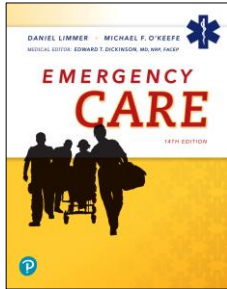


Emergency Care

Fourteenth Edition



Chapter 29

Bleeding and Shock

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Topics

- [The Circulatory System](#)
- [Shock](#)
- [Bleeding](#)

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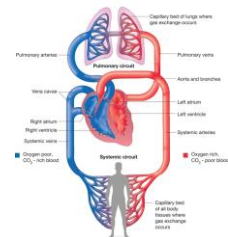
The Circulatory System

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Circulatory System



[For long description, see slide 85: Appendix 1](#)

The circulatory system.

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Main Components (1 of 7)

- Heart
- Blood vessels
- Blood

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Main Components (2 of 7)

- Heart
 - Job is to pump blood
 - Supplies oxygen and nutrients to body's cells
 - Must pump at an adequate rate and rhythm

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Main Components (3 of 7)

- Arteries
 - Carry oxygenated blood away from the heart
 - Have thick, muscular walls that enable dilation and constriction



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Main Components (4 of 7)

- Capillaries
 - Microscopic blood vessels
 - Vital exchange site
 - Oxygen, nutrients passed through capillary walls in exchange for carbon dioxide from cells



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Main Components (5 of 7)

- Veins
 - Carry oxygen-depleted blood rich in carbon dioxide back to the heart
 - Contain one-way valves to prevent back flow of blood



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Main Components (6 of 7)

- Functions of blood
 - Transportation of gases
 - Nutrition
 - Excretion
 - Protection
 - Regulation



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Main Components (7 of 7)

- Perfusion
 - Adequate circulation of blood throughout body
- Hypoperfusion
 - Inadequate perfusion of body's tissues and organs



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Shock

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Shock

- Inadequate tissue perfusion
- If hypoperfusion persists, cells and organs will die.



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Pathophysiology of Shock

- Four causes
 - Volume problems
 - Pump problems
 - Blood vessel tone problems
 - Obstruction of blood flow



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Volume Problems

- Hypovolemia
 - Blood is lost (absolute hypovolemia)
 - Plasma is removed from circulatory system (relative hypovolemia)
 - Not enough blood volume in the blood vessels, so pressure falls
 - Both absolute and relative hypovolemia are called hypovolemic shock
 - Hemorrhagic shock is loss of blood



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Pump Problems

- Caused by failure of the heart to pump blood
- Usually related to a mechanical problem of the heart
- Blood cannot be moved because of a drop in blood pressure
- Categorized as cardiogenic shock



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Blood Vessel Tone Problems

- All blood vessels dilate at the same time
 - Blood cannot fill entire circulatory system
 - Referred to as distributive shock
- Types of distributive shock
 - Anaphylactic shock
 - Neurogenic shock
 - Septic shock



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Obstruction of Blood Flow

- Blood flow is blocked
 - Called obstructive shock
- Caused by conditions such as:
 - Pulmonary embolism
 - Cardiac tamponade
 - Tension pneumothorax



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Fight or Flight

- Baroreceptors stimulate release of epinephrine and norepinephrine
 - Blood vessels constrict
 - Skin becomes cool and pale
 - Skin becomes sweaty
 - Kidneys produce less urine
 - Nausea and vomiting
 - Increased heart rate and contractility



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Compensation

- Body senses the decrease in perfusion and attempts to compensate for it.
- Compensation aims to restore blood flow.
 - Regulation of volume
 - Vasoconstriction
 - Cardiopulmonary response
- Compensatory actions collectively called compensated shock.



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Pediatric Note

- Infants and children
 - Efficient compensating mechanisms maintain blood pressure until half of volume is depleted
- Never wait for a drop in blood pressure to identify shock in pediatric patients.
- Pediatric patients rely on heart rate to compensate for shock.
 - Fast heart rates are a key indicator of shock.



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Decompensation

- Compensated shock requires more fuel.
- When muscles run out of fuel for compensation, compensated shock becomes decompensated shock.
- Indicators of decompensation
 - Drop in blood pressure
 - Mental status changes
 - Slow heart rate
 - Slow respiratory rate



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Irreversible Shock and Death

- Prolonged vasoconstriction will lead to organ-system damage and death over time.
- As organs begin to fail, irreversible shock begins.
- Often results in apnea and cardiac arrest.



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Patient Assessment (1 of 11)

- Identify underlying problem
- Recognize compensation
- Scene survey for mechanism of injury/illness
- Primary assessment



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Patient Assessment (2 of 11)

- Airway
 - Correct airway problems immediately
- Breathing
 - Never allow patient to become or remain hypoxic
 - Treat hypoxia with supplemental oxygen



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Patient Assessment (3 of 11)

- Circulation
 - Skin color
 - Distal pulses
 - Capillary refill time
 - Heart rate
- Treat problems found in primary assessment immediately
- Identify shock by trends in vital signs



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Patient Assessment (4 of 11)

- Physical examination
 - Identify conditions that are associated with shock
- History taking in secondary assessment
 - Mechanism of injury
 - History of present illness
 - Chief complaint



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Signs of Shock



[For long description, see slide 86: Appendix 2](#)

Signs of shock will be detectable during the patient assessment.



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Treating Shock (1 of 3)

- Treatment depends on underlying cause.
- Best way to resolve hypoperfusion is to stop whatever is causing it.
 - May mean surgery
- Use primary assessment to identify urgent interventions.
- Use patient assessment to identify treatment needs.



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Treating Shock (2 of 3)

- Deadly triad of trauma
 - Acidosis
 - Hypothermia
 - Coagulopathy



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Treating Shock (3 of 3)

- Treatment of deadly triad
 - Initiate transport to an appropriate destination
 - Prevent hypoxia
 - Prevent heat loss
 - Consider shock positioning
 - Consider advanced life support (ALS)



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Patient Care (1 of 4)

- Initiate rapid transport to an appropriate destination
- Manage specific underlying causes of shock
- Manage the airway and breathing to prevent hypoxia.
- Take steps to prevent heat loss.
- Place patient in supine position.
- Request ALS.



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Bleeding

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Types of Bleeding

- Hemorrhage is severe bleeding.
 - Major cause of shock (hypoperfusion) in trauma
- External
- Internal



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External Bleeding (1 of 2)



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Three types of external bleeding.



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External Bleeding (2 of 2)

- Occurs outside of body after force penetrates skin and lacerates or destroys underlying blood vessels
- Typically visible on surface of the skin
- How much a person bleeds determined by:
 - Size and severity of wound
 - Size and pressure of ruptured vessel
 - Individual's ability to clot



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Massive Hemorrhage (1 of 3)

- Arterial bleeding
 - Bright red color
 - Spurting with heartbeat
 - Oxygen rich



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Massive Hemorrhage (2 of 3)

- Venous bleeding
 - Darker in color than arterial bleeding
 - Less pressure than arterial bleeding
 - Volume of blood carried by some veins can create immediately life-threatening hemorrhage



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Massive Hemorrhage (3 of 3)

- Junctional hemorrhage
 - Occurs where appendages of the body connect to the trunk
 - Large arteries and veins are not well protected
 - Injury is likely to cause massive bleeding



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Other External Hemorrhage (1 of 2)

- Capillary bleeding
 - Caused by superficial wounds to surface of skin
 - Slow and oozing
 - Stops spontaneously
- All bleeding needs to be stopped
- Identifying type of bleeding is almost irrelevant



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Other External Hemorrhage (2 of 2)

- Bleeding can be accelerated by underlying conditions.
 - Prescription medications designed to limit body's natural ability to form blood clots
- Hypothermia affects body's ability to clot.
- External hemorrhage can usually be controlled by compressing the tissue around the wound.



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Precautions with External Hemorrhage

- Use Standard Precautions
 - Gloves
 - Mask
 - Eyewear
 - Gown
- Always wash hands after each call.



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Think About It 1

- How severe is the bleeding? Is it a massive hemorrhage? If so, how does that affect the priorities of treatment?



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Patient Assessment (5 of 11)

- Identify and control massive hemorrhage within first seconds of primary assessment.
- Ensure open airway.
- Ensure adequate breathing.



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Patient Assessment (6 of 11)

- Control nonmassive bleeding only after assessing and treating prior elements.
 - Be aware of signs or symptoms of shock.
 - Do not wait for symptoms of shock to appear before beginning treatment.



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Patient Care (2 of 4)

- Methods of controlling external bleeding
 - Direct pressure
 - Hemostatic agents
 - Wound packing
 - Tourniquet use on extremities
 - Specialized compression devices for junctional bleeding



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Controlling External Bleeding

- Control of bleeding is essential to preventing shock.
- Uncontrolled bleeding can lead to patient death.
- Standard Precautions are mandatory.
- Observe Standard Precautions and infection control practices when cleaning up after the call.



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Strategies for External Bleeding Control (1 of 9)

- Direct pressure
 - Apply firm pressure to wound with the palm of your hand or fingers
 - Hold pressure until bleeding is controlled.
 - Resist the temptation to apply layers of “absorbent” dressings.



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Strategies for External Bleeding Control (2 of 9)

- Direct pressure
 - Once bleeding is controlled, bandage a dressing firmly in place to form a pressure dressing.
 - Do not remove a dressing once it has been placed on the wound.



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Strategies for External Bleeding Control (3 of 9)

- Wound packing
 - Junctional areas present natural cavities that promote profuse bleeding.
 - Direct pressure should be augmented by wound packing.
 - Fill void spaces with hemostatic gauze.



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Strategies for External Bleeding Control (4 of 9)

- Wound packing
 - Pressure dressing
 - Place several gauze pads on wound.
 - Hold dressings in place with self-adhering roller bandage wrapped tightly over dressings and above and below wound site.
 - Create enough pressure to control bleeding.



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Strategies for External Bleeding Control (5 of 9)

- Hemostatic agents
 - Designed to enhance direct pressure's ability to control bleeding
 - Agents come in the form of impregnated gauze or dressings
 - Best suited for wound packing



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Strategies for External Bleeding Control (6 of 9)



Combat gauze. © Edward T. Dickinson, MD



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Strategies for External Bleeding Control (7 of 9)

- Tourniquet
 - Closes off all blood flow to and from an extremity.
 - Use if bleeding is uncontrollable by direct pressure.
 - Use only on extremity injuries.
 - Always apply between the wound and the heart.



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Tourniquet



The Mechanical Advantage Tourniquet (MAT).



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Strategies for External Bleeding Control (8 of 9)

- Tourniquet
 - Follow manufacturer's instructions.
 - Once applied, do not remove or loosen.
 - Attach notation to patient alerting other providers tourniquet has been applied.



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Strategies for External Bleeding Control (9 of 9)

- Junctional tourniquets
 - Designed specifically to control hemorrhage in junctional areas of axilla and groin



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Think About It 2

- Is the current method of bleeding control working? Do you need to move on to a more aggressive step? How would you evaluate this?



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Other Methods of Bleeding Control (1 of 2)

- Elevation
 - Elevate injured extremity above level of the heart while applying direct pressure.
 - Do not elevate if musculoskeletal injury, impaled objects in extremity, or spine injury is suspected.



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Other Methods of Bleeding Control (2 of 2)

- Splinting
 - Stabilizing sharp ends of broken bones
 - Inflatable (air) splints
- Cold application
 - Minimizes swelling, constricts blood vessels, and reduces pain
 - Use in conjunction with other manual techniques.



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Special Situations Involving Bleeding (1 of 2)

- Head injury
 - From increased intracranial pressure, not direct trauma to ears or nose
 - Stopping bleeding only increases intracranial pressure.
 - Allow drainage to flow freely, using gauze pad to collect it.



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Special Situations Involving Bleeding (2 of 2)

- Nosebleed (epistaxis)
 - Have patient sit and lean forward.
 - Apply direct pressure to fleshy portion of nostrils.
 - Keep patient calm and quiet.
 - Do not let patient lean back.
 - If patient becomes unconscious, place patient in recovery position and be prepared to suction.



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Patient Care (3 of 4)

- Begin hemorrhage control with direct pressure.
- Consider hemostatic agents to augment direct pressure.
- Consider the need for wound packing.
- Consider the use of a junctional tourniquet.
- If direct pressure fails or is inappropriate, apply a tourniquet.
- Initiate rapid transport.
- Consider the need for ALS.



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Internal Bleeding

- Damage to internal organs and large blood vessels can result in loss of a large quantity of blood in short time.
- Blood loss commonly cannot be seen.
- Severe blood loss can even result from injuries to extremities.



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Patient Assessment (7 of 11)

- Mechanisms of blunt trauma that may cause internal bleeding
 - Falls
 - Motor-vehicle or motorcycle crashes
 - Auto-pedestrian collisions
 - Blast injuries



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Patient Assessment (8 of 11)

- Common injuries from penetrating trauma
 - Gunshot wounds
 - Stab wounds
 - Impaled objects



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Patient Assessment (9 of 11)

- Signs of internal bleeding
 - Injuries to surface of body
 - Bruising, swelling, or tenderness over vital organs
 - Painful, swollen, or deformed extremities
 - Bleeding from mouth, rectum, or vagina



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Patient Assessment (10 of 11)

- Signs of internal bleeding
 - Tender, rigid, or distended abdomen
 - Vomiting coffee-grounds like substance or bright red vomitus
 - Dark, tarry stools or bright red blood in stool
 - Signs and symptoms of shock



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Patient Assessment (11 of 11)



Bruising is one sign of internal bleeding. © Edward T. Dickinson, MD



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Patient Care (4 of 4)

- Maintain ABCs.
- Consider the need for high-concentration oxygen.
- Control any external bleeding.
- Apply a splint if needed.
- Take steps to preserve body temperature.
- Provide prompt transport to appropriate medical facility.



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Chapter Review



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Chapter Review (1 of 4)

- Early signs of shock are often restlessness, anxiety, pale skin, and rapid pulse and respirations.
- If shock remains uncontrolled, the patient's blood pressure falls, a late sign of shock.



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Chapter Review (2 of 4)

- Signs and symptoms of shock may not be evident early in the call, so treatment based on the mechanism of injury may be lifesaving.
- Treat shock by maintaining the airway, preventing hypoxia, controlling bleeding, and keeping the patient warm.



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Chapter Review (3 of 4)

- Almost all external bleeding can be controlled by direct pressure and elevation. When these don't work, apply a tourniquet if bleeding is on an extremity or a hemostatic dressing if the bleeding is from the head or torso.
- Emergency care for internal bleeding is based on prevention and treatment of shock.



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Chapter Review (4 of 4)

- One of most important treatments is early recognition of shock and immediate transport to a hospital.



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Remember (1 of 4)

- The circulatory system is designed to ensure adequate perfusion of body tissues.
- The classification of hemorrhage is directly related to the type of vessel ruptured and the pressure within that vessel.



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Remember (2 of 4)

- Shock develops if the heart fails, blood volume is lost, or blood vessels dilate, resulting in inadequate perfusion.
- Signs of shock reflect the body's attempts at compensating for inadequate perfusion.



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Remember (3 of 4)

- The most significant treatment for the shock patient is early recognition and prompt transport to a hospital where the patient will receive definitive care.



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Remember (4 of 4)

- Treatment of external hemorrhage includes progression through the following steps: direct pressure, wound packing, use of hemostatic agents, and tourniquet application.
- Internal bleeding is impossible to evaluate. The most appropriate treatment must be rapid transport to an appropriate facility.



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Questions to Consider (1 of 2)

- What can I use for a tourniquet that will control bleeding but not damage tissue?
- When treating a patient with shock, what should I do at the scene and what should I do en route to the hospital?



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Questions to Consider (2 of 2)

- Is a patient with pale, cool skin, tachycardia, and rapid, shallow respirations in shock or just under stress? How will continuing assessment help in making that decision?



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Critical Thinking (1 of 2)

- A patient has been involved in a motor-vehicle collision. There is considerable damage to the vehicle. The steering column and wheel are badly deformed. The patient complains of a "sore chest." You note no external bleeding.



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Critical Thinking (2 of 2)

- The patient's vital signs are pulse 116, respirations 20, blood pressure 106/70. How would you proceed to assess and care for this patient?



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Appendix 1

Diagram shows how deoxygenated blood travels from a person's veins to the right side of the heart through the pulmonary artery to the lungs, where gas exchange occurs. Then, oxygenated blood travels from the lungs through the pulmonary vein to left side of the heart, where it is pumped back to the body.

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Appendix 2

First image depicts an EMT checking the pulse on a patient, who experienced a shock. A text reads, pulse increases to maintain cardiac output. The next image depicts the patient's lethargic, pale face. A text reads, blood vessels constrict, causing pale, clammy skin. The third image depicts an EMT's hands palpating the patient's anterior chest. Hands are placed under the front ribcage with thumbs in midline. A text reads, respiration rate increases. The fourth image depicts the patient sitting and leaning slightly to the side. A text reads, blood is shunted away from gastrointestinal organs, causing nausea. The fifth image depicts an EMT checking a manual blood pressure on the patient. A text reads, decreasing blood pressure is a late sign of shock. The final image leads to this statement in uppercase letters, Uncontrolled shock leads to death.

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Appendix 3

One hand illustrates an arterial bleed with a large amount of drainage. The image text reads, Spurting blood, pulsating flow, bright red color. The middle image shows a hand with a venous bleed with a moderate amount of drainage. The text reads, Steady slow flow, dark red color. The third hand shows a capillary bleed with a scant amount of drainage. The text reads, Slow, even flow.

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