrating mechanisms (pp 291–293)
- › Evisceration (p 291)
- › Impaled object (p 290)

Soft-Tissue Trauma

Recognition and management of

- › Wounds (pp 282–286; pp 288–293)
- › Burns (pp 293–297)
 - Electrical (pp 296–297)
 - Chemical (p 296)
 - Thermal (p 295)
- › Chemicals in the eye and on the skin (p 296)

Multi-System Trauma

Recognition and management of

- › Multi-system trauma (p 297)

Medicine

Recognizes and manages life threats based on assessment findings of a patient with a medical emergency while awaiting additional emergency response.

Immunology

Recognition and management of shock and difficulty breathing related to

- › Anaphylactic reactions (p 273; pp 275–276)

Diseases of the Eyes, Ears, Nose, and Throat

Recognition and management of

- › Nosebleed (p 288)

Knowledge Objectives

1. Describe the function and relationship among the following parts of the circulatory system:
 - Pump (heart) (p 271)
 - Pipes (blood vessels) (p 271)
 - Fluid (blood) (p 271)
2. Describe how and where to locate a patient's pulse. (pp 271–272)
3. Explain how shock is caused by pump failure, pipe failure, and fluid loss. (pp 272–273)
4. List three types of shock caused by pipe failure. (p 273)
5. List signs and symptoms of shock. (p 273)
6. Describe the general treatment for shock. (pp 273–274)
7. Describe the treatment for shock caused by pump failure. (p 275)
8. Describe the treatment for shock caused by pipe failure. (pp 275–276)
9. Describe the treatment for shock caused by fluid loss. (p 276)
10. Explain how to control external blood loss. (pp 276–281)
11. Describe the indications for use of a tourniquet. (p 278)
12. Describe how to use the femoral and brachial artery pressure points to control bleeding. (pp 279–281)
13. List the four types of soft-tissue injuries. (pp 282–284)

14. Discuss the treatment of avulsions and amputations. (pp 283–284)
15. Describe the principles of treatment for open soft-tissue injuries. (p 283)
16. Explain the functions of dressings and bandages. (pp 284–285)
17. Explain the relationship between standard precautions and soft-tissue injuries. (p 286)
18. Discuss the emergency medical care for patients with the following injuries:
 - Face and scalp wounds (p 288)
 - Nosebleeds (p 288)
 - Eye injuries (pp 288–289)
 - Neck wounds (p 289)
 - Chest and back wounds (pp 289–290)
 - Impaled objects (p 290)
 - Closed abdominal wounds (p 291)
 - Open abdominal wounds (pp 291–292)
 - Genital wounds (p 292)
 - Extremity wounds (p 292)
 - Gunshot wounds (pp 292–293)
 - Bites (p 293)
19. Describe how the seriousness of a burn is related to the depth of the burn. (p 293)
20. Describe how the seriousness of a burn is related to the extent of the burn. (p 294)
21. Describe the signs, symptoms, possible complications, and treatment associated with each of the following types of burns:
 - Thermal (p 295)
 - Respiratory (p 295)
 - Chemical (p 296)
 - Electrical (p 296)
22. Explain the concept of multi-system trauma and how it affects your patient assessment and treatment. (p 297)

Skills Objectives

1. Demonstrate how and where to locate a patient's pulse. (pp 271–272)
2. Demonstrate the general treatment for shock. (pp 274–275)
3. Demonstrate the treatment for shock caused by pump failure. (p 275)
4. Demonstrate the treatment for shock caused by pipe failure. (pp 275–276)
5. Demonstrate the treatment for shock caused by fluid loss. (p 276)
6. Demonstrate how to use the femoral and brachial pressure points to control blood loss. (pp 279–281)
7. Demonstrate treatment of avulsions and amputations. (pp 283–284)
8. Demonstrate treatment of soft-tissue injuries. (pp 283–286)
9. Demonstrate the emergency medical care for patients with the following injuries:
 - Face and scalp wounds (p 288)
 - Nosebleeds (p 288)
 - Eye injuries (pp 288–289)
 - Neck wounds (p 289)
 - Chest and back wounds (pp 289–290)
 - Impaled objects (p 290)
 - Closed abdominal wounds (p 291)
 - Open abdominal wounds (pp 291–292)
 - Genital wounds (p 292)
 - Extremity wounds (p 292)
 - Gunshot wounds (pp 292–293)
 - Bites (p 293)
10. Demonstrate treatment of the following types of burns:
 - Thermal (p 295)
 - Respiratory (p 295)
 - Chemical (p 296)
 - Electrical (p 296)

Introduction

This chapter presents the skills you need to recognize and care for patients who are experiencing shock, are bleeding, or have soft-tissue injuries. Because most soft-tissue injuries result in bleeding, maintaining good standard precautions is important when you are caring for patients with these types of injuries. The chapter describes four types of soft-tissue wounds: abrasions, lacerations, punctures, and avulsions. Techniques for controlling external bleeding are discussed, and you will learn the various techniques for dressing and bandaging wounds.

Damage to internal soft tissues and organs can cause life-threatening conditions. Internal bleeding

causes blood loss in the circulatory system and results in shock. **Shock** is a state of collapse of the cardiovascular system that results in inadequate delivery of blood to the organs. More trauma patients die from shock than from any other condition. Your ability to recognize the signs and symptoms of shock and to take simple measures to aid shock patients will give them the best chance for survival. This chapter explains the causes and types of shock using an analogy of a pump, pipes, and fluid. You will learn how the failure of any part of the system can cause shock.

Burns are another type of soft-tissue injury. Burns may be caused by heat, chemicals, or electricity. They may damage any part of the body and are especially

harmful if they occur inside the respiratory tract. This chapter examines the extent, depth, and cause of burns.

As you study this chapter, keep in mind the importance of maintaining standard precautions to prevent the spread of disease-carrying organisms.

■ Patient Assessment for Bleeding, Shock, and Soft-Tissue Injuries

It is important to follow the steps of the patient assessment sequence described in Chapter 9, *Patient Assessment*, when caring for patients who are bleeding, are in shock, or have soft-tissue injuries. Your scene size-up needs to include all the steps you learned previously to ensure safety for you and your patient. When performing the primary assessment, you may need to temporarily halt the assessment if the patient is losing a significant amount of blood. However, once you have managed this problem, you should immediately return to completing the assessment sequence, performing all the remaining steps to ensure no problems or injuries are overlooked.

During your secondary assessment, be alert for any signs and symptoms of shock from internal or external blood loss. When obtaining a SAMPLE history, ask the patient whether he or she is using a blood thinner, which may interfere with blood clotting. When performing a reassessment, watch the patient for signs and symptoms of shock such as pale skin, increasing pulse rate, or decreasing blood pressure.

For trauma patients, you will usually perform the secondary assessment before you obtain the SAMPLE history. Review the patient assessment sequence shown in **Figure 14-1**.

Safety

Most soft-tissue injuries involve some degree of bleeding. Always maintain standard precautions when you approach a patient with a potential soft-tissue injury.

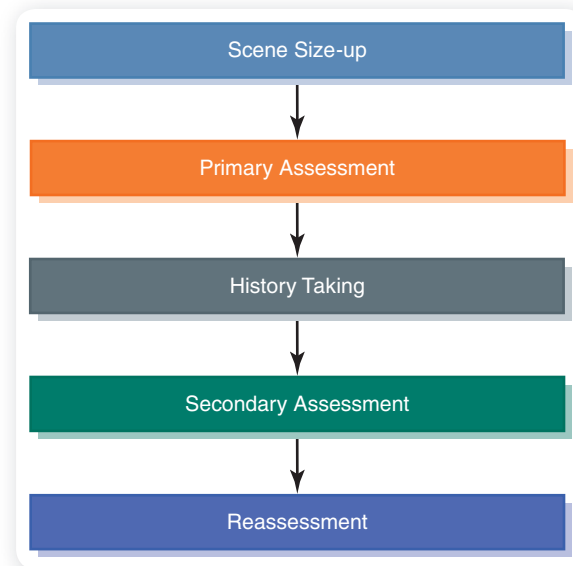


Figure 14-1 Patient assessment sequence. For trauma patients, you may perform the secondary assessment before obtaining a SAMPLE history.

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■ Standard Precautions and Soft-Tissue Injuries

The concept of standard precautions assumes all body fluids are potentially infectious. Therefore, take appropriate measures to prevent contact with the patient's body fluids. Wear gloves to prevent contact with the patient's blood when caring for patients who have soft-tissue injuries. At times, you may also need to wear a surgical mask and eye protection if there is danger of blood splatter from a massive wound or if the patient is coughing or vomiting bloody material.

■ Parts and Function of the Circulatory System

The three parts of the circulatory system are the pump (heart), the pipes (arteries, veins, and capillaries), and the fluid (blood cells and other blood components).

Figure 14-2 presents a schematic illustration of the circulatory system.

YOU are the Provider

CASE 1

On a crisp autumn day, you are dispatched for a report of an injured carpenter at the site of a new house under construction. As you are responding, the dispatcher informs you that your patient is a 38-year-old man who has cut his leg with a circular saw. He is "actively bleeding" from the wound.

1. What safety considerations should you keep in mind as you approach this situation?
2. What equipment and supplies do you want to take with you?
3. What are your treatment goals for this incident?

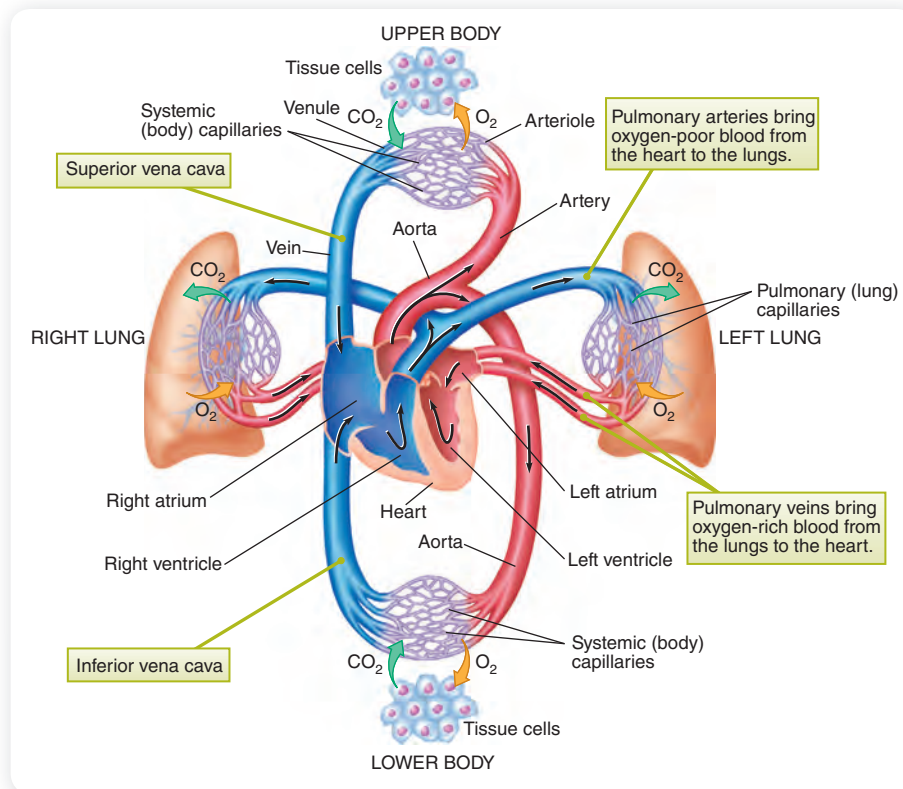


Figure 14-2 The circulatory system includes the heart, arteries, veins, and capillaries. At the center of the system is the heart, which pumps the blood.

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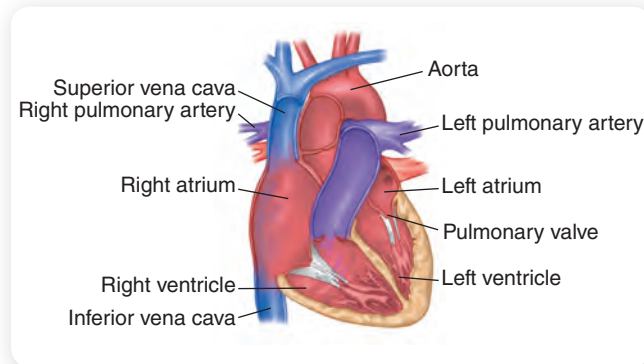


Figure 14-3 The heart functions as the pump of the human circulatory system.

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► The Pump

The heart functions as the human circulatory system's pump. The heart consists of four separate chambers: the two upper chambers on the top of the heart are called the left and right **atria** (a single chamber is called an atrium), and the two lower chambers on the bottom of the heart are called the left and right **ventricles**. The ventricles are the larger chambers and do most of the actual pumping. The atria are somewhat less muscular and serve as reservoirs for blood flowing into the heart from the body and the lungs

Figure 14-3

► The Pipes

The human body has three main types of blood vessels: arteries, capillaries, and veins. The arteries (big-flow, heavy-duty, high-pressure pipes) carry blood away from the heart. The capillaries (distribution pipes), the smallest of the blood vessels, form a network that distributes blood to all parts of the body. The smallest capillaries are so narrow that blood cells have to flow through them single file. The veins return the blood from the capillaries to the heart, where it is pumped to the lungs. There, the blood gives off carbon dioxide and absorbs oxygen

Figure 14-4

► The Fluid

Fluid in the circulatory system consists of blood cells and other blood components, each with a specific function. The liquid part of the blood is known as plasma. Plasma serves as the transporting medium for the solid parts of the blood, which are the red blood cells, white blood cells, and platelets. Red blood cells carry oxygen and carbon dioxide **Figure 14-5**. White blood cells have a "search and destroy" function. They consume bacteria and viruses to combat infections in the body. Platelets interact with each other and with other substances in the blood to form clots that help stop bleeding.

► Pulse

A pulse is the pressure wave generated by the pumping action of the heart. With each heartbeat, there is a surge

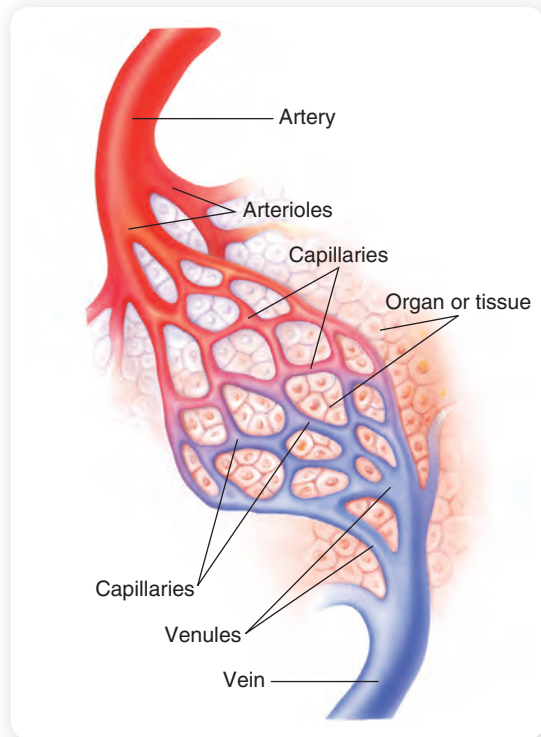


Figure 14-4 Blood enters an organ or tissue through the arteries and leaves through the veins.

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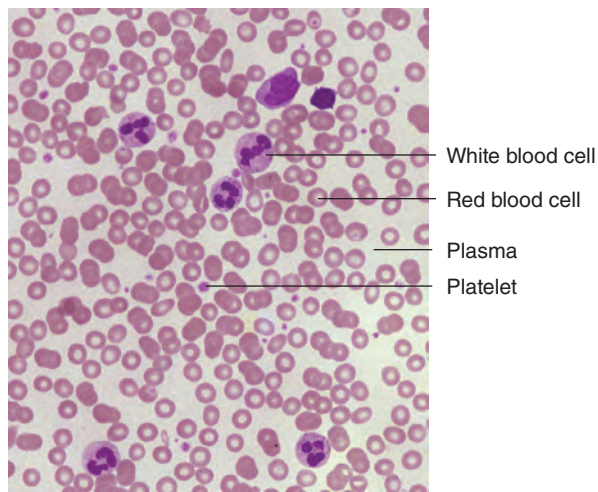


Figure 14-5 The components of blood.

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of blood from the left ventricle as it contracts and pushes blood out into the main arteries of the body. When you are counting the number of pulsations per minute, what you are actually counting is each heartbeat per minute. In other words, the pulse rate reflects the heart rate.

Usually you can feel a patient's radial and carotid pulses. In a conscious patient, you can easily find the radial (wrist) pulse at the base of the thumb. If the patient is unconscious, experiencing shock, or both, it may be impossible for you to feel a radial pulse. Therefore, it is vital that you know how to locate the carotid (neck)



Figure 14-6 Taking the carotid pulse.

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pulse. If the patient appears to be in shock or is unconscious, attempt to locate the carotid pulse first. To locate the carotid pulse, place two fingers lightly on the larynx and slide the fingers off to one side until you feel a slight notch on the neck. You should be able to feel the carotid pulse at this location **Figure 14-6**. Practice locating the carotid pulse of another person in a dark room. You should be able to locate the pulse within 3 seconds of touching the person's larynx.

Shock

Shock is failure of the circulatory system. Circulatory failure has many possible causes, but the three primary causes are discussed here.

► Pump Failure

Cardiogenic shock occurs if the heart cannot pump enough blood to supply the needs of the body. Pump failure can result if the heart has been weakened by a heart attack. Inadequate pumping of the heart can cause blood to back up in the vessels of the lungs, resulting in a condition known as **congestive heart failure (CHF)**.

► Pipe Failure

Pipe failure is caused by the expansion (dilation) of the capillaries to as much as three or four times their normal size. This causes blood to pool in the capillaries, instead of circulating throughout the system. When blood pools in the capillaries, the rest of the body, including the heart and other vital organs, is deprived of blood. Blood pressure falls and shock results. **Blood pressure** is the pressure of the circulating blood against the walls of the arteries.

In shock caused by sudden expansion of the capillaries, blood pressure may drop so rapidly in your patient that you are unable to feel either a radial or a carotid pulse.

Special Populations

In an infant, check the brachial (upper arm) pulse instead of the carotid pulse.

The least serious type of shock caused by pipe failure is fainting. Fainting, a form of **psychogenic shock**, is the body's response to a major psychological or emotional stress. As the nervous system reacts, the capillaries suddenly expand to three or four times their normal size. Blood then pools in the dilated vessels, resulting in reduced blood supply to the brain. Fainting is a short-term condition that corrects itself once the patient is placed in a horizontal position.

Anaphylactic shock is caused by an extreme allergic reaction to a foreign substance, such as venom from bee stings (see Chapter 11, *Poisoning and Substance Abuse*), penicillin, or certain foods. Shock may develop very quickly following exposure. The patient may suddenly start to sneeze or itch, a rash or hives may appear, the face and tongue may swell very quickly, and a blue color may appear around the mouth. The patient appears flushed (red) and breathing may quickly become difficult, with wheezing sounds coming from the chest. Blood pressure drops rapidly as the blood pools in the expanded capillaries. The pulse may be so weak that you cannot feel it. Pipe failure has occurred and death will result if prompt action to counteract the toxin is not taken.

Spinal shock may occur in patients who have sustained a spinal cord injury. The injury to the spinal cord allows the capillaries to expand, and blood pools below the level of the injury. The brain, heart, lungs, and other vital organs are deprived of blood, resulting in shock.

Words of Wisdom

Three types of shock caused by capillary expansion are as follows:

1. Shock induced by fainting
2. Anaphylactic shock
3. Spinal shock

► Fluid Loss

The third general type of shock is caused by fluid loss. Fluid loss caused by excessive bleeding (**hemorrhage**) is the most common cause of shock. Blood escapes from the normally closed circulatory system through an internal or external wound, and the system's total fluid level (blood volume) drops until the pump cannot operate efficiently. To compensate for fluid loss, the heart begins to pump faster to maintain pressure in the pipes. However, as the fluid continues to drain out, the pump eventually stops pumping altogether, resulting in cardiac arrest.

External bleeding is not difficult to detect because you can see blood escaping from the circulatory system to the outside of the patient's body. With internal bleeding, blood escapes from the system, but usually the bleeding cannot be seen. However, you may see signs of internal blood loss, such as bruising, swelling, and rigidity in the affected area. If the patient is conscious, he or she may report severe pain in the immediate area. Even though the escaped blood remains inside the body, it cannot reenter the circulatory system and it is not available to be pumped by the heart. Whether the bleeding is external or internal, if it remains unchecked, the result will be shock, eventual pump failure, and death.

An average adult has about 12 pints (6 L) of blood circulating in the system. The loss of a single pint of blood will not produce shock in a healthy adult. In fact, 1 pint (0.5 L) per donor is the amount that blood banks collect. However, the loss of 2 or more pints (1 L or more) of blood can produce shock. This amount of blood loss can result from such injuries as a fractured femur. **Figure 14-7** shows the amount of blood loss that can result from various injuries.

► Signs and Symptoms of Shock

Shock deprives the body of sufficient blood to function normally. As shock progresses, the body alters some of its functions in an attempt to maintain sufficient blood supply to its vital parts. A patient who is in shock may exhibit some or all of the signs and symptoms shown in the box below. Initially, the patient's breathing may

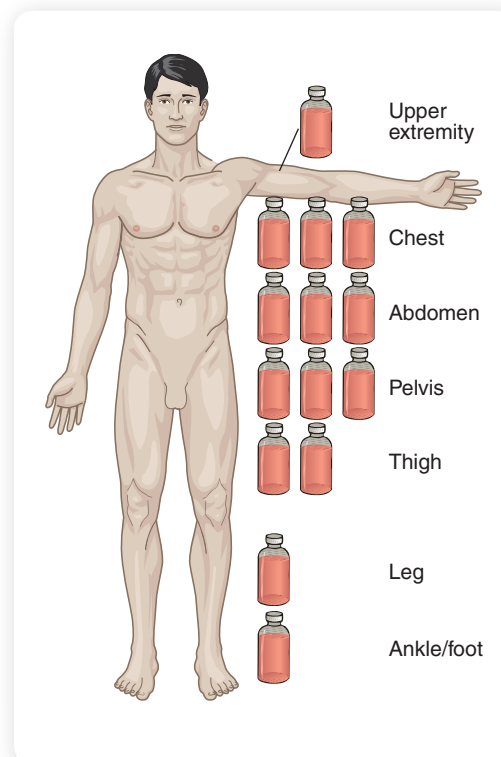


Figure 14-7 Potential blood loss from injuries in various parts of the body. Each bottle equals 1 pint (473 mL).

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be rapid and deep, but as shock progresses in severity, breathing becomes rapid and shallow.

Changes in mental status may be the first signs of shock; therefore, monitoring the overall mental status of a patient can help you detect shock. Any change in mental status may be significant. In severe cases of shock, the patient loses consciousness. If a trauma patient who has been quiet suddenly becomes agitated, restless, and vocal, you should suspect shock. If a trauma patient who has been loud, vocal, and aggressive becomes quiet, you should also suspect shock and begin treatment. If the patient has dark skin, you may not be able to use skin color changes to help you detect shock. Therefore, be especially alert for other signs of shock. The capillary refill test and the condition of the skin (cool and clammy) will help you recognize shock in patients who have dark skin.

Signs and Symptoms

Signs and symptoms of shock include:

- Confusion, agitation, restlessness, or anxiety
- Cold, clammy, sweaty, pale skin
- Rapid, shallow breathing
- Rapid, weak pulse
- Increased capillary refill time
- Nausea or vomiting
- Weakness or fainting
- Thirst

► General Treatment for Shock

As an emergency medical responder (EMR), you can combat shock from any cause and keep it from getting worse by taking several simple but important steps. Remember that the protocols for use of these skills may vary. Always follow the protocols approved by your medical director.

Position the Patient Correctly

If the patient has no head injury, extreme discomfort, or difficulty breathing, place the patient flat on his or her back (supine) on a horizontal surface. Place a blanket under the patient, if available. Elevate the patient's legs

according to local protocol. If the patient has a head injury, spine injury, or lower extremity injury, position the patient flat on his or her back. If the patient is having chest pain or difficulty breathing (which is likely to occur in cases of heart attack and emphysema) and no spinal injury is suspected, place the patient in a sitting or semireclining position.

Treatment

Follow these steps for the general treatment of shock:

1. Position the patient correctly.
2. Maintain the patient's ABCs.
3. Treat the cause of shock, if possible.
4. Maintain the patient's body temperature by placing blankets under and over the patient.
5. Ensure the patient does not eat or drink anything.
6. Assist with other treatments (such as administering oxygen, if available).
7. Arrange for immediate and prompt transport to an appropriate medical facility.

Treatment

Do not allow a patient in shock to stand!

Maintain the Patient's ABCs

Check the patient's airway, breathing, and circulation (ABCs) at least every 5 minutes. If necessary, open the airway, perform rescue breathing, or begin cardiopulmonary resuscitation (CPR).

Treat the Cause of Shock, if Possible

Most patients who are in shock must be treated in the hospital, with care provided by specially trained physicians. However, you are able to treat one common cause of shock—external bleeding. By controlling external bleeding with direct pressure, elevation, tourniquet, or **pressure points**, you can treat this cause of shock temporarily until the patient can be transported to an appropriate medical facility for more advanced treatment.

YOU are the Provider

CASE 2

At 1515 hours you are dispatched to a residential neighborhood for a report of a gunshot wound. As you are responding, your dispatcher reports the police are on the scene, and they report it appears to be an accidental discharge. As you arrive on the scene, a sheriff's deputy takes you to the basement where you find a 43-year-old man sitting in a chair. He is holding his hand on his right thigh. There is blood seeping around his hand and some blood on the floor. A police officer has taken possession of the gun. There are no other weapons in sight. You cut off his trousers from around the gunshot wound. There is a small wound in the middle of his thigh that is moderately bleeding. You cannot locate an exit wound.

1. What are your initial steps in treating this patient?
2. How serious is an injury like this?

Maintain the Patient's Body Temperature

Attempt to keep the patient comfortably warm. A patient with cold, clammy skin should be covered. It is as important to place blankets under the patient to keep body heat from escaping into the ground as it is to cover the patient with blankets.

Do Not Allow the Patient to Eat or Drink

Even though a patient in shock is often very thirsty, do not give liquids by mouth. There are two reasons for this rule:

1. A patient in shock may be nauseated and eating or drinking may cause vomiting.
2. A patient in shock may need emergency surgery. Patients should not have anything in their stomachs before surgery.

If you are working in an area where ambulance response time is more than 20 minutes, you may give patients a clean cloth or gauze pad that has been soaked in water to suck on. This relieves dryness of the mouth but does not quench thirst. No matter how thirsty patients are, do not permit them to drink anything.

Treatment

In the summer or in hot environments, it is not necessary to cover every shock patient with blankets. You are trying to maintain body heat, not produce more.

Assist With Other Treatments

When an advanced life support (ALS) unit arrives at the scene, be ready to assist them with further treatment. Patients may be given oxygen or IV solutions. If you are trained in the administration of oxygen and have it available, provide it to shock patients. Oxygen benefits shock patients by ensuring that the reduced number of red blood cells are as oxygen saturated as they can be.

Advanced emergency medical technicians (AEMTs) or paramedics can administer **intravenous (IV) fluids**. Adding fluid to the body combats the loss of blood volume. Although rare, some emergency medical services (EMS) personnel sometimes use **pneumatic anti-shock garments (PASGs)** in the field to treat pelvic fractures; however, PASGs are no longer favored for shock treatment. PASGs are placed around the patient's legs and abdomen and inflated with air. As the PASG inflates, it exerts pressure around the legs and abdomen. Although, as an EMR, you will not use these devices yourself, you should know their purpose and function. It is also important to understand that PASGs must not be removed in the field. Removing PASGs must be done in a hospital and under the direct supervision of a physician.

Arrange for Transport

As soon as you determine that you have a patient who is in shock, make sure an ambulance has been dispatched. When the ambulance arrives, give EMS personnel a concise handoff report, emphasizing the signs and symptoms of shock that you noted. The EMS personnel will then ensure the patient is quickly prepared for *prompt transport* to an appropriate medical facility that can handle a patient with this type of condition. Usually, the most appropriate treatment for a patient in shock that is the result of injury or bleeding is surgical repair, and the sooner the patient gets to the hospital, the better the chance of his or her survival.

Words of Wisdom

A quiet patient is often a patient who is in shock. Other times, when you have a patient who suddenly becomes agitated, shock may be developing. Watch all patients carefully for signs of shock!

► Treatment for Shock Caused by Pump Failure

Patients experiencing pump failure may be confused, restless, anxious, or unconscious. Their pulse is usually rapid and weak, and their skin is cold and clammy, sweaty, and pale. Their respirations are often rapid and shallow. Pump failure is a serious condition. Your proper treatment and *prompt transport* by ambulance to an appropriate medical facility will give these patients their best chance for survival.

► Treatment for Shock Caused by Pipe Failure

Patients who have fainted, who are experiencing anaphylactic shock, or who have sustained a severe spinal cord injury will have pipe failure. Their capillaries may increase three or four times the normal size, causing signs and symptoms of shock.

Treatment for Anaphylactic Shock

The initial treatment for anaphylactic shock is similar to the treatment for any other type of shock. Anaphylactic shock is an extreme emergency, and the patient must be transported as soon as possible. Paramedics, nurses, and physicians can administer medications that may reverse the allergic reaction. Some patients who have severe allergies may carry an epinephrine auto-injector. If the patient has a prescribed auto-injector, you can administer the epinephrine if you have been trained in its use and have permission from your local medical director. Be aware of and follow your local protocols. Support the patient's thigh and place the tip of the auto-injector lightly against the outer thigh. Using a

quick motion, push the auto-injector firmly against the thigh and hold it in place for several seconds. This will inject the medication. The detailed steps for administering epinephrine by auto-injector are outlined in Chapter 11, *Poisoning and Substance Abuse*.

► Treatment for Shock Caused by Fluid Loss

Shock may be caused by internal blood loss (blood that escapes from damaged blood vessels and stays inside the body) or by external blood loss (blood that escapes from the body). Excessive bleeding is the most common cause of shock.

Signs and Symptoms

Signs and symptoms of internal bleeding include the following:

- Coughing or vomiting of blood
- Abdominal tenderness, rigidity, bruising, or distention
- Rectal bleeding
- Vaginal bleeding in women
- Classic signs of shock

Shock Caused by Internal Blood Loss

Patients can die quickly and quietly from internal bleeding following abdominal injuries that rupture the spleen, liver, or large blood vessels. You must be alert to detect the earliest signs and symptoms of internal bleeding and to begin treatment for shock. If you are treating several injured patients, those with internal bleeding should be transported first to the medical facility because immediate surgery may be needed. (Chapter 19, *Transport Operations*, discusses how to decide which patients should receive care first.)

Bleeding from stomach ulcers, ruptured blood vessels, or tumors can cause internal bleeding and shock. This bleeding can be spontaneous, massive, and rapid, often leading to the loss of large quantities of blood by vomiting or bloody diarrhea.

It is important to recognize the signs and symptoms of internal bleeding and take prompt corrective action. In addition to the classic signs of shock (confusion, rapid pulse, cold and clammy skin, and rapid breathing), patients with internal bleeding may show additional signs and symptoms as depicted in the Signs and Symptoms box on this page.

Treatment

You cannot stop internal bleeding. You can only treat its symptoms and arrange for the patient to be promptly transported to an appropriate medical facility.

Bleeding

Blood loss can occur through external bleeding, which is visible, or through internal bleeding, which can be hard to detect. It ranges from minor cuts to massive blood loss that can kill a person in a few minutes. As an EMR, it is important for you to be able to recognize the signs and symptoms of external bleeding and internal bleeding. It is also important for you to know what steps to take to control bleeding and what care you can administer for patients who are experiencing internal blood loss and shock.

Words of Wisdom

Patients who regularly consume large quantities of alcohol are at high risk for internal bleeding. Heavy alcohol consumption damages the liver and reduces the production of clotting factors and platelets. Because platelets are needed for blood coagulation and clotting, these patients can experience life-threatening internal bleeding from relatively minor injuries. According to the Centers for Disease Control and Prevention (CDC), in 2013, 36,427 deaths were reported from liver failure. Remember that patients with liver disease are at a high risk for bleeding because liver disease interferes with blood clotting.

Alcohol also irritates the digestive system, which makes patients with alcoholism more likely to experience life-threatening bleeding from the esophagus or stomach.

► Controlling External Blood Loss

This section describes how to control external blood loss using direct pressure, elevation, tourniquets, and pressure points. Follow your local protocols for bleeding control. Some protocols may not permit the use of all these methods. They are all included because each technique may be beneficial to patients under certain circumstances.

There are three types of external blood loss: capillary, venous, and arterial (Figure 14-8). The most common type of external blood loss is **capillary bleeding**. In capillary bleeding, the blood oozes out (such as from a cut finger). You can control capillary bleeding simply by applying direct pressure to the site.

The next most common type of bleeding is **venous bleeding**. This type of bleeding has a steady flow. Bleeding from a large vein may be profuse and life threatening. To control venous bleeding, apply direct pressure to the site for at least 5 minutes.

The most serious type of bleeding is **arterial bleeding**. Arterial blood spurts or surges from the laceration or wound with each heartbeat. Blood pressure in arteries is higher than in capillaries or veins, and unchecked arterial bleeding can result in death from loss of blood in a short time. To control arterial bleeding, exert and



Figure 14-8 Recognizing the three types of external bleeding.
A. Capillary **B.** Venous **C.** Arterial.

A: Sasha Radosavljevic/iStock/Getty; B: © E. M. Singletary, MD. Used with permission; C: © Brian Slichta/ AP Photo.

maintain direct pressure on the site, sufficient to stop the flow of blood, until EMS arrives. If available and permitted under your local protocol, apply a tourniquet between the heart and the site of the arterial bleeding.

Because many injured patients actually die from shock caused by blood loss, it is vitally important that you control external bleeding quickly.

Treatment

Follow these steps to treat shock caused by pump failure:

1. Keep the patient lying down unless the patient is able to breathe easier in a sitting position.
2. Maintain the patient's ABCs. Be prepared to perform CPR, if necessary.
3. Maintain the patient's normal body temperature.
4. Ensure the patient does not eat or drink anything.
5. Keep the patient quiet and do any necessary moving for him or her.
6. Provide reassurance.
7. Arrange for *prompt transport* by ambulance to an appropriate medical facility.
8. Provide high-flow oxygen as soon as it is available.

Follow these steps to treat shock caused by pipe failure:

Fainting

1. Examine the patient to ensure there is no injury.
2. Keep the patient lying down and elevate the legs if indicated by local protocol.
3. Maintain the ABCs.
4. Maintain the patient's normal body temperature.
5. Provide reassurance.

Anaphylactic Shock

1. Keep the patient lying down and elevate the legs if indicated by local protocol.
2. If the patient has an epinephrine auto-injector, help the patient use it if indicated by local protocol.
3. Maintain the patient's ABCs. Anaphylactic shock may cause airway swelling. In severe reactions, the patient may require mouth-to-mask breathing or full CPR.
4. Maintain the patient's normal body temperature.
5. Provide reassurance.
6. Arrange for *rapid transport* by ambulance to an appropriate medical facility.

Spinal Shock

1. Place the patient on his or her back. Because the spine may be injured, keep the patient's head and neck stabilized to protect the spinal cord (see Chapter 15, *Injuries to Muscles and Bones*).
2. Maintain the patient's ABCs.
3. Maintain the patient's normal body temperature.
4. Ensure the patient does not eat or drink anything.
5. Assist with other treatments. Help other medical providers place the patient on a backboard.

Follow these steps to treat shock caused by fluid loss:

Internal Blood Loss

1. Keep the patient lying down and elevate the legs if indicated by local protocol.
2. Maintain the patient's ABCs.
3. Maintain the patient's normal body temperature.
4. Ensure the patient does not eat or drink anything.
5. Provide reassurance.
6. Keep the patient quiet and do any necessary moving for him or her.
7. Provide high-flow oxygen as soon as it is available.
8. Monitor the patient's vital signs at least every 5 minutes.
9. Arrange for *prompt transport* by ambulance to an appropriate medical facility.

Treatment *Continued**External Blood Loss*

1. Control bleeding by applying direct pressure on the wound, elevating the injured part, and applying a tourniquet if one is available and permitted under your local protocols. Controlling bleeding using one of these methods is the most important step. Maintain standard precautions.
2. Ensure the patient is lying down and elevate the legs if indicated by local protocol.
3. Maintain the patient's ABCs.
4. Maintain the patient's normal body temperature.
5. Ensure the patient does not eat or drink anything.
6. Provide reassurance.
7. Provide high-flow oxygen as soon as it is available.
8. Arrange for *prompt transport* by ambulance to an appropriate medical facility.

Treatment

Three methods of controlling external bleeding are as follows:

1. Apply direct pressure.
2. Elevate the injured body part.
3. Apply a tourniquet if permitted and if available.

Direct Pressure

Most external bleeding can be controlled by applying direct pressure to the wound. Place a dry, sterile **dressing** directly on the wound and apply pressure to the wound with your gloved hand (Figure 14-9). Wear the gloves from your EMR life support kit. If you do not have a sterile dressing or gauze bandage, use the cleanest cloth available. Wrap the dressing and wound snugly with a roller gauze bandage to maintain direct pressure on the



Figure 14-9 Applying direct pressure to a wound.
Courtesy of Rhonda Hunt.

wound. Do not remove a dressing after you have applied it. If the dressing becomes blood soaked, place another dressing on top of the first and keep them both in place.

Elevation

If direct pressure does not stop external bleeding from an extremity, elevate the injured arm or leg as you maintain direct pressure. Elevation, in conjunction with direct pressure, will usually stop severe bleeding

(Figure 14-10).

Tourniquets

Use tourniquets in any situation where extremity bleeding cannot be easily and immediately controlled by direct pressure or elevation. High-velocity gunshot wounds and explosive devices can sever arteries in the arm or the leg. These types of injuries result in rapid and profound blood loss that lead to death within minutes. These devastating types of wounds occur in military combat situations and in noncombat situations where high-velocity weapons are used by civilians or law enforcement personnel.

Recent military experience in combat situations has resulted in some changes regarding the use of tourniquets. To reduce deaths from these types of wounds, the military has developed and adopted several modern versions of tourniquets that use simple laws of physics to apply sufficient pressure quickly and easily to stop life-threatening bleeding. These updated tourniquets can be applied in less than 1 minute. Because the tourniquets multiply the force you place on them, they require you to use only one hand to apply.

Recent medical research indicates that a tourniquet can be applied and left in place for up to 2 hours without causing additional damage to the injured limb. This



Figure 14-10 Elevate an extremity while maintaining direct pressure to control external bleeding.
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means that the use of tourniquets seems to have great benefit to the patient without incurring a high risk of further damage to the limb.

Some EMS agencies teach their personnel the indications for the use of these tourniquets and how to apply them properly (Figure 14-11). You should use tourniquets once you have completed proper instruction and have protocols in place that have been approved by your medical director.

Words of Wisdom

Recent military research has resulted in the development of effective blood clotting or **hemostatic agents**. These are usually impregnated in gauze dressings or supplied as a powder. These agents can be packed into a wound and aid in the formation of a blood clot in a shorter period of time. The use of these clotting agents is usually not recommended for some wounds involving the head, neck, chest, or abdomen. They are useful for extremity wounds and for wounds in junctional areas, such as the groin, shoulder and armpit, or neck, where a tourniquet cannot be applied. Hemostatic agents are carried by some EMS agencies and are carried in special kits by some law enforcement agencies for rapid treatment of gunshot wounds. Use these clotting agents only if you have received special training and are permitted by your local protocols.

Follow the steps in **Skill Drill 14-1** to control bleeding with a tourniquet:

1. Apply direct pressure with a dry, sterile dressing **Step 1**.
2. Apply a pressure dressing **Step 2**.
3. Apply a tourniquet above the level of bleeding **Step 3**.

Pressure Points

Pressure points should be used for extremity wounds if direct pressure and elevation do not control the bleeding and only if you are not permitted to use a tourniquet (or if a tourniquet is not available). Pressure points can be difficult to use to control hemorrhage and are not always effective. However, using pressure points to attempt to control bleeding requires no special equipment and should be considered in cases where other options are unavailable.

For injuries too near to the body to allow for tourniquet application (for example, injuries that are too proximal or too close to the trunk to apply a tourniquet [junctional injuries]), direct pressure and use of pressure points may be effective. Tourniquets, however, can be improvised when commercially produced options are not available. Options for improvisation include belts and articles of clothing tied around the limb as proximal as possible to the zone of injury. If



Figure 14-11 Different types of tourniquets used by EMS personnel. **A.** A CAT tourniquet. **B.** An EMT tourniquet. **C.** A SOF-T tourniquet.

A&C: Courtesy of Peter T. Pons, MD, FACEP; B: Courtesy of Dely Medical Innovations, Inc.

you have a choice between using a pressure point or a tourniquet to control brisk bleeding in an extremity, use the tourniquet because it is more effective and will lessen the chance that the patient will die from serious hemorrhage.

Pressure points may theoretically be able to control bleeding by preventing blood from flowing into a

Skill Drill 14.1**Controlling Bleeding With a Tourniquet****Step 1** Apply direct pressure with a sterile dressing.**Step 2** Apply a pressure dressing.**Step 3** If bleeding continues or recurs, apply a tourniquet above the level of bleeding.

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limb. This is accomplished by compressing a major artery against the bone at a specific location, a pressure point. Although there are several pressure points in the body, the **brachial artery pressure point** (in the upper arm) and the **femoral artery pressure point** (in the groin) are the most commonly described

Figure 14-12.

Words of Wisdom

Pressure points should never be used as a tool to control hemorrhage in place of a tourniquet if one is available or if one can be improvised using readily available materials.



Figure 14-12 The location of the brachial (A) and femoral (B) pressure points.

A & B: © Jones & Bartlett Learning.

Safety

To prevent coming into contact with any blood that is present, wear gloves and other protective devices as necessary.

When you are applying pressure to the brachial artery, remember the words “slap, slide, and squeeze”:

1. Position the patient’s arm so the elbow is bent at a right angle (90°) and hold the upper arm away from the patient’s body.
2. Gently “slap” the inside of the biceps with your fingers halfway between the shoulder and the elbow to push the biceps out of the way.
3. “Slide” your fingers up to push the biceps away.
4. “Squeeze” (press) your hand down on the humerus (upper arm bone). You should be able to feel the pulse as you press down.

Treatment

Do not hesitate to lean into the pressure point.

If the patient is sitting down, squeeze the arm by placing your fingers halfway between the shoulder and the elbow and your thumb on the opposite side of the patient’s arm. If done properly, this technique (in combination with direct wound pressure and elevation) will quickly stop any bleeding below the point of pressure application.

The femoral artery pressure point is more difficult to locate and squeeze. Follow these steps to apply pressure to the femoral artery:

1. Position the patient on his or her back and kneel next to the patient’s hips, facing the patient’s head. You should be on the side of the patient opposite the extremity that is bleeding.
2. Find the pelvis and place the little finger of your hand closest to the injured leg along the anterior crest on the injured side.
3. Rotate your hand down firmly into the groin area between the genitals and the pelvic bone. This action compresses the femoral artery and usually stops the bleeding, when combined with elevation and direct pressure over the bleeding site.
4. If the bleeding does not slow immediately, reposition your hand and try again.

To effectively apply brachial and femoral pressure points, you must regularly practice each step of these skills.

► Standard Precautions and Bleeding Control

Certain communicable diseases such as hepatitis or HIV can be spread by contact with blood from an infected person. This risk is greatly increased when the infected blood comes into contact with a cut or an open sore on your skin. Although your risk of contracting hepatitis or HIV through intact skin is small, you should minimize this risk as much as possible by wearing nitrile or latex gloves whenever you might come in contact with a patient’s blood or body fluids **Figure 14-13**. Carry your gloves on top of your



Figure 14-13 Wear gloves to minimize your risk of infection.

© Jones & Bartlett Learning. Courtesy of MIEMSS.



Figure 14-14 Keep your gloves on top in your EMR life support kit or in a pouch on your belt.

© Jones & Bartlett Learning.

EMR life support kit or in a pouch on your belt for quick access **Figure 14-14**. If you do get blood on your hands, wash it off as soon as possible with soap and water. If you are in the field and cannot wash your hands, use a waterless hand-cleaning solution that contains an effective germ-killing agent.

Wounds

A wound is an injury caused by any physical means that leads to damage of a body part. Wounds are classified as closed or open. In a **closed wound**, the skin remains intact; in an **open wound**, the skin is disrupted.

► Closed Wounds

The only closed wound is the **bruise** (contusion). A bruise is an injury of the soft tissue beneath the skin. Because small blood vessels are broken, the injured area becomes discolored and swells. The severity of these closed soft-tissue injuries varies greatly. A simple bruise heals quickly.

In contrast, bruising and swelling following an injury may also be a sign of an underlying fracture. Whenever you encounter a significant amount of swelling or bruising, suspect the possibility of an underlying fracture.

► Open Wounds

An open wound is one that results in a break in the skin. There are several types of open wounds, including abrasions, puncture wounds, lacerations, avulsions, and amputations. Each type is described below.

Abrasion

Commonly called a scrape, **road rash**, or rug burn, an **abrasion** occurs when the skin is rubbed across a rough surface **Figure 14-15**.

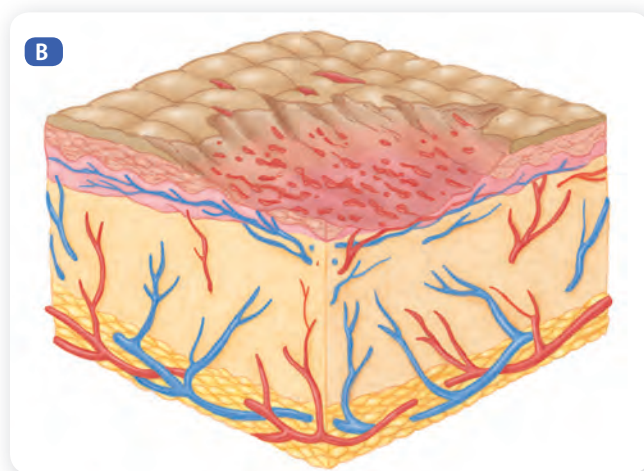


Figure 14-15 Abrasions involve variable depth of the skin; they are often called scrapes or road rashes.

A: © American Academy of Orthopaedic Surgeons; B: © Jones & Bartlett Learning.

Puncture

Puncture wounds are caused by a sharp object that penetrates the skin **Figure 14-16**. These wounds may cause a significant deep injury that is not immediately recognized. Puncture wounds do not bleed freely. If the object that caused the puncture wound remains sticking out of the skin, it is called an **impaled object**.

A **gunshot wound** is a special type of puncture wound. The amount of damage done by a gunshot depends on the type of gun used and the distance between the gun and the victim. A gunshot entry wound may appear as an insignificant hole but the bullet can cause massive damage to internal organs. Some gunshot wounds are smaller than a dime, and some are large enough to destroy significant amounts of tissue. Gunshot wounds usually have both an **entrance wound** and an **exit wound**. The entrance wound is usually smaller than the exit wound. Most deaths from gunshot wounds result from internal blood loss caused by damage to internal organs and major blood vessels as the bullet passes through the body. There is often more than one gunshot wound. It is important to conduct a thorough patient exam

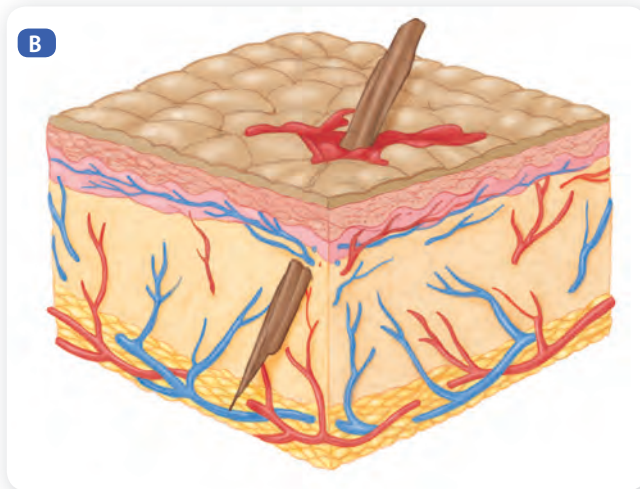


Figure 14-16 Puncture wounds may penetrate the skin to any depth.

A: © E. M. Singletary, MD. Used with permission; B: © Jones & Bartlett Learning.

to ensure that you have discovered all of the entrance and exit wounds.

Laceration

The most common type of open wound is a **laceration** (Figure 14-17). Lacerations are commonly called cuts. Minor lacerations may require little care, but large lacerations can cause extensive bleeding and can even be life threatening.

Avulsions and Amputations

An **avulsion** is a tearing away of body tissue (Figure 14-18). The avulsed part may be totally severed from the body or it may be attached by a flap of skin. Avulsions may involve small or large amounts of tissue. If an entire body part is torn away, the wound is called a traumatic amputation (Figure 14-19). Any amputated body part should be located, placed in a clean plastic bag, kept cool, and taken with the patient to the hospital for possible reattachment (reimplantation). If the amputated part is small and a clean plastic bag is not available, use a surgical glove turned inside out. Use cold packs or ice water to keep the detached body parts cold. Do not allow ice to touch the body part directly.

Treatment

Many older patients with heart conditions are on blood thinners (anticoagulants) to keep blood clots from forming in their body vessels. If they are taking blood thinners, it may take longer to control bleeding from an open wound. As part of your SAMPLE history, ask patients if they are taking any blood thinners.

► Principles of Wound Treatment

Very minor bruises need no treatment. Other closed wounds should be treated by applying ice and gentle compression and by elevating the injured body part. Because extensive bruising may indicate an underlying fracture, **splint** all major contusions. (Splinting involves using flexible or rigid support to prevent the movement of the injured body part; splinting is discussed more detail in Chapter 15, *Injuries to Muscles and Bones*.)

It is important to stop bleeding as quickly as possible using the cleanest dressing available. You can usually control bleeding by covering an open wound with a dry, clean, or sterile dressing and applying pressure to the dressing with your hand. If the first dressing does not

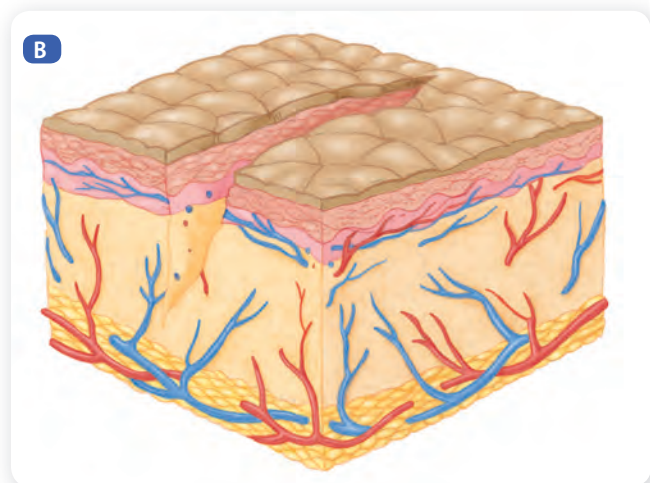


Figure 14-17 Lacerations are cuts produced by sharp objects.

A: © E. M. Singletary, MD. Used with permission; B: © Jones & Bartlett Learning.

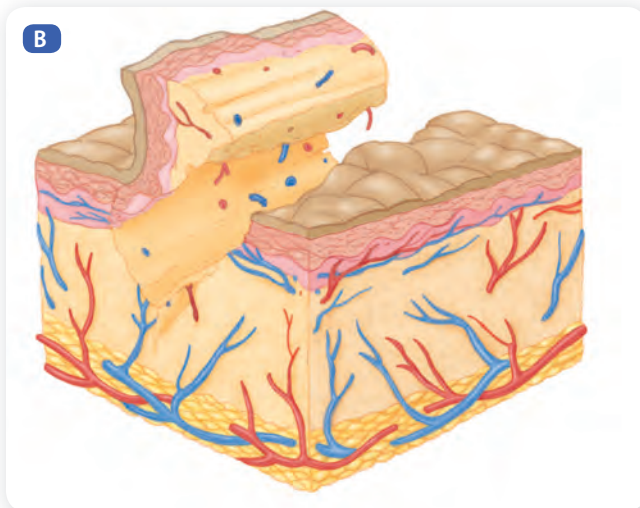


Figure 14-18 Avulsions raise flaps of tissue; significant bleeding is common.

A: © Jones & Bartlett Learning. Courtesy of MIEMSS; B: © Jones & Bartlett Learning.



Figure 14-19 Amputated parts can often be reattached. Attempt to locate the body parts and transport them to the hospital with the patient.

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control the bleeding, reinforce it with a second layer. Additional ways to control bleeding include elevating an extremity, applying a tourniquet, and using pressure points.

A dressing should cover the entire wound to prevent further contamination. Do not attempt to clean the



Figure 14-20 Head bandage.

© American Academy of Orthopaedic Surgeons.

contaminated wound in the field because cleaning will only cause more bleeding. A thorough cleaning will be done at the hospital. All dressings should be secured in place by a compression bandage.

Treatment

The major principles of open-wound treatment are to:

- Control bleeding.
- Prevent further contamination of the wound.
- **Immobilize** the injured part (reduce or prevent movement).
- Stabilize any impaled object.

Learning to dress and bandage wounds requires practice. As a trained EMR, you should be able to bandage all parts of the body quickly and competently

Figure 14-20

Treatment

Never remove an impaled object.

► Dressing and Bandaging Wounds

All wounds require bandaging; therefore, you should be familiar with the general principles of applying dressings and bandages to effectively cover and protect wounds.

Dressings and bandages are applied to achieve the following:

- Control bleeding
- Prevent further contamination
- Immobilize the injured area
- Prevent movement of impaled objects

Dressings

A dressing is an object placed directly on a wound to control bleeding and prevent further contamination. Once a dressing is in place, apply firm, direct manual pressure on it to stop any bleeding. It is important to stop severe bleeding as quickly as possible using the cleanest dressing available. If no dressing materials are available, you may have to apply direct pressure with your hand to a wound that is bleeding extensively; if this is the case, be sure to observe standard precautions and wear gloves.

Sterile dressings come packaged in many different sizes. The three most common sizes are gauze squares that measure 4 inches \times 4 inches (10 cm \times 10 cm) (commonly known as 4 \times 4s), heavier pads that measure 5 inches \times 9 inches (13 cm \times 23 cm) (5 \times 9s), and trauma dressings that are thick, sterile dressings that measure 10 inches \times 30 inches (25 cm \times 76 cm). Use a trauma dressing to cover a large wound on the abdomen, neck, thigh, or scalp—or as padding for splints (Figure 14-21).

When you open a package containing a sterile dressing, touch only one corner of the dressing (Figure 14-22). Place it on the wound without touching the side of the dressing that will be next to the wound. If bleeding continues after you have applied a compression dressing to the wound, put additional gauze pads over the original dressing. Do not remove the original dressing because the blood-clotting process will have already started and should not be disrupted. When you are satisfied that the wound is sufficiently dressed, you can proceed to bandaging the wound.

Treatment

If commercially prepared dressings are not available, use the cleanest cloth object available, such as a clean handkerchief, washcloth, disposable diaper, or article of clothing.



Figure 14-21 Common sizes of wound dressings are 10 inches \times 30 inches (25 cm \times 76 cm), 5 inches \times 9 inches (13 cm \times 23 cm), and 4 inches \times 4 inches (10 cm \times 10 cm).

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Bandaging

A bandage is used to hold the dressing in place. Two types of bandages commonly used in the field are roller gauze and triangular bandages. The first type, conforming roller gauze, stretches slightly and is easy to wrap around the body part (Figure 14-23). Triangular bandages are usually 36 inches (91 cm) across (Figure 14-24). A triangular



Figure 14-22 Open the package containing a sterile dressing carefully.

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Figure 14-23 Roller gauze bandage.

© Jones & Bartlett Learning. Courtesy of MIEMSS.



Figure 14-24 Triangular bandage.

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bandage can be folded and used as a wide **cravat** or it can be used without folding **Figure 14-25**. Roller gauze is easier to apply and stays in place better than a triangular bandage, but a triangular bandage is very useful for bandaging scalp lacerations and lacerations of the chest, abdomen, back, or thigh.

Follow certain principles if the bandage is to hold the dressing in place, control bleeding, and prevent further contamination. Before you apply a bandage, check to ensure the dressing covers the wound completely and extends beyond all sides of the wound **Figure 14-26**. Wrap the bandage just tightly enough to control bleeding. Do not apply it too tightly because it may cut off all circulation. It is important to regularly check circulation at a point farther away from the heart than the injury itself because swelling may make the bandage too tight. If this happens while the patient is under your care, remove the roller gauze or triangular bandage and reapply it, making sure that you do not disturb the dressing beneath.

Once you have completed applying the bandage, secure it so it cannot slip. Tape, tie, or tuck in any loose ends. Practice bandaging techniques for several types of wounds using both roller gauze and triangular bandages. Although the principles of bandaging are simple, some parts of the body are difficult to bandage. It is important to practice bandaging different parts of the body to ensure competency in emergency medical care situations.

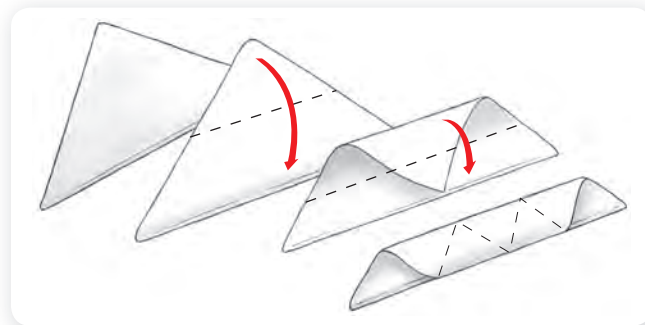


Figure 14-25 Folding a triangular bandage to make a cravat.

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Figure 14-26 Ensure the dressing covers the wound completely.

© Jones & Bartlett Learning.

Treatment

Bandaging is a skill that requires practice. Apply bandages tight enough so they stay in place and apply sufficient pressure to stop the bleeding. However, do not apply bandages too tightly or they can occlude circulation to an extremity. Check bandages as part of your reassessment to ensure they are still applied correctly.

Standard Precaution Techniques for the EMR

Some infectious disease organisms, including the hepatitis and AIDS viruses, can be transmitted if blood from an infected person enters the bloodstream of a healthy person through a small cut or opening in the skin. Because you may have such a cut, it is important to wear gloves to avoid contact with patients' blood **Figure 14-27**. Wearing gloves also protects wounds from being contaminated by dirt or infectious organisms you may have on your hands. Nitrile or latex medical gloves can be stored on the top of your EMR life support kit or in a pouch on your belt, where they will be readily available. (See Chapter 2, *Workforce Safety and Wellness*, for more information on infectious diseases.)

Safety

Providing for your own safety and that of the patient is always a high priority when you are examining and treating open wounds.

Specific Wound Treatment

The preceding material discussed the general principles of wound treatment. The next section discusses treatment for specific types of wounds on different parts of the body.



Figure 14-27 Always wear gloves when in contact with body fluids.

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Voices of Experience

We were called to assist the ambulance at an accident at the local paper manufacturing facility. An adult male had his gloved hand caught in a piece of machinery and several of his fingers had been amputated. After we made contact with our patient, we simultaneously determined he had an open airway, was breathing adequately, and was bleeding from his hand. We were able to successfully stop the bleeding with direct pressure, all the while reassuring our patient.

“ His gloved hand had gotten caught in a piece of machinery, and several of his fingers had been amputated.”

We radioed ahead to the ambulance to let them know the status of our patient and that four of his fingers had been amputated at the knuckle level. The ambulance in turn requested a helicopter flight meet them at the hospital for rapid transit to a larger, Level One trauma center, which could perform intricate hand surgery.

I found all the fingers (sounds awful, but was not at all), wrapped them in gauze, put them in a plastic bag, and then placed the plastic bag into a container of cold ice water. The patient was transported to the hospital and on to the Level One trauma center.

About six months later, the patient made an unexpected visit to my place of business. He asked if I remembered him and I replied, “Of course!” He picked up his hand and waved at me, with all of his fingers intact and perfectly responding. He said, “I just wanted to say hi and say thank you.”

He was back at work doing the same job, but being much more careful, and truly thankful for the quick action by the emergency medical responders.

Ellen A. Mathein, EMT, CPA
Nicolet Area Technical College
Tripoli, Wisconsin

Face and Scalp Wounds

The face and scalp have many blood vessels. Because of this generous blood supply, a relatively small laceration can result in significant bleeding. Although face and scalp lacerations may not be life threatening, they are always bloody and cause much anxiety for the patient.

You can control almost all facial or scalp bleeding by applying direct manual pressure. Direct pressure is effective because the bones of the skull are so close to the skin. Direct pressure compresses the blood vessels against the skull and stops the bleeding. If bleeding continues, do not remove the dressing. Instead, reinforce it with a second layer and continue to apply manual pressure. After the bleeding stops, wrap the head with a bandage **Figure 14-28**.

For wounds inside the cheek, hold a gauze pad inside the cheek (in the mouth). If necessary, apply a pad outside the cheek. Always keep the airway open.

Severe scalp lacerations may be associated with skull fractures or even brain injury. If any brain tissue or bone fragments are visible, do not apply pressure to the wound. Instead, cover the wound loosely, being careful



Figure 14-28 Bandaging a head wound. **A.** Apply direct pressure until bleeding stops. **B.** Wrap the head with a bandage.

A&B: © Jones & Bartlett Learning. Courtesy of MIEMSS.

not to exert direct pressure on the brain or the bone fragments.

If the patient has a head injury, the neck and spine may also be injured. Move the head as little as possible and stabilize the neck. (Treatment of spinal injuries is discussed in Chapter 15, *Injuries to Muscles and Bones*.) In patients with a head injury, always evaluate the patient's level of consciousness. Carefully monitor the patient's airway and breathing and protect the spine.

Words of Wisdom

Remember, patients who have injuries or are bleeding will likely be worried. It is your job to reassure them that you are doing everything you can to treat them. Do not forget to show your patients and their families that you care!

Nosebleeds

Nosebleeds can result from injury, high blood pressure, or dry air. In some cases, there is no apparent cause. A nosebleed with no apparent cause is called a **spontaneous nosebleed**. In a patient with high blood pressure, increased pressure in the small blood vessels of the nose may cause one to rupture, resulting in bleeding. A patient with high blood pressure should be seen and treated by a physician.

Most nosebleeds can be controlled easily. Unless the patient is experiencing shock, have the patient sit down and tilt his or her head slightly forward. This position keeps the blood from dripping down the throat. Swallowing blood may cause coughing or vomiting and make the nosebleed worse.

Treatment

If you suspect that a patient may have high blood pressure, the patient must be evaluated by a physician.

After the patient is seated correctly, pinch both nostrils together for at least 5 minutes. The patient may wish to do this without assistance. This treatment usually controls nosebleeds **Figure 14-29**. If the nosebleed persists or is very severe, arrange for transport to an appropriate medical facility. Instruct the patient to avoid blowing his or her nose because this will often cause additional bleeding.

Eye Injuries

All eye injuries are potentially serious and require medical evaluation. When an eye laceration is suspected, cover the entire eye with a dry gauze pad. Have the patient lie on his or her back and arrange for *transport* to an appropriate medical facility.



Figure 14-29 Pinch nostrils together to control a nosebleed.
© Jones & Bartlett Learning. Courtesy of MIEMSS.

If a small foreign object is lying on the surface of the patient's eye, you can use a saline solution, when available, to gently flush the object from the eye. Clean water can also be used, but it tends to irritate the injured eye. Flush from the nose side toward the outside to avoid flushing the object into the other eye. Even small foreign objects can leave a small scratch on the surface of the eye. It is always a good idea to transport the patient to an appropriate medical facility for further assessment and possible treatment.

Occasionally an object will be impaled in the eye. Immediately place the patient on his or her back and cover the injured eye with a dressing and a paper cup so the impaled object cannot move. Remember to bandage both eyes. This is an important step to help minimize eye movement because if the patient attempts to look at something with the uninjured eye, the injured eye moves in conjunction, further aggravating the injury (Figure 14-30). Arrange for transport of the patient to the hospital.

Treatment

Whenever you must bandage both eyes, explain to the patient why you are doing so. Having both eyes covered may be distressing to the patient. Stay with the patient to provide reassurance.

Neck Wounds

The neck contains many important structures: the trachea, the esophagus, large arteries, veins, muscles, vertebrae, and the spinal cord. Because an injury to any of these structures may be life threatening, all neck injuries are considered serious.

Apply direct pressure to control bleeding neck wounds. Once bleeding is controlled, dress the neck (Figure 14-31). In rare cases, you may have to exert finger pressure above and below the injury site to prevent further neck bleeding.



Figure 14-30 To bandage an eye impaled by an object, use a paper cup to cover the impaled object, then bandage both eyes to minimize eye movement.
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Figure 14-31 Dressing a neck wound. **A.** Apply direct pressure over the wound to control bleeding. **B.** Place the dressing over the wound.

A&B: © Jones & Bartlett Learning. Courtesy of MIEMSS.

Always keep in mind that major trauma to the neck may be associated with airway problems and with neck fracture or spinal cord injury. Therefore, maintain the patient's airway and stabilize the head and neck.

Chest and Back Wounds

The major organs affected by chest wounds and back wounds are the lungs, large blood vessels, and heart. Any wound involving these organs is a life-threatening

injury. Place the patient with a chest injury in a comfortable position (usually sitting) (see Chapter 15, *Injuries to Muscles and Bones*).

If a lung is punctured, air can escape and the lung can collapse. The patient may cough up bright red blood. To help maintain air pressure in the lung, your first action should be to cover any open chest wound with an airtight material, thereby sealing the wound. This covering is called an **occlusive dressing**. Use a clear plastic cover from your medical supplies, aluminum foil, plastic wrap, gloves, or a special dressing that has been impregnated with petroleum jelly (Vaseline). Any material that will occlude (seal off) the wound is sufficient **Figure 14-32**.

Administering oxygen is important early treatment for a patient with an injured lung. It should be given by EMS personnel when they arrive or by EMRs who are trained and have the equipment available.

Chest wounds may also damage the heart. Seal the wound in the manner described and monitor the patient's airway, breathing, and circulation. Treat the patient for shock and perform CPR, if necessary.

If the patient's breathing becomes more labored after you seal the chest wound, you may need to remove the seal briefly to allow excess air to escape and then reseal the wound.

Impaled Objects

If an object is impaled in the patient, apply a stabilizing dressing and arrange for the patient's *prompt transport* to an appropriate medical facility. Sometimes an impaled object is too long to permit the patient to be removed from the scene and transported to an appropriate medical facility. In these situations, it may be necessary to stabilize the impaled object and carefully cut it close to the patient's body. If you encounter a situation like this, stabilize the impaled object as well as you can and immediately request a specialized rescue team that has the tools and training to handle this type of incident.



Figure 14-32 For occlusive dressings, use plastic wrap, petroleum jelly, or gloves.

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If your patient has a knife or other object protruding from the abdomen, do not attempt to remove it. Instead, support the impaled object so it cannot move. Place a large roll of gauze or towels on either side of the object and secure the rolls with additional gauze wrapped around the patient's body. It is important to stabilize the object so it will not move while the patient is being transported to the hospital **Figure 14-33**. Any movement of the object may cause further internal damage.



Figure 14-33 Bandaging an impaled object. **A.** Do not attempt to remove or move an impaled object. **B.** Stabilize the object in place with dressings. **C.** Place a bandage over the dressings.

A, B, & C: © Jones & Bartlett Learning. Courtesy of MIEMSS.

Closed Abdominal Wounds

Closed abdominal wounds commonly occur as the result of a direct blow from a blunt object. Check for a closed abdominal wound whenever force has been applied to the abdomen. Look for bruises or other marks on the abdomen that indicate blunt injury.

Any time an injured patient is experiencing shock, you should remember that there may be internal abdominal injuries accompanied by bleeding. When there is internal bleeding, the abdomen may become swollen, rigid, or hard like a board. Treat patients with closed abdominal injuries and signs of shock by placing them on their backs (unless they are having difficulty breathing). Use blankets to help conserve their body heat and elevate the legs if indicated by local protocol.

If the patient is vomiting blood (ranging in color from bright red to dark brown), it may be an indication of bleeding from the esophagus or stomach. Monitor the patient's airway and vital signs carefully because shock may result. Give the patient nothing by mouth. Arrange for *prompt transport* to an appropriate medical facility.

Special Populations

Septic Shock

Septic shock is caused by a system-wide infection. It is a very serious condition that can result in rapid decrease of the patient's blood pressure. It is most common in older adults and people who have weakened immune systems. This recognition and treatment of this condition is discussed more fully in Chapter 18, *Geriatric Emergencies*.

Open Abdominal Wounds

Open abdominal wounds usually result from slashing with a knife or other sharp object and are always serious injuries.

If the intestines are protruding from the abdomen (an evisceration), place the patient on his or her back with the knees bent to relax the abdominal muscles. Cover the injured area with a sterile dressing **Figure 14-34**. Do not attempt to replace the intestines inside the abdomen.

You can make a bandage from a large trauma pad (10 inches × 30 inches [25 cm × 76 cm]) and several cravats to cover protruding abdominal intestines. Position the trauma pad to cover the whole area of the wound. Tie two or three wide cravats loosely over the trauma pad, just tightly enough to keep it firmly in place, but not tightly enough to push the intestines back into the abdomen.

EMTs and paramedics carry sterile **saline** (salt water) that can be poured on the dressing to keep the protruding organs moist so they do not dry out. Use only sterile saline.

Treatment

To treat an open abdominal wound, follow these steps:

1. Apply a sterile dressing to the wound.
2. Maintain the patient's body temperature.
3. Place the patient on his or her back with the knees bent.
4. Place the patient who is having difficulty breathing in a semireclining position.
5. Administer oxygen if it is available and you are trained to use it.

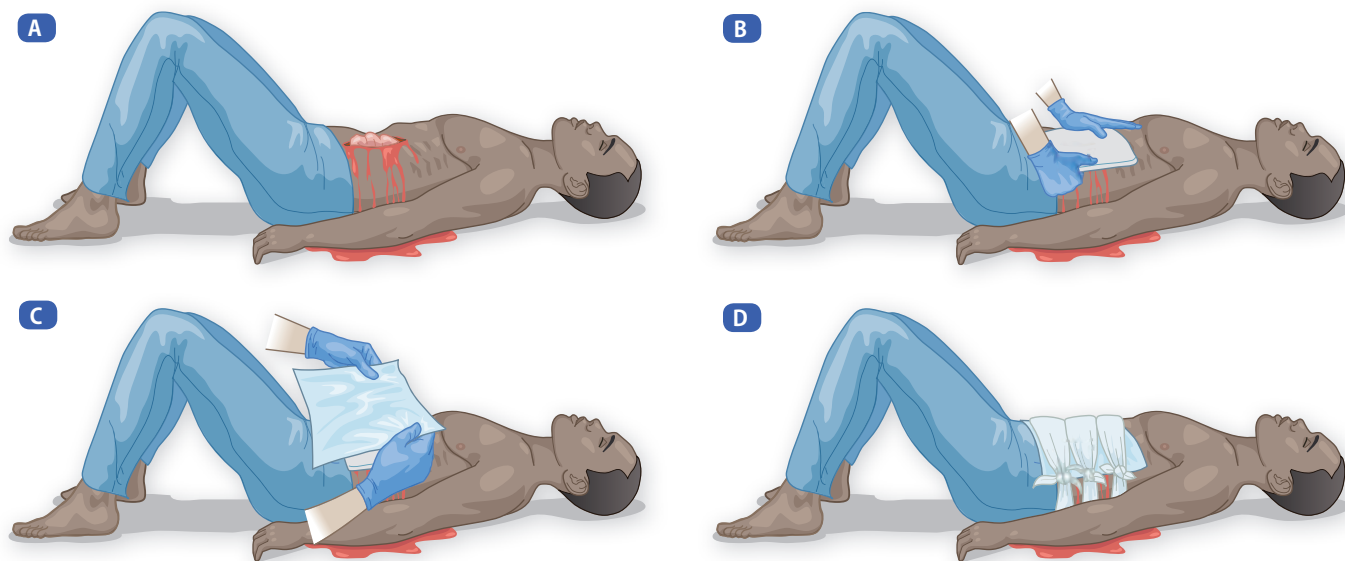


Figure 14-34 Bandaging an open abdominal wound. **A.** Place the patient on his or her back with the knees bent to relax the abdominal muscles. **B.** Cover the injured area with a sterile dressing. Do not attempt to replace the intestines inside the abdomen. **C.** Place a large trauma pad over the wound. **D.** Use several wide cravats to loosely cover the trauma pad. Place them just tight enough to hold the abdominal contents in place.

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Figure 14-35 Bandaging a hand wound. **A.** Place a dressing over the wound. **B.** Place a gauze roll in the palm of the hand to apply pressure. **C.** Secure the dressing with a gauze roller bandage.

A, B & C: © Jones & Bartlett Learning.



Figure 14-36 Bandaging an extremity wound. **A.** Place a dressing over the wound. **B.** Secure the dressing with a cravat. **C.** Secure the dressing with a roller bandage.

A, B & C: © Jones & Bartlett Learning.

Genital Wounds

Both male and female genitals have a rich blood supply. Injury to the genitals often results in severe bleeding. Apply direct pressure to any genital wound with a dry, sterile dressing. Direct pressure usually stops the bleeding. Although it may be embarrassing to examine the patient's genital area to determine the severity of the injury, you must do so if you suspect such injuries. The patient can experience a critical loss of blood if you do not find the injury and control the bleeding.

Extremity Wounds

To treat all open extremity wounds, apply a dry, sterile compression dressing and bandage it securely in place

Figure 14-35 and **Figure 14-36**. Elevate the injured part to help decrease bleeding and swelling. Splint all injured extremities prior to transport because there may be an underlying fracture.

Gunshot Wounds

Some gunshot wounds are easy to miss unless you perform a thorough patient examination **Figure 14-37**. Most deaths from gunshot wounds result from internal blood loss caused by damage to internal organs and major blood vessels. Because gunshot wounds are so serious, prompt and effective treatment is important. Gunshot wounds of the trunk and neck can cause spinal cord injuries. Because you cannot see the bullet's path

YOU are the Provider

CASE 3

It is almost midnight on Saturday when you are dispatched to the Friendly Bar & Lounge for a report of a stabbing. Your dispatcher quickly announces that the police have been notified. On the way to the scene, you cannot help but think about scene safety. After a 4-minute response, you arrive at the scene. A quick glance at the parking lot reveals at least four police cars on the scene. An officer approaches your vehicle as you are getting out and tells you the scene is secure. She leads you to an outdoor bench where your patient is sitting. You find a 30- to 35-year-old man, Alex, who is holding his abdomen with both hands. He appears to be in a lot of pain. As you begin to question him he tells you that he and Marco got into an argument and suddenly Marco pulled out a knife and stabbed him twice in the belly. Your patient exam reveals two small cuts on his stomach. Both cuts are seeping small amounts of blood. Your exam does not reveal additional injuries. Alex's pulse is 84 beats per minute, his blood pressure is 112/74 mm Hg, and his respirations are 22 breaths per minute. He is sweating. You are not surprised to detect a strong odor of alcohol on his breath.

1. What initial treatment can you give to this patient?
2. What additional care does this patient need?



Figure 14-37 Bullet entry wound.
© Mediscan/Alamy.

through the body, you should treat these patients for spinal cord injuries.

To treat a patient with a gunshot wound, follow these steps:

1. Open the airway and establish adequate ventilation and circulation.
2. Control any external bleeding by covering wounds with sterile dressings and applying pressure with your hand or a bandage.
3. Examine the patient thoroughly to ensure you have discovered all entrance and exit wounds.
4. Treat for symptoms of shock by performing the following actions:
 - Maintain the patient's body temperature.
 - Place the patient on his or her back and elevate the legs if indicated by local protocol.
 - Place a patient who is having difficulty breathing in a semireclining position.
 - Administer oxygen, if available.
5. Arrange for *prompt transport* of the patient to an appropriate medical facility.
6. Perform CPR if the patient's heart stops as a result of loss of blood.

Bites

Bites from animals or humans may range from minor to severe. All bites carry a high risk of causing infection. Bites from an unvaccinated or wild animal may cause **rabies**. Minor bites can be washed with soap and water, if they are available. Major bite wounds should be treated by controlling the bleeding and applying a suitable dressing and bandage.

All patients who have been bitten by an animal or another person must be treated by a physician. In most states, EMS or hospital personnel are required to report animal bites to the local health department or a law enforcement agency. Check the laws in your local area to determine requirements.

Burns

The skin serves as a barrier that prevents foreign substances, such as bacteria, from entering the body. It also prevents the loss of body fluids. When the skin is damaged, such as by a burn, it can no longer perform these essential functions.

Words of Wisdom

Characteristics for burn classification include the following:

- Depth
- Extent (amount of the body injured by the burn)
- Cause or type

► Burn Depth

There are three classifications of burns by depth: superficial (first-degree) burns, partial-thickness (second-degree) burns, and full-thickness (third-degree) burns. Although it is not always possible to determine the exact degree of a burn injury, it is important to understand this concept.

Superficial burns (first-degree burns) are characterized by reddened and painful skin. The injury is confined to the outermost layers of skin, and the patient experiences minor to moderate pain. An example of a superficial burn is sunburn, which usually heals in about a week, with or without treatment **Figure 14-38**.

Partial-thickness burns (second-degree burns) are somewhat deeper but do not damage the deepest layers of the skin **Figure 14-39**. Blistering is present, although blisters may not form for several hours in some cases. There may be some fluid loss and moderate to severe pain because the nerve endings are damaged. Partial-thickness burns require medical treatment. They usually heal within 2 to 3 weeks.

Full-thickness burns (third-degree burns) damage all layers of the skin. In some cases, the damage is deep



Figure 14-38 Superficial or first-degree burn.
© Amy Walters/Shutterstock.

enough to injure and destroy underlying muscles and other tissues (Figure 14-40). Pain is often absent because the nerve endings have been destroyed. Without the protection provided by the skin, patients with extensive full-thickness burns lose large quantities of body fluids and are susceptible to shock and infection.

If the patient has injuries in addition to the burn, treat the injuries before transporting the patient. For example, if a patient who has a partial-thickness burn of the arm has also fallen off a ladder and fractured both



Figure 14-39 Partial-thickness or second-degree burn.
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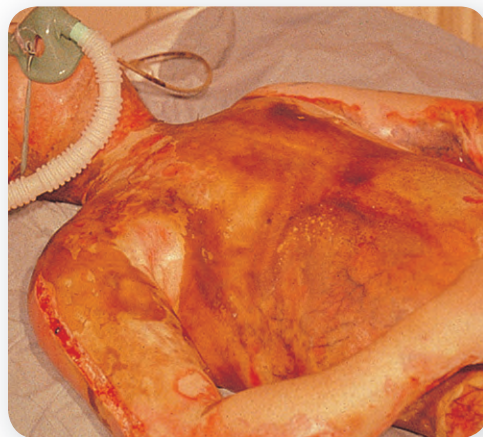


Figure 14-40 Full-thickness or third-degree burn.
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legs, splint the fractures and place the patient on a backboard, in addition to treating the burn injury.

► Extent of Burns

The **rule of nines** is a method used to determine what percentage of the body has been burned. Although this rule is most useful for EMTs and paramedics who report information to the hospital from the field, you should be able to roughly estimate the extent of a burn.

Figure 14-41 shows how the rule of nines divides the body. In an adult, the head and arms each equal 9% of the total body surface. The front and back of the trunk and each leg are equal to 18% of the total body surface. For example, if one half of the back and the entire right arm of a patient are burned, the burn involves about 18% of the total body area. The rule of nines is slightly modified for young children, but the adult percentages serve as an adequate guide.

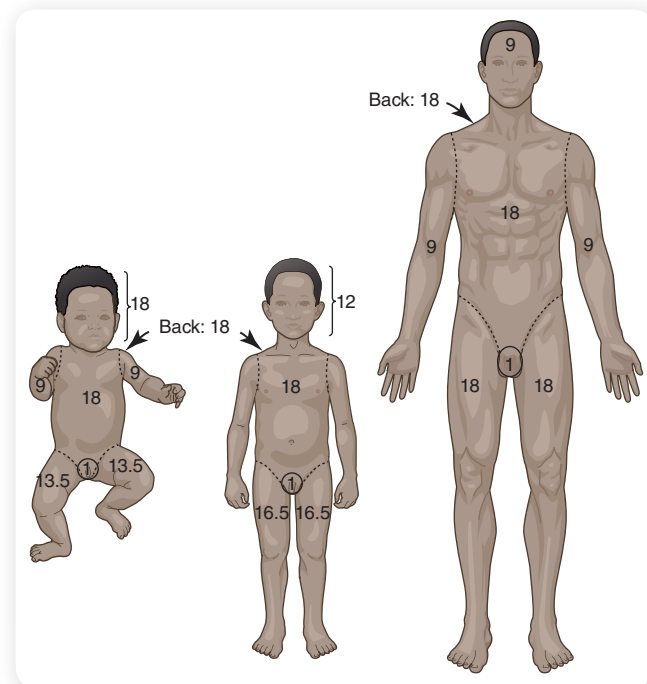


Figure 14-41 Use the rule of nines to determine the extent of burns.
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YOU are the Provider

CASE 4

It is 2330 hours and you have been called to the local university for a report of a man who has burns as the result of a dormitory fire. You arrive at the scene to find a 20-year-old man with full-thickness burns to both forearms, from the wrist to the elbow. The patient indicates that while he was sleeping, his electric blanket caught fire. He attempted to put out the fire with his arms, which resulted in the severe burns on his arms. The fire department has extinguished the fire and removed the patient from the burned room.

1. What distinguishes a full-thickness burn from a partial-thickness burn?
2. Why is a person with full-thickness burns at an increased risk for shock?

► Cause or Type of Burns

Burns are an injury to body cells caused by excess exposure to heat (thermal burns), chemicals, or electricity. They may involve a small area of the body or involve the entire body. Burns can cause minor injuries affecting only the top layers of the skin or they can be deep, involving muscles, blood vessels, and nerves. Severe burns can involve damage to all the organs and systems of the body. This section discusses the three major causes of burns: heat, chemicals, and electricity. It discusses the impact the size and severity of the burn have on the patient, as well as the care and treatment you can provide to a burn patient.

Thermal Burns

Thermal burns are caused by heat. The first step in treating thermal burns is to cool the skin by putting out the fire. Superficial burns can be quite painful, but if there is clean, cold water available, you can place the burned area in cold water to help reduce the pain. You can also wet a clean towel with cold water and put it on superficial burns. After the burned area is cooled, cover it with a dry, sterile dressing or a large sterile cloth called a burn sheet (found in your EMR life support kit) **Figure 14-42**.

Treatment

Do not apply burn ointments, butter, grease, or cream to any burn!

Partial-thickness burns should be cooled if the burn area is still warm. Cooling helps reduce pain, stops the heat from further injuring the skin, and helps stop the swelling caused by partial-thickness burns.

If blisters are present, be very careful not to break the blisters. Intact skin, even if blistered, provides an excellent barrier against infection. If the blisters break, the danger of infection increases. Cover partial-thickness burns with a dry, sterile dressing or burn sheet.



Figure 14-42 Sterile burn sheet.
© Jones & Bartlett Learning. Courtesy of MIEMSS.

Full-thickness burns, if still warm, should also be cooled with water to keep the heat from damaging more skin and tissue. Cut any clothing away from the burned area, but leave any clothing that is stuck to the burn. Cover full-thickness burns with a dry, sterile dressing or burn sheet **Figure 14-43**.

Patients with large superficial burns or any partial-thickness or full-thickness burns must be treated for shock and transported to a hospital.

Respiratory Burns

A burn to any part of the airway is a **respiratory burn**. If a patient has been burned around the head and face or while in a confined space (such as in a burning house), look for the signs and symptoms of respiratory burns listed in the Signs and Symptoms box.

Watch the patient carefully. Breathing problems that result from this type of burn can develop rapidly or slowly over several hours. Administer oxygen as soon as it is available and be prepared to perform CPR. If you suspect that a patient has sustained respiratory burns, arrange for *prompt transport* to a medical facility.

Signs and Symptoms

Signs and symptoms of a respiratory burn include the following:

- Burns around the face
- Singed nose hairs
- Soot in the mouth and nose
- Difficulty breathing
- Pain while breathing
- Unconsciousness as a result of a fire



Figure 14-43 Applying a sterile burn sheet.
A & B: © Jones & Bartlett Learning. Courtesy of MIEMSS.

Chemical Burns

Many strong substances can cause **chemical burns** to the skin, and chemicals are extremely dangerous to the eyes. These substances include strong acids such as battery acid or strong alkalis such as drain cleaners. Some chemicals are so strong or caustic that they can cause damage to the skin or eyes even if the exposure is very brief. The longer the chemical remains in contact with the skin, the more it damages the skin and underlying tissues, oftentimes resulting in superficial, partial-thickness, or full-thickness burns to the skin.

The initial treatment for chemical burns is to remove as much of the chemical as possible from the patient's skin. Brush away any dry chemical on the patient's clothes or skin, being careful not to get any on yourself. You may have to ask the patient to remove all clothing.

After you have removed as much of the dry chemical as possible, flush the contaminated skin with abundant quantities of water. Use water from a garden hose, a shower in the home or factory, or even the booster hose of a fire engine. It is essential that the chemical be washed off the skin quickly to avoid further injury. Flush the affected area of the body for at least 10 minutes, then cover the burned area with a dry, sterile dressing or a burn sheet and arrange for *prompt transport* to an appropriate medical facility.

Safety

Chemical burns are caused by hazardous materials. In situations like this, special protective equipment may be required. Follow your local protocols for these situations.

Chemical burns to the eyes cause extreme pain and severe injury. Gently flush the affected eye or eyes with water for at least 20 minutes **Figure 14-44**. Hold the eye open to allow water to flow over its entire surface. Direct the water from the inner corner of the eye to the outward edge of the eye to avoid contaminating the unaffected eye. You may have to put the patient's face under a shower, garden hose, or faucet so the water



Figure 14-44 Flushing the eyes with water.

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flows across the patient's entire face. Continue flushing the eyes while the patient is being transported.

After flushing the eyes for 20 minutes, loosely cover the injured eye or eyes with gauze bandages and arrange for *prompt transport* to an appropriate medical facility. All chemical burns should be examined by a physician.

Electrical Burns

Electrical burns can cause severe injuries or even death, but they leave little evidence of injury on the outside of the body. These burns are caused by an electrical current that enters the body at one point (for example, the hand that touches the live electrical wire), travels through the body tissues and organs, and exits from the body at the point of ground contact **Figure 14-45**.

Electricity causes major internal damage, rather than external damage. A strong electrical current can actually "cook" muscles, nerves, blood vessels, and internal organs, resulting in major damage. Patients who have been subjected to a strong electrical current can also experience irregularities of cardiac rhythm or even full cardiac arrest and death. Children often sustain electrical burns by chewing on an electrical cord or by pushing something into an outlet. Although the burn may not look serious at first, it is often quite severe because of underlying tissue injury.

Persons who have been hit or nearly hit by lightning frequently sustain electrical burns. Treat these



Figure 14-45 Electrical burns. **A.** An entrance wound is often small. **B.** An exit wound can be extensive and deep.

A&B: © Chuck Stewart, MD.

patients as you would electrical burn patients. Evaluate them carefully because they may also experience cardiac arrest. Arrange for *prompt transport* to an appropriate medical facility.

Before you touch or treat a person who has sustained an electrical burn, be certain the patient is not still in contact with the electrical power source that caused the burn. If the patient is still in contact with the power source, anyone who touches him or her may be electrocuted. If the patient is touching a live power source, your first act must be to unplug, disconnect, or turn off the power **Figure 14-46**. If you cannot do this alone, call for assistance from the power company or from a qualified rescue squad or fire department.

If a power line falls on top of a motor vehicle, the people inside the vehicle must be told to stay inside until qualified personnel can remove the power line or turn the power off. After ensuring that the power has been disconnected, examine each electrical burn patient carefully, assess the ABCs, and treat the patient for visible, external burns. Cover these external burns with a dry, sterile dressing and arrange for *prompt transport* to an appropriate medical facility.

Monitor the airway, breathing, and circulation of electrical burn patients closely, and arrange to have these patients transported promptly to an appropriate medical facility for further treatment.

Safety

Avoid direct or indirect contact with live electrical wires. Direct contact occurs when you touch a live electrical wire. Indirect contact occurs when you touch a vehicle, a patient, a fence, a tree, or any other object that is in contact with a live electrical wire.



Figure 14-46 Do not touch the patient without unplugging, disconnecting, or turning off the power first.
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Multi-System Trauma

Multi-system trauma is an injury that affects more than one body system. The injuries in multi-system trauma can occur in one part of the body but involve different body systems. For example, an unrestrained patient who hits the steering wheel in a motor vehicle crash can sustain trauma to the chest. This trauma could result in injuries to both the heart (the circulatory system) and to the lungs (the respiratory system). Another patient in a vehicle crash might have injuries to different parts of body, for example, to the abdomen and to the head. Both of these patients have sustained multi-system trauma. As an EMR, you are not expected to diagnose a patient's injuries. However, it is important to remember that several body systems may be injured in situations that involve significant trauma. As you assess your patients, be alert for signs and symptoms of injury to each part of the body.

YOU are the Provider

SUMMARY

You are the Provider: CASE 1

1. What safety considerations should you keep in mind as you approach this situation?

Ensure the scene is safe for you, the patient, and bystanders. As you approach the scene, ensure there are no objects that can fall from above. Be certain that all power tools are turned off and unplugged. Be certain the saw blade and other sharp objects are out of the way. Maintain standard precautions to prevent the spread of bloodborne diseases. Remember to wear gloves to protect yourself from contact with blood. If there is a chance of blood splatter, consider the need for eye protection.

2. What equipment and supplies do you want to take with you?

For an incident such as this, there are three types of equipment you should take with you: equipment to maintain standard precautions, supplies for wound treatment, and equipment to treat the patient for shock. The equipment for standard precautions includes latex or nitrile gloves and eye protection for any possible blood splatter. Wound treatment equipment should include an adequate supply of dressings and bandages to treat the wound and supplies to immobilize the affected extremity. Equipment to treat for shock should include blankets to preserve body heat, a blood pressure cuff to assess blood pressure, and

YOU are the Provider

SUMMARY

oxygen administration equipment if it is available and you have been trained in its use.

3. What are your treatment goals for this incident?

The goals for this incident include maintaining standard precautions, treating soft-tissue injuries by controlling external bleeding, preventing further contamination of the wound site, immobilizing the affected extremity, and treating the patient for shock.

You are the Provider: CASE 2

1. What are your initial steps in treating this patient?

Your initial treatment steps should include the following: ensure scene safety; look for any additional hidden weapons as you approach to examine the patient; take standard precautions to prevent contact with blood; control the external bleeding by placing a dressing over the wound, applying direct pressure, and then applying a pressure dressing; treat the patient for shock by placing him either in a supine position or a reclining position if he is having difficulty breathing and maintaining body temperature; take an initial set of vital signs; and ensure that an EMS transport unit is responding.

2. How serious is an injury like this?

A gunshot wound to the thigh is a serious injury. You cannot determine the pathway of the bullet or the parts of the leg that have been damaged. There is the possibility that the bullet may have traveled into the abdomen and caused additional damage. This type of injury often causes a significant amount of internal blood loss. There are no good ways for you to measure this blood loss. It is important for you to take repeat vital signs every 5 minutes to monitor the patient for signs of shock. The initial signs and symptoms of shock include: pale, cool, or clammy skin; increased heart rate and respiratory rate; and a sense of anxiety. It is also important to arrange for prompt transportation to an appropriate medical facility as soon as possible.

You are the Provider: CASE 3

1. What initial treatment can you give to this patient?

After you have completed your assessment of this patient, you need to put the pieces together to determine what type of injury you have found and then develop a treatment plan. This patient has two small wounds in his abdomen reportedly from a knife. There is no way for you to

determine how deep these wounds are, what organs have been damaged, or the amount of internal blood loss he has suffered. You need to understand that this type of wound can result in profound shock from internal blood loss; therefore your actions are to treat the patient for shock by placing him in a comfortable position—often for this type of injury, it will be lying supine with his legs drawn up or reclining—and maintaining his body temperature. Monitor his airway, breathing, and circulation. Monitor his vital signs every 5 minutes and be alert for the possibility that his vital signs may change rapidly. Apply a dressing to the abdominal wounds. Maintain standard precautions. Finally, ensure this patient is promptly transported to an appropriate medical facility that can provide evaluation and needed treatment.

2. What additional care does this patient need?

Advanced life support providers can provide additional treatment for shock by administering IV fluids. However, the care most needed by this patient can be provided only by a physician in a hospital setting. In the hospital, this patient will need to be taken into surgery to determine the extent of the damage to his abdominal organs and to stop the internal bleeding by surgically repairing the damaged organs. If not treated properly, this patient can develop life-threatening infections. Therefore, it is important for you to arrange for prompt transportation of this patient to an appropriate medical facility as soon as possible while continuing to monitor his vital signs and treating him for shock. If internal blood loss continues, his condition may deteriorate quickly.

You are the Provider: CASE 4

1. What distinguishes a full-thickness burn from a partial-thickness burn?

In partial-thickness burns, the burned area is very painful, the skin will be red, and blisters will form within a few hours. Full-thickness burns penetrate down through the dermis and epidermis, often into the underlying subcutaneous tissue, muscle, and bone. Full-thickness burns are usually blackened or charred. Pain in the burned area may be absent or diminished because of damage to the nerve endings. Many times it will not be possible to determine the thickness of burns immediately after they occur.

2. Why is a person with full-thickness burns at an increased risk for shock?

The integrity of the skin has been compromised in a full-thickness burn, allowing fluids to escape. The loss of body fluids can lead to hypovolemic shock. These patients can also develop severe infections if they do not receive proper and timely treatment.

Prep Kit

► Ready for Review

- This chapter covers the knowledge and skills you need to treat patients experiencing shock, bleeding, and soft-tissue injuries.
- Maintain standard precautions to prevent contact with the patient's body fluids.
- The three parts of the circulatory system are the pump (heart), the pipes (arteries, veins, and capillaries), and the fluid (blood cells and other blood components).
- Shock is a state of collapse of the cardiovascular system that results in inadequate delivery of blood to the organs. The three primary causes of shock are pump failure, pipe failure, and fluid loss. The general treatment for shock is positioning the patient correctly, maintaining the patient's ABCs, and treating the cause of shock, if possible.
- There are three types of external blood loss: capillary (blood oozes out), venous (bleeds at a steady flow), and arterial (blood spurts or surges). Most external bleeding can be controlled by applying direct pressure to the wound.
- A wound is an injury caused by any physical means that leads to damage of a body part. Wounds are classified as closed (skin remains intact) or open (skin is disrupted). Open wounds are classified as abrasions, punctures, lacerations, and avulsions or amputations.
- Control bleeding by covering an open wound with a dry, clean, or sterile dressing and apply pressure to the dressing with your hand. Additional ways to control bleeding include elevating an extremity, applying a tourniquet, and using pressure points.
- There are three classifications of burns by depth: superficial (first-degree) burns, partial-thickness (second-degree) burns, and full-thickness (third-degree) burns. Burns may be caused by heat, chemicals, or electricity.
- By learning to recognize and provide initial emergency treatment for patients experiencing shock, bleeding, and soft-tissue injuries, you will be able to provide physical and emotional assistance to these patients in their time of need. At times, your prompt recognition and treatment will make a real difference in the outcome.
- Injuries that affect more than one body system are called multi-system trauma. Multi-system trauma may be a result of an injury to one part of the body or it can be caused by injuries to different parts of the body.

► Vital Vocabulary

- abrasion** Loss or damage of skin as a result of a body part being rubbed or scraped across a rough or hard surface.
- anaphylactic shock** Shock caused by an extreme allergic reaction to certain foods, medications, or insect bites and stings.
- arterial bleeding** Serious bleeding from an artery in which blood frequently pulses or spurts from an open wound.
- atria** The two upper chambers of the heart.
- avulsion** An injury in which a piece of skin is torn completely loose or is left hanging as a flap.
- blood pressure** The pressure of the circulating blood against the walls of the arteries.
- brachial artery pressure point** Pressure point located in the arm between the elbow and the shoulder; also used in taking blood pressure and for checking the pulse in infants.
- bruise** Injury caused by a blunt object striking the body and crushing the tissue beneath the skin. Also called a contusion.
- capillary bleeding** Bleeding from the capillaries in which blood oozes from the open wound.
- cardiogenic shock** Shock resulting from inadequate functioning of the heart.
- chemical burns** Burns that occur when any toxic substance comes in contact with the skin. Most chemical burns are caused by strong acids or alkalis.
- closed wound** Injury in which soft-tissue damage occurs beneath the skin but there is no break in the surface of the skin.
- congestive heart failure (CHF)** Heart disease characterized by breathlessness, fluid retention in the lungs, and generalized swelling of the body.
- cravat** A triangular swathe of cloth used to hold a body part splinted against the body.
- dressing** Any of various materials placed directly on a wound to control bleeding and prevent further contamination.
- electrical burns** Burns caused by contact with high- or low-voltage electricity. Electrical burns have an entrance and an exit wound.
- entrance wound** Point where an object such as a bullet enters the body.
- exit wound** Point where an object such as a bullet passes out of the body.
- femoral artery pressure point** Pressure point located in the groin, in the middle of the bottom crease of the groin, between the groin and the upper thigh.

Prep Kit *Continued*

full-thickness burns Burns that extend through the skin and into the underlying tissues; the most serious class of burns.

gunshot wound A puncture wound caused by a bullet or shotgun pellets.

hemorrhage Excessive bleeding.

hemostatic agent A chemical compound that slows or stops bleeding by assisting with clot formation.

immobilize To reduce or prevent movement of a limb, usually by splinting.

impaled object An object such as a knife, splinter of wood, or glass that penetrates the skin and remains in the body.

intravenous (IV) fluids Fluids other than blood or blood products infused into the vascular system to maintain an adequate circulatory blood volume.

laceration An irregular cut or tear through the skin.

multi-system trauma An injury that affects more than one body system.

occlusive dressing An airtight dressing or bandage for a wound.

open wound Injury that breaks open the skin or mucous membrane.

partial-thickness burns Burns in which the outer layers of skin are burned; these burns are characterized by blister formation.

pneumatic antishock garments (PASGs) Trouser-like devices placed around a shock victim's legs and abdomen and inflated with air.

pressure points Points where a blood vessel lies near a bone; pressure can be applied to these points to help control bleeding.

psychogenic shock Commonly known as fainting; caused by a temporary reduction in blood supply to the brain.

puncture A wound resulting from a bullet, knife, ice pick, splinter, or any other pointed object.

rabies An acute viral infection of the central nervous system transmitted by the bite of an infected animal.

respiratory burn Burn to the respiratory system resulting from inhaling superheated air.

road rash An abrasion caused by sliding on pavement. Usually seen after motorcycle or bicycle accidents.

rule of nines Used to calculate the amount of body surface burned; the body is divided into sections, each of which constitutes approximately 9% or 18% of the total body surface area.

saline Salt water.

shock A state of collapse of the cardiovascular system; the state of inadequate delivery of blood to the organs of the body.

splint A means of immobilizing an injured part by using a rigid or soft support.

spontaneous nosebleed A nosebleed with no apparent cause.

superficial burns Burns in which only the superficial part of the skin has been injured; an example is a sunburn.

thermal burns Burn caused by heat; the most common type of burn.

venous bleeding External bleeding from a vein, characterized by steady flow; the bleeding may be profuse and life threatening.

ventricles The two lower chambers of the heart.



Assessment in Action

You are dispatched to a lumber yard for a report of a log falling on a person. On arrival, you find a 21-year-old man lying in the supine position on the floor, holding his abdomen and reporting severe pain. He is also holding a blood-soaked T-shirt to his right forearm. Your primary assessment reveals a bruise approximately 3 inches (8 cm) in diameter to the right upper quadrant of the abdomen and a 1.5-

inch (4-cm) flap of skin and fat that is loosely attached on his right arm, 2 inches (5 cm) below the elbow. Physical exam reveals a rigid abdomen. The patient has no pain in his head, neck, or spine. (Questions 1–6 relate to this scenario.)

1. What is your first concern as you arrive at the scene?
 - A. The patient is bleeding profusely.
 - B. How many patients are there?
 - C. Do I have all the resources I need?
 - D. Is the scene safe?
2. What is your primary concern about this patient?
 - A. His back may be injured.
 - B. He is bleeding into the abdomen and may go into shock.
 - C. The cut on his arm may need a tourniquet.
 - D. He is in a significant amount of pain.
3. What type of standard precaution is NOT needed when treating this patient?
 - A. Gloves
 - B. Eye protection
 - C. Gown
 - D. Face mask
4. What is the proper order to follow to control bleeding?
 1. Elevation
 2. Pressure points
 3. Direct pressure
 4. Tourniquet
 - A. 3, 1, 4, 2
 - B. 2, 3, 1, 4
 - C. 3, 4, 2, 1
 - D. 4, 1, 3, 2
5. What type of wound does this patient have on his arm?
 - A. Avulsion
 - B. Amputation
 - C. Laceration
 - D. Impaled object
6. If using a pressure point to assist in bleeding control for the forearm, which artery will you apply pressure to?
 - A. Femoral
 - B. Brachial
 - C. Carotid
 - D. Radial
7. Neck injuries may be life threatening because:
 - A. they are close to the brain.
 - B. they may result in injury to the parasympathetic nervous system.
 - C. the neck contains many important structures.
 - D. they result in shock.
8. Put the following steps for treating an impaled object in the proper order.
 1. Stabilize the object in place with dressings.
 2. Provide prompt transport to an appropriate medical facility.
 3. Do not attempt to remove the impaled object.
 4. Place a bandage over the dressings.
 - A. 1, 4, 2, 3
 - B. 3, 1, 4, 2
 - C. 2, 3, 4, 1
 - D. 3, 2, 1, 4

Assessment in Action *Continued*

9. Which of the following is NOT a recommended treatment for treating an open abdominal wound?
- A. Bandage the abdomen with a large trauma pad and several cravats.
 - B. Place the patient on his or her back with his or her knees drawn up.
 - C. Cover the intestines with a sterile dressing.
 - D. Attempt to replace the intestines back in the abdomen.
10. Which of the following statements is NOT true about a patient who has come in contact with an electrical current?
- A. Electrical current often produces severe burns.
 - B. Contact with an electrical current leaves little evidence of injury on the outside of the body.
 - C. Electrical current may produce entrance and exit wounds.
 - D. Most of the injury from electricity is to the skin.