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# First Aid, Survival, and CPR

HOME AND FIELD POCKET GUIDE

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Reusable



**Shirley A. Jones, EMT-P, RN**

- Basic Safety
- CPR and Choking Guidelines
- Medical Emergencies
- Natural Disasters
- Outdoor Survival Skills
- Poisons, Bites, and Stings
- First Aid, Survival, and Disaster Kit
- Pet CPR & First Aid

## **EMERGENCY INFORMATION CONTACTS**

### **American Red Cross (United States)**

Phone: 800-733-2767

Website: [www.redcross.org](http://www.redcross.org)

### **International Committee of the Red Cross**

Website: [www.icrc.org](http://www.icrc.org)

### **Centers for Disease Control and Prevention (United States)**

Phone: 800-232-4636

Website: [www.cdc.gov](http://www.cdc.gov)

### **Centers for Disease Control and Prevention (International)**

#### **Travelers' Health Topics (safety, vaccinations, children, pets)**

Phone: 800-232-4636

Website: [www.cdc.gov/travel](http://www.cdc.gov/travel)

### **Department of Homeland Security (United States)**

Phone: 202-282-8000

Website: [www.dhs.gov](http://www.dhs.gov)

### **Department of Health and Human Services (United States)**

Phone: 877-696-6775

Website: [www.hhs.gov](http://www.hhs.gov)

### **Divers Alert Network (International)**

Phone: 800-446-2671

Website: [www.diversalertnetwork.org](http://www.diversalertnetwork.org)

### **Federal Emergency Management Agency (United States)**

Phone: 800-621-3362

Website: [www.fema.gov](http://www.fema.gov)

### **Food and Drug Administration (United States)**

Phone: 888-463-6332

Website: [www.fda.gov](http://www.fda.gov)

### **Geological Survey (United States)**

Phone: 888-275-8747

Website: [www.usgs.gov](http://www.usgs.gov)

### **Humane Society of the United States**

Phone: 202-452-1100

Website: [www.hsus.org](http://www.hsus.org)

### **National Weather Service (United States)**

Website: [www.weather.gov](http://www.weather.gov)

### **Poison Control Center (United States)**

Phone: 800-222-1222

Website: [www.aapcc.org](http://www.aapcc.org)

### **Animal Poison Control Center (United States)**

Phone: 888-426-4435

Website: [www.aspca.org/pet-care/poison-control/](http://www.aspca.org/pet-care/poison-control/)

### **World Health Organization (International)**

Website: [www.who.int](http://www.who.int)

### **United States Department of Agriculture**

Website: [www.usda.gov](http://www.usda.gov)

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**Shirley A. Jones, MS Ed, MHA, EMT-P, RN**

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SAFETY

CPR

MED-  
ICAL

INJURY

ENVIRO

POI-  
SON

DIS-  
ASTER

SUR-  
VIVE

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## Tab 1: Basic Safety

Your *First Aid, Survival, and CPR: Home and Field Pocket Guide* is designed to help you respond effectively in an emergency. Keep a copy with you at all times—in your first aid, survival, or disaster kit; in your home, school, and office; in your car, boat, recreational vehicle, hiking pack, and travel gear. Be proactive and take a first aid and cardiopulmonary resuscitation (CPR) course. Be sure to keep your training up to date.

In this tab on basic safety, you'll learn how to recognize and act in an emergency, how to avoid disease and injury, and how to assemble first aid, survival, and disaster kits.

### HOW TO RECOGNIZE EMERGENCIES

Emergencies are unexpected events that require urgent action. They can affect anyone, anywhere, at any time. Here's how to recognize an emergency:

#### Unusual Personal Appearances or Behaviors

- Sudden collapse or unconsciousness
- Slurred speech, confusion, or drowsiness
- Trouble breathing, wheezing, and coughing
- Clutching the chest or throat
- Excessive sweating or inability to sweat in a hot environment
- Inability to move a body part
- Uncharacteristic skin color
- Nausea and vomiting

#### Noises

- Screaming, yelling, moaning, or calling for help
- Breaking glass, crashing metal, or screeching tires
- Sudden loud or unidentifiable sounds
- Sound of structural collapse or falling ladders
- An infant or child crying for unexplained reasons

## Odors

- Unusually strong odors
- Unrecognizable odors
- Inappropriate odors
- The smell of smoke

## Unusual Sights

- Broken glass, fallen boxes, or overturned chair
- Vehicle run off the road or twisted bicycle
- Burning pot in the kitchen or smoke from the oven
- Spilled medicine container
- Fallen electrical lines or trees
- Sparks, smoke, or fire

## HOW TO ACT IN AN EMERGENCY

In any emergency, it's essential to stay calm if you are to help the individuals involved. Here are the actions to take:

- **Ensure that the scene is safe.** Make sure there are no immediate dangers such as fallen power lines, floodwaters, high tides, hazardous materials, or traffic.
- **Check victims for life-threatening conditions.** Common ones are unconsciousness, difficulty breathing, or severe bleeding.
- **Activate the Emergency Medical Services system.** Call 911 or another designated emergency phone number in your country or region and begin CPR if necessary. If you are not trained in CPR, see Tab 2: CPR, or ask for instructions from the emergency dispatcher.
- Stop any bleeding and treat for shock (see Tab 4: Injuries and Wounds).
- Check for head, neck, or spinal injuries. Don't move the person unless it's necessary (see Tab 4: Injuries and Wounds).
- Look for medical identification tags or prescription medications that may indicate special health problems.

## 3

- Don't give fluids unless the person is conscious and alert. An unconscious person may not be able to swallow and could aspirate (breathe in) the fluids.
- Stay calm. Continue to aid the person until medical help arrives.

## HOW TO AVOID DISEASE

### Prevent Disease Transmission

- Avoid contact with blood and other body fluids. Protect yourself with barriers such as disposable gloves. These should be carried in your first aid kit.
- Use protective breathing barriers, such as a CPR face mask or face shield, if you need to give rescue breaths during CPR (see Tab 2: CPR).
- If you have any cuts, sores, scrapes, or scratches, cover them with a bandage before giving first aid.
- Use proper hand washing before and after giving first aid.

### Wash Your Hands

Good hand hygiene is the single most important action you can take to prevent the spread of infection. Hand washing doesn't take much time or effort and is a proven way to kill harmful bacteria and wash off dirt and grime. Adopting this simple habit can play a major role in protecting your health.

### ***Effective Hand Washing With Soap and Water***

- 1.** Wet your hands with warm running water.
- 2.** Use liquid soap or clean bar soap. Lather well.
- 3.** Rub your hands vigorously together for at least 20 seconds. Scrub all surfaces, including the backs of your hands, your wrists, between your fingers, and under your fingernails.
- 4.** Rinse well.
- 5.** Dry your hands with a clean or disposable towel.
- 6.** Use a towel to turn off the faucet. This prevents germs from getting on your clean hands.

**SAFETY TIP—**To get children into the habit, teach by example.

Wash your hands with your children and supervise their hand washing. Tell them to wash their hands for as long as it takes them to sing their ABCs or to sing the “Happy Birthday” song twice. This works especially well with younger children, who may rush when washing their hands.

## PROPER HAND WASHING TECHNIQUE



**Step 1.** Wet hands.



**Step 2.** Soap up.



**Step 3.** Scrub and rub for 20 seconds.



**Step 4.** Rinse.



**Step 5.** Dry.



**Step 6.** Turn off water.



**SAFETY TIP—**Antibacterial hand gels and wipes can be effective germ fighters when you don't have access to hand washing facilities. You can keep these gels and wipes in your car, handbag, gym bag, office drawer, or first aid kit. Under normal conditions a hand sanitizer complements, but doesn't substitute for, proper hand washing with soap and water.

## HOW TO AVOID INJURY

### Prevent Injuries Away From Home

- **Wear your seat belt** every time you get in a car. Teach your children to do the same. Children under 13 should ride in the backseat. Use car seats for babies and small children.
- **Never drink and drive** and don't ride in a car with a drunken driver. Don't drive if you are tired or taking a medication that makes you drowsy.
- **Wear a helmet** and other protective gear whenever you're bicycling, motorcycling, kayaking, horseback riding, skiing, snowboarding, or rock climbing.

- **Do not let children play near water** without a responsible adult watching them.
- **Wear safety goggles** whenever you use power tools or work with chemicals.
- **Be prepared** by keeping a first aid, survival, and disaster supply kit in your car and workplace.

## Keep a Safer Home

- Maintain a **fall-proof home**. Keep stairs and walkways clear of clutter. Use bright lighting inside and outside. Make sure carpets are secured firmly to the floor; use a nonskid pad under a throw rug. Remove snow and ice from sidewalks and porches.
- Use a **step stool** to reach highly placed objects. Don't stand on chairs or countertops. Take care when you're high on a ladder or on the roof. Don't take chances.
- If you have young children or pets, plug **bare electrical sockets** with plastic inserts.
- Keep **electrical cords** out of reach of children and pets. Replace frayed electrical cords. Don't overload extension cords or outlets; this may lead to fire.
- Install **smoke and carbon monoxide detectors**. Check the batteries once a month and replace them once a year. Keep a working **fire extinguisher** in your home.
- Have an **emergency plan in case of fire**. Practice the plan with your family or group. Don't forget your pets.
- Keep **appliances** away from water. Turn off or unplug appliances when you're done with them. Read and follow the safety instructions that came with your appliances.
- Have your **heating and cooling system** checked once a year. Keep fireplaces and stoves in working order.
- Use a mask and gloves and follow the instructions on the label when you work with **harsh chemicals** such as pesticides, fertilizers, and strong cleaning products.

- Follow the manufacturer's precautions when using **flammable liquids** such as gasoline or kerosene.
- Keep **toxic substances**, such as medications, vitamins, food, cleaning products, and bug killer, out of reach of children and pets. Keep products in their original containers. Never store poisons in food containers. Use childproof latches on your cabinets.
- **Be prepared** by keeping first aid, survival, and disaster supply kits in your home.



**SAFETY TIP**—Never douse an object with gasoline to start a fire. Once you light the match to toss at the gasoline-soaked object—whether a pile of leaves, wood, charcoal, or a hornet's nest—the fumes from the gasoline will burst into flames and cause life-threatening burns. Once a campfire or charcoal fire is lit, never pour gasoline on it. The fire will travel back up to the portable container and cause a potentially fatal explosion.



**SAFETY TIP**—Never smoke near flammable liquids, including gasoline and kerosene. The vapor from flammable liquids will burst into flames. This is a common but preventable cause of accidental burns.

## HOW TO DESIGN FIRST AID, SURVIVAL, AND DISASTER SUPPLY KITS

In an emergency, the right equipment will give you the edge you need to treat any injuries and, in some cases, to survive. When designing your kit, consider the following:

- Environmental extremes
- Duration of travel (or how long you'll use the kit)
- Distance from medical care and availability of rescue
- Number of persons the kit will need to support—include enough items for all the members of your family and/or group
- Weight and space limitations

**SAFETY TIP—Write in emergency phone numbers here:**

**Police:** \_\_\_\_\_

**Fire:** \_\_\_\_\_

**Hospital:** \_\_\_\_\_

**Doctor:** \_\_\_\_\_

**Dentist:** \_\_\_\_\_

**Veterinarian:** \_\_\_\_\_

**Power company:** \_\_\_\_\_

**Gas company:** \_\_\_\_\_

**Water company:** \_\_\_\_\_

**Telephone company:** \_\_\_\_\_

**Home:** \_\_\_\_\_

**Office:** \_\_\_\_\_

**School:** \_\_\_\_\_

## First Aid Kit

A **first aid kit** contains the items necessary to provide urgent care. A well-stocked first aid kit should be kept in your home, office, school, and vehicle or boat. It should be packed with your survival kit (pages 11–13) when you camp, hike, or are in a remote location.

### ***Bandages and Wound Care***

- Alcohol wipes
- Antibacterial hand gel or wipes
- Antibiotic ointment packets
- Antiseptic cream or wipes
- Antiseptic solution (e.g., hydrogen peroxide)
- Bandages, adhesive (assorted sizes)
- Bandages, triangular (36 × 36 × 51 inches [100 × 100 × 143 cm])
- Cold packs (instant cold compresses)
- Cotton balls
- Elastic roller bandage, 3 inches (7.6 cm) wide
- Elastic roller bandage, 6 inches (15.2 cm) wide

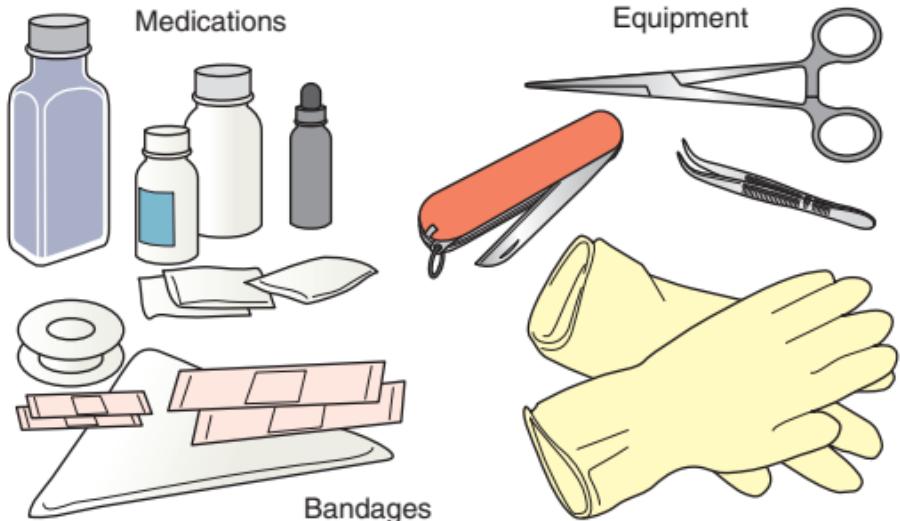
- Eye pads
- Gauze roller bandage, 3 inches (7.6 cm) wide
- Gauze pads, 4 × 4 inches (10 cm × 10 cm) (sterile)
- Gauze pads, 5 × 9 inches (13 × 23 cm) (sterile)
- Gloves (latex or nonlatex)
- Iodine wipes
- Insect sting relief
- Moleskin: An adhesive pad used to prevent and treat blisters
- SAM (structural aluminum malleable) splint (built from a thin core of aluminum alloy and sandwiched between two layers of closed-cell foam and available in a roll or as a flat strip): A compact, light-weight splint designed for immobilizing bone and soft tissue injuries
- Steri-Strips: Adhesive strips that keep the edges of a wound together
- Sterile water to cleanse wound (unopened bottled water can substitute)
- Tape (adhesive)
- Vaseline petroleum jelly

### ***Medical Equipment***

- CPR face mask or face shield (breathing barrier with one-way valve)
- Eyewash
- Knife (pocket knife)
- Safety pins
- Scissors
- Shears (heavy-duty serrated scissors with a blunt end)
- Suction bulb (used in emergency childbirth to remove secretions from the newborn's nose and mouth)
- Syringe (30 mL): To flush eye, ear, or wound with water
- Thermometer (nonmercury/nonglass)
- Tweezers: For taking out splinters or ticks

## Medications

- Acetaminophen (Tylenol): Relieves pain and reduces fever
- Antacid tablets (Rolaids, Tums): Relieve stomach indigestion
- Antihistamine (diphenhydramine [Benadryl]): Relieves sneezing, itchy and watery eyes from an allergy; also relieves itchiness from insect bites and stings and from poison ivy, oak, and sumac
- Antifungal cream or ointment
- Aspirin: Relieves pain and reduces fever and inflammation (redness and swelling)
- Calamine lotion: Anti-itching lotion treats mild sunburn, insect bites and stings, and rashes from poison ivy, oak, and sumac
- Cough suppressant
- Decongestant tablets
- EpiPen: Prescription medication (epinephrine) in an injectable form counteracts life-threatening allergic reactions
- Hydrocortisone (1%) cream or packet: Relieves minor skin irritations, itches, and rashes
- Ibuprofen (Motrin, Advil): Relieves pain and reduces fever and inflammation (redness and swelling)
- Laxative: Relieves constipation
- Loperamide (Imodium): Relieves diarrhea
- Motion sickness tablets (dimenhydrinate [Dramamine]): Relieve nausea, vomiting, or dizziness associated with motion sickness
- Nasal spray: Relieves symptoms of colds, stuffy nose, or blocked sinuses
- Prescription medications: Especially for asthma, heart disease, diabetes, or high blood pressure



### A well-stocked first aid kit.

**SAFETY TIP—First aid, survival, and disaster supply kits should be checked regularly. Make sure flashlight and radio batteries work. Check expiration dates and replace any out-of-date contents. Include a copy of *First Aid, Survival, and CPR: Home and Field Pocket Guide* in every kit.**

### Survival Kit

A **survival kit** contains the items necessary to survive an unplanned night in the woods, in the desert, or at sea. If you're trapped by a natural disaster or if your car slides off the road in a snowstorm, it may be all that keeps you alive. It won't keep you safe, however, unless you've remembered to take it with you! Also, a survival kit doesn't substitute for a first aid kit; for your safety, bring them both along.

- Aluminum foil (heavy duty): A  $24 \times 24$  inch ( $61 \times 61$  cm) piece can fold to  $3 \times 3$  inches ( $7.6 \times 7.6$  cm) and is ideal for boiling water, cooking food, making a reflector for fire, and using as a signal mirror.

- Blanket (emergency space blanket): Strong and lightweight, about the size of your shirt pocket. It is coated on both sides with a heat-reflective metallic surface and offers basic protection from wind, cold, and rain.
- Bottled water: Enough to keep you hydrated during a hike or survival situation.
- Butane lighter: Be sure it is filled with lighter fluid.
- Compass: The arrow of the compass will always point north. It can help guide you north, south, east, and west.
- Flint: A durable form of quartz. When struck against steel (the back of a locked knife blade), flint generates sparks. Use it to ignite a survival fire.
- Flashlight and extra batteries.
- Fire starter (magnesium): A small, flat bar made of soft magnesium with a hard flint running along the edge. It is proven effective to start a fire even in wet conditions. The magnesium is scraped off the bar with a knife onto dry kindling. A scrape on the flint side sends a shower of sparks that ignite the magnesium.
- Food: Power Bar or other nonperishable energy food.
- Global positioning system (GPS): An electronic mapping system that shows your exact position on the Earth no matter where you are. Make sure you have spare batteries.
- Insect repellent: Protection from biting insects such as mosquitoes, ticks, and chiggers.
- Knife: A survival knife (with a 3–5 inch [7.6–12.7 cm] blade) is a good cutting tool for preparing food, spearing wild game, and using with a flint to spark a flame for a fire.
- Multifunction tool: This pocket-sized item contains a straight-edged knife, a serrated knife, and needle-nose pliers (good for fixing survival gear or removing a hook from a fish or your finger). Also included are screwdriver bits, a bottle opener, a scissors, a small saw, and two files. One file is for wood and softer metals; the other is diamond coated and can be used on harder metals.

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- Map: Kept in a plastic bag or laminate it to protect it from water.
- Matches (waterproof): Kept in a weather-tight plastic match safe. Replace them every 6 months or so because matches have a short shelf life.
- Plastic bag that seals shut (gallon or liter size): Holds water while you treat it with purification tablets.
- Radio: National Oceanic and Atmospheric Administration (NOAA) weather-band radio (United States).
- Signal mirror: Highly accurate mirror that reflects sunlight to help rescuers pinpoint your position.
- Sunscreen.
- Tube tent: Lightweight emergency shelter that sleeps two and is small enough to roll up in your pocket.
- Water purification tablets: Kills microbes to produce safe drinking water.
- Whistle: Can be used to signal for help over long distances.

### Disaster Supply Kit

A **disaster supply kit** is a collection of essential items that members of a household need in the event of a disaster. You may be cut off from basic services such as electricity, gas, water, sewage treatment, or phones for days.

Keep enough supplies in your home or workplace kit to meet your needs for at least 3 days. Your disaster supply kit should also contain items you may need in an evacuation. Store all items in sturdy containers such as waterproof backpacks, duffle bags, or plastic bins. Adjust your kit to meet your own family or group needs and check it every 6 months to update supplies. A disaster supply kit is an adjunct to, not a substitute for, your first aid and survival kits. For more on preparing for natural disasters, see Tab 7: Natural Disasters.

- Three days' supply of clean water: Each person needs 1 gallon (or 4 liters) of water per day, half to drink and half to use for cooking and sanitation. The average person needs 2 quarts (2 liters) of

water daily, just for drinking. Reminder: 4 quarts equal 1 gallon, 1 quart equals 32 ounces, and 1 liter equals 1000 mL.

- Three-day supply, per person, of food that won't spoil.
- One change of clothing and footwear per person and one blanket or sleeping bag per person.
- Credit cards, cash or traveler's checks, and extra vehicle keys.
- Sanitation and hygiene items (moist towelettes and toilet paper).
- Important family or group documents: Keep these in a waterproof container. Make photocopies of health insurance cards, birth certificates, wills, driver's licenses, homeowner's insurance policy, bank account numbers, inventory of valuable household goods, Social Security cards, passports, immunization records, pet vaccination records, credit card information, and account numbers.
- Special-needs items: Prescription medications, contact lens solutions, and hearing aid batteries.
- Items for infants: Formula, diapers, bottles, and pacifiers.

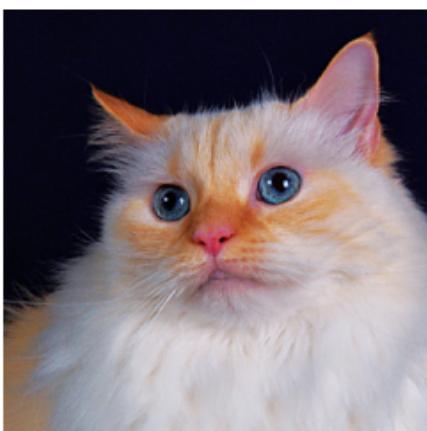
## HOW TO DESIGN A PET SAFETY KIT

After you've stocked yourself with supplies, it's time to take care of the pets who depend on you for their daily survival. Many of the supplies in your own first aid kit (pages 8–10) can be used to treat an injured pet. Your survival kit (pages 11–13) will also sustain your pet if you are lost or stranded at home together.

A pet safety kit includes a variety of pet-specific supplies to help keep your pet safe during an emergency. Store your pet safety kit in an easily transportable container. Supplies should include the following:

- Recent pictures of your pet (in the kit, in addition to carrying copies on your person)
- A spare collar, halter, and leash or lead rope
- Health records, including vaccination records showing that all of your pet's shots are current
- Medications
- Carrier or cage

- Water and food bowls
- Three-day pet food supply
- Several gallons or liters of clean drinking water per pet, depending on size
- Manual can opener (not electric) to open canned pet food
- Waste disposal system: Newspapers, cat litter, scooper, bleach, and plastic garbage bags
- List of detailed, individualized pet care instructions
- Grooming supplies and toys
- Clean bedding
- Styptic powder or styptic pencil (to stop minor bleeding)
- Mild grease-cutting dishwashing liquid (to bathe animal after skin contamination)
- Emergency phone numbers (your veterinarian, nearby veterinary emergency clinic, Animal Poison Control)



## Tab 2: CPR

### CPR OVERVIEW

Every day around the world, CPR (also called cardiopulmonary resuscitation) is used to save lives. CPR has been used to save the lives of children who have swallowed something accidentally or gotten into a pool when they don't know how to swim, and even the lives of adults suffering from a heart attack.

### What Is CPR?

Cardiopulmonary resuscitation is a lifesaving technique that is performed when a person's breathing or heart has stopped. The purpose of CPR is to move blood and therefore oxygen (which your body needs to survive) to the brain and heart. CPR involves three steps:

- Compressing the person's chest to keep the blood circulating.
- Opening the person's airway (the passageway between the nose/mouth and the lungs).
- Giving rescue breaths that fill the lungs with air.

### Why Perform CPR?

- CPR is performed when a person's heart stops beating (a condition called cardiac arrest), to prevent brain damage and death. The heart may stop because of heart disease, a motor vehicle accident, drowning, or choking.
- Anyone who has lost consciousness may need CPR. Also, confusion, weakness, and chest pain may signal that cardiac arrest is about to occur and CPR may be needed.
- After the heart stops, even a few minutes' delay in starting CPR can mean the difference between life and death.
- Performing CPR supports the heart and brain with oxygen until medical help arrives.

## How Can I Tell Whether CPR Is Needed?

If the person is conscious but cannot talk and appears to be choking, CPR is not appropriate. Instead, follow the instructions for choking on pages 29–36.

### *If the person appears to have lost consciousness:*

- Ask, “Are you OK?” Call out loudly. The person may be asleep or hard of hearing.
- If the person answers, ask how you can help.
- If there is no answer, gently tap the person’s shoulder.
- If there is still no response, begin the three steps of CPR. The general technique for each step is described next. See the step-by-step instructions for CPR for adults (page 21), young children (page 24), and infants (page 27).

## How Do I Perform Chest Compression?

Chest compression substitutes for the lost pumping action of the heart and so keeps the blood moving through the body. The following is the general technique, which varies slightly for young children and for infants.

### To compress the chest:

- Place the heel of one hand over the center of the person’s chest between the nipples (lower half of breastbone); place the heel of your other hand over the first. Keep your arms straight and locked at the elbows.
- Firmly compress the person’s chest.
- Push hard and fast, at a rate of at least 100 compressions/minute.

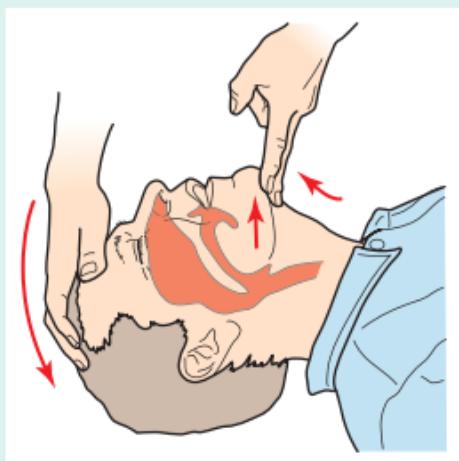


## How Do I Open the Person's Airway?

Ensure an open airway. This does not require looking in the mouth, but straightening the angle of the head and neck so that the path of air flow is unobstructed (e.g., by the person's tongue).

### To open the airway:

- Place the person face up on a hard, flat surface.
- Lift the person's chin with one hand while pushing down on the forehead with the other hand. This aligns the airway structures.



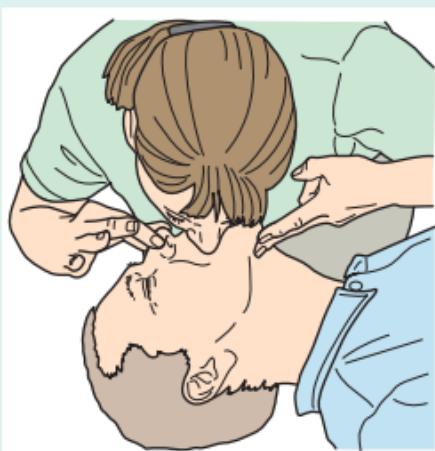
## How Do I Perform Rescue Breathing?

Rescue breathing delivers oxygen to the victim's lungs. The most common technique is mouth-to-mouth breathing. You probably won't catch a disease using this method, but you may want to buy a face mask or face shield at your local drug store and keep it in your first aid kit. See three following examples:

## THREE RESCUE BREATHING METHODS

### Method 1, Mouth-to-mouth:

- Open the person's airway by tilting the head and lifting the chin as shown.
- Pinch the person's nose shut with your fingers.
- Inhale normally and cover the person's mouth with your mouth to create an airtight seal.
- Exhale.
- Watch for the person's chest to rise as you give each breath.



### Method 2, CPR face mask:

- Put the mask over the person's nose and mouth as shown.
- Make sure the airway is open and press the mask against the person's face to create an airtight seal.
- Give rescue breaths through the one-way valve.



*Continued*

## THREE RESCUE BREATHING METHODS—cont'd

### Method 3, CPR face shield:

- Place the shield over the person's mouth with the airway tube between the person's lips.
- Hold the airway open and pinch the person's nose shut with your fingers.
- Give rescue breaths through the breathing tube.



### Do I Need an Automated External Defibrillator?

An **automated external defibrillator (AED)** can be used to "kick-start" a heart that has stopped beating. If CPR does not revive the person and an AED is available, you should use it. We explain how to use an AED at the end of this tab.

## 21

# HOW TO PERFORM CPR: UNCONSCIOUS ADULT (8 YEARS OLD OR OLDER)

## EMERGENCY ACTIONS

**Step 1.** First, check to make sure the scene is safe.

**Step 2.** Check the person for alertness. Gently tap the person's shoulder. Ask, "Are you OK?" See if the person moves or makes a noise.



**Step 3.** Check for breathing (no more than 10 seconds). If the person is not breathing or only gasping for breath go immediately to step 4.

**Step 4.** If there is no reaction and others are present, tell someone to phone 911 and get an AED, if available. If you are alone and have a cell phone, dial 911, put your cell phone on speaker, and begin CPR. If you are alone and do not have a cell phone, begin CPR immediately.

**Step 5.** Place the person face up on a hard, flat surface. Kneel on the floor at the person's side.

*Continued*

## EMERGENCY ACTIONS—cont'd

### Step 6. Begin chest compressions.

- Place the heel of one hand over the center of the person's chest between the nipples (lower half of breastbone); place the heel of your other hand over the first. Keep your arms straight and locked at the elbows.
- Firmly compress the person's chest at least 2.0 inches (5 cm).
- Give 30 compressions at a rate of at least 100/min.
- Push hard and fast.
- Allow complete recoil after each compression.
- Count 1, 2, 3, 4 . . . up to 30.

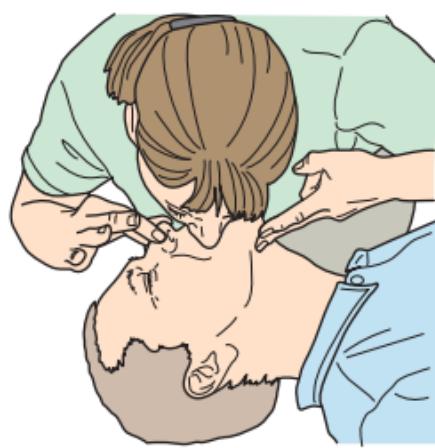


### Step 7. After 30 chest compressions open the airway by lifting the person's chin with one hand while pushing down on the forehead with the other hand.



**Step 8.** If the person is not breathing, begin rescue breaths.

- Pinch the person's nose shut with your fingers.
- Give two breaths (1 sec each) strong enough to make the person's chest rise.



**Step 9.** Continue to give 2 breaths followed by 30 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. IF these signs are not present, continue CPR until help arrives. IF a second rescuer arrives to help with adult CPR, continue the same ratio of 2 breaths followed by 30 compressions.

#### WHAT TO DO NEXT

- If breathing begins, monitor the person until help arrives.
- If the person moves but is still not breathing, continue rescue breathing at 10–12 breaths/min until help arrives.
- If neither movement nor breathing occurs, continue CPR until help arrives. If an AED is available, set up and use it. See instructions on pages 36–39.

# HOW TO PERFORM CPR: UNCONSCIOUS CHILD (1 TO 8 YEARS OLD)

## EMERGENCY ACTIONS

**Step 1.** First, check to make sure the scene is safe.

**Step 2.** Check for alertness.

Gently tap the child's shoulder.  
Ask, "Are you OK?" See whether  
the child moves or makes a  
noise.



**Step 3.** Check for breathing (no more than 10 seconds). If the child is not breathing or only gasping for breath go immediately to step 4.

**Step 4.** If there is no reaction and others are present, tell someone to phone 911 and get an AED, if available. If you are alone and have a cell phone, dial 911, put your cell phone on speaker, and begin CPR. If you are alone and do not have a cell phone, begin CPR immediately.

**Step 5.** Place the child face up on a hard, flat surface. Kneel on the floor at the child's side.

**Step 6.** Begin chest compressions.

- Place the heel of one or both hands over the center of the child's chest between the nipples (lower half of breastbone). Keep your arm(s) straight and locked at the elbows.
- Firmly compress the child's chest at least one third the depth of the chest, about 2 inches (5 cm).
- Give 30 compressions at a rate of at least 100/min.
- Push hard and fast.
- Allow complete recoil after each compression.
- Count 1, 2, 3, 4 . . . up to 30

**Step 7.** Open the airway by lifting the child's chin with one hand while pushing down on the forehead with the other hand.

*Continued*

## EMERGENCY ACTIONS—cont'd

**Step 8.** If the child is not breathing, begin rescue breaths.

- Pinch the child's nose shut with your fingers.
- Give two breaths (1 sec each) strong enough to make the child's chest rise.



**Step 9.** Continue to give 2 breaths followed by 30 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. IF these signs are not present, continue CPR until help arrives. IF a second rescuer arrives to help with child CPR, change the ratio to 2 breaths followed by 15 compressions.

### WHAT TO DO NEXT

- If breathing begins, monitor the child until help arrives.
- If the child moves but is still not breathing, continue rescue breathing at 12–20 breaths/min until help arrives.
- If neither movement nor breathing occurs, continue CPR until help arrives. If an AED is available, set up and use it. See instructions on pages 36–39.

## HOW TO PERFORM CPR: UNCONSCIOUS INFANT (YOUNGER THAN 1 YEAR)

### EMERGENCY ACTIONS

**Step 1.** First, check to make sure the scene is safe.

**Step 2.** Check for alertness.

- Gently rub the infant's back or tap the feet.
- Never shake an infant.
- See whether the infant moves or makes a noise.



**Step 3.** Check for breathing (no more than 10 seconds). If the infant is not breathing or only gasping for breath go immediately to step 4.

**Step 4.** If there is no reaction and others are present, tell someone to phone 911 and get an AED, if available. If you are alone and have a cell phone, dial 911, put your cell phone on speaker, and begin CPR. If you are alone and do not have a cell phone, begin CPR immediately.

**Step 5.** Place the infant face up on a hard, flat surface, against your thigh or on the floor.

*Continued*

## EMERGENCY ACTIONS—cont'd

### Step 6. Begin chest compressions.

- Place two fingers just below the infant's nipple line on the breastbone (center of the chest).
- Firmly compress the infant's chest at least one third the depth of the chest, about  $1\frac{1}{2}$  inches (4 cm).
- Give 30 compressions at a rate of at least 100/min.
- Push hard and fast.
- Count 1, 2, 3, 4 . . . up to 30.



### Step 7. Open the airway by lifting the infant's chin with one hand while pushing down on the forehead with the other hand.

- The infant's head should not be tilted as far back as an adult's.
- If the infant's head is tilted too far back, it may close off the airway.



**Step 8.** If the infant is not breathing, begin rescue breaths.

- Cover the infant's nose and mouth with your mouth.
- Give two breaths (1 sec each).
- Use small puffs of air so you don't over inflate the lungs.



**Step 9.** Continue to give 2 breaths followed by 30 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. If these signs are not present, continue CPR until help arrives. If a second rescuer arrives to help with infant CPR, change the ratio to 2 breaths followed by 15 compressions.

#### WHAT TO DO NEXT

- If breathing begins, monitor the infant until help arrives.
- If the infant moves but is still not breathing, continue rescue breathing at 12–20 breaths/min.
- If neither movement nor breathing occurs and you are still alone, shout for help. Continue CPR until help arrives. If an AED is available, set up and use it. See instructions on pages 36–39.

## CHOKING: ALERT ADULT OR CHILD (1 YEAR OLD OR OLDER)

### What Signs Indicate Choking?

- Grabbing at the throat with one or both hands
- Noisy breathing, gagging, coughing
- Inability to talk or make a sound

## EMERGENCY ACTIONS

**Step 1.** Determine whether the airway is blocked. Ask, "Are you choking? Can you speak? Can I help you?"

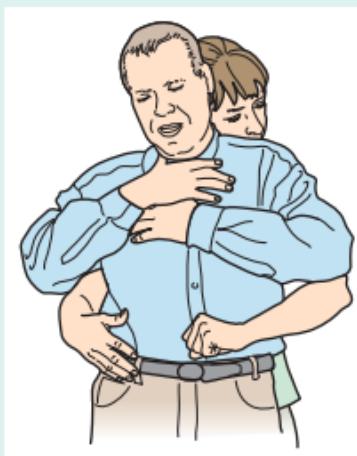
**Step 2.** If you determine the airway is blocked:

- Stand behind the person and wrap your arms around the person's waist. Locate the navel (bellybutton).
- If the person is obese or pregnant, wrap your arms around the chest.



**Step 3.** Make a fist.

- Place thumb side just above the person's navel.
- Locate the middle of the person's chest if the person is obese or pregnant.



**Step 4.** Grasp your fist with your other hand.

- Press your fist abruptly into the person's abdomen and use an upward, inward thrust.
- Use a straight thrust back if the person is obese or pregnant.
- Your action will push air from the lungs like a cough. This can help dislodge an object.



### WHAT TO DO NEXT

- Continue thrusts until the object is coughed out and the person can breathe or talk.
- If the object cannot be removed, the person will pass out.
- If the person passes out, follow the steps for Adult or Child Who Becomes Unconscious From Choking (page 31).

## ADULT OR CHILD WHO BECOMES UNCONSCIOUS FROM CHOKING

### What Signs to Look For?

- No movement
- No breathing
- Bluish lips or skin (from lack of oxygen)
- Inability to move air into the lungs with rescue breaths

## EMERGENCY ACTIONS

**Step 1.** Check for alertness. Gently tap the person's shoulder. Ask, "Are you OK?" See whether the person moves or makes a noise.

**Step 2.** If others are present, tell someone to phone 911. If you are alone and have a cell phone, dial 911, put your cell phone on speaker, and begin adult or child CPR (pages 21–26). If you are alone and do not have a cell phone, begin CPR immediately.

**Step 3.** Each time you open the person's mouth to give rescue breaths:

- Look in the person's mouth for an object such as a piece of food that may have become stuck in the throat.
- If seen, do not push the object further into the throat. Instead, use your finger to sweep the object out.
- If not seen, never perform a blind finger sweep.
- Chest compressions from CPR can help force air from the lungs to dislodge the object.



**Step 4.** Continue to give 2 breaths followed by 30 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. If these signs are not present, continue CPR until help arrives. IF a second rescuer arrives to help with adult CPR, continue the ratio of 2 breaths to 30 compressions. IF a second rescuer arrives to help with child CPR, change the ratio to 2 breaths followed by 15 compressions.

## WHAT TO DO NEXT

- If the person moves but is still not breathing, continue rescue breathing at 10–12 breaths/min for an adult and 12–20 breaths/min for a child.
- If breathing begins, monitor the person until help arrives.

## CHOKING: ALERT INFANT (YOUNGER THAN 1 YEAR OLD)

### What Signs Indicate an Infant Is Choking?

- Noisy breathing
- High-pitched crowing sounds
- Inability to breathe or cry

## EMERGENCY ACTIONS

**Step 1.** Determine whether the airway is blocked. Listen for noisy or high-pitched breathing.

**Step 2.** If you determine the airway is blocked, support the infant's head and neck and lay the infant face down on your forearm. Using your leg or lap for support, keep the infant's head lower than the body.

*Continued*

## EMERGENCY ACTIONS—cont'd

**Step 3.** Give back slaps: With the heel of your free hand, strike five quick, forceful slaps between the infant's shoulder blades.



**Step 4.** Turn the infant face up on your other arm. Using your leg or lap for support, keep the infant's head lower than the body.

**Step 5.** Give chest thrusts:

- Place two fingers on the breastbone just below nipple line.
- Give five quick thrusts downward, depressing the chest by  $\frac{1}{3}$  to  $\frac{1}{2}$  its depth each time.



## WHAT TO DO NEXT

- Continue five back slaps and five chest thrusts until the object is coughed out or the infant cries.
- If the object cannot be removed, the infant will pass out.
- If the infant passes out, follow the steps for choking infant who becomes unconscious (page 35).

## INFANT WHO BECOMES UNCONSCIOUS FROM CHOKING

### What Signs to Look For?

- No movement
- No breathing
- Bluish lips or skin (from lack of oxygen)
- Inability to move air into the lungs with rescue breaths

## EMERGENCY ACTIONS

**Step 1.** Check for alertness. Gently rub the infant's back or tap the feet. Never shake an infant. See whether the infant moves or makes a noise.

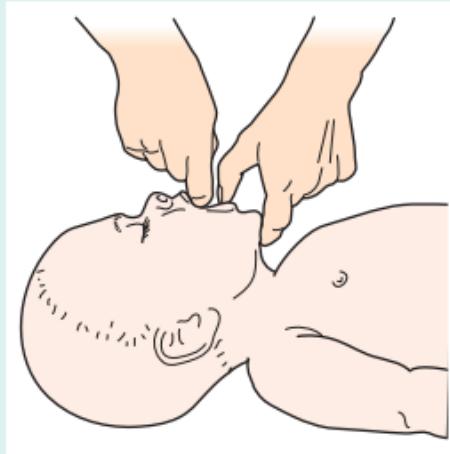
**Step 2.** If others are present, tell someone to phone 911. If you are alone and have a cell phone, dial 911, put your cell phone on speaker, and begin infant CPR (page 27). If you are alone and do not have a cell phone, begin CPR immediately.

*Continued*

## EMERGENCY ACTIONS—cont'd

**Step 3.** Each time you open the infant's mouth to give rescue breaths:

- Look in the infant's mouth for an object such as a piece of food or toy that may have become stuck in the throat.
- If seen, do not push the object further into the throat. Instead, use your finger to sweep the object out.
- If not seen, never perform a blind finger sweep.
- Chest compressions from CPR can help force air from the lungs to dislodge the object.



**Step 4.** Continue to give 2 breaths followed by 30 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. If these signs are not present, continue CPR until help arrives. IF a second rescuer arrives to help with infant CPR, change the ratio to 2 breaths followed by 15 compressions.

### WHAT TO DO NEXT

- If the infant moves but is still not breathing, continue rescue breathing at 12–20 breaths/min.
- If breathing begins, monitor the infant until help arrives.

### AED

An automated external defibrillator (AED) is a small, lightweight, portable device used to give an electric shock to restore a stopped heartbeat. An electric shock is the most important factor in kick-starting the heart.

## How Does an AED Work?

- After you turn it on, an AED uses voice and visual prompts to tell you what to do.
- Pads are applied to the person's chest.
- An electric cord attaches the pads to the AED.
- The AED determines that a shock is needed.
- The AED delivers an electric shock.

## Where Can You Find an AED?

- Schools, airports, office buildings, and sometimes a person's home
- Your local pharmacy

## What Do I Need to Know About AEDs?

- Never use a child pad on an adult. The energy is too low.
- You can use adult pads on a child, but the pads must not touch each other.

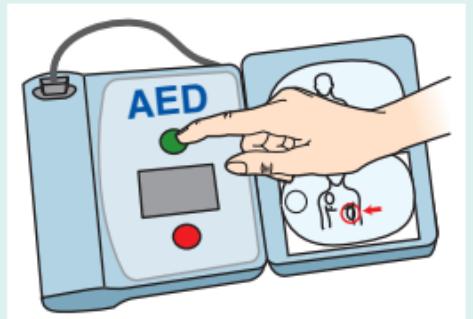
## What Signs Indicate the Need for AED?

- No response to voice or touch
- No breathing
- No movement

## EMERGENCY ACTIONS

**Step 1.** Perform CPR until an AED arrives and is set up.

**Step 2.** Turn on the AED. Follow the voice prompts and visual messages.

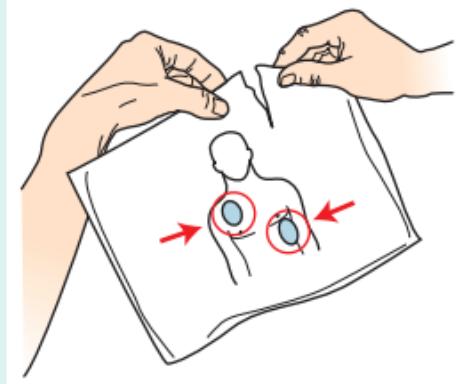


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## EMERGENCY ACTIONS—cont'd

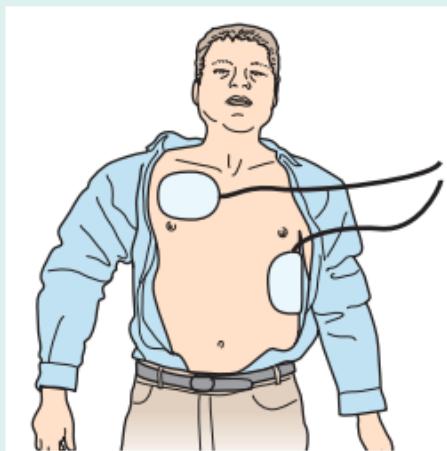
**Step 3.** Open the package of chest pads.

- Bare the chest.
- Check for medication patches on chest (use gloves).
- Shave chest (with included razor in AED pack) if person has chest hair where pads are placed.
- Do not place pads over an implanted pacemaker or defibrillator.
- Dry chest if moist or wet so electricity will not arc when shock is given.



**Step 4.** Attach the sticky side of the pads directly to the person's bare chest:

- Place one pad to the upper right side of the chest.
- Place the second pad under the left breast.
- The pads will have pictures on them that show where to put them.



**Step 5.** Clear the area around the person.

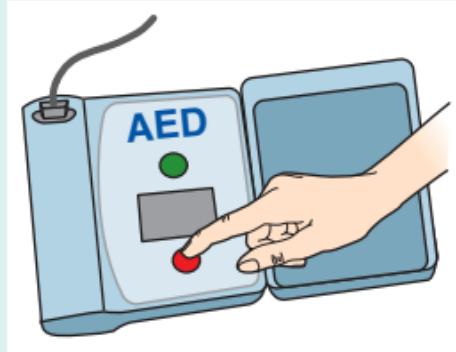
**Step 6.** Wait until the AED tells you what to do.

**Step 7.** If a shock is indicated and other people are present, warn them to keep clear. Also make sure your body is not touching the person.

- Say, "I'm going to shock on three. One, I'm clear. Two, you're clear. Three, everybody's clear."
- Check to make sure no one is touching the person or the AED.



**Step 8.** Press the "Shock" button.



#### WHAT TO DO NEXT

- Once the shock is given, follow the voice prompts from the AED.
- If CPR is advised, continue CPR, beginning with chest compression.
- After 2 min of CPR, the AED will prompt you with further verbal and visual cues.

## HOW TO PERFORM CPR ON A DOG OR CAT

If your pet collapses, there are steps you can take to save the animal's life. Performing CPR on a dog or cat is similar to the technique used on people.

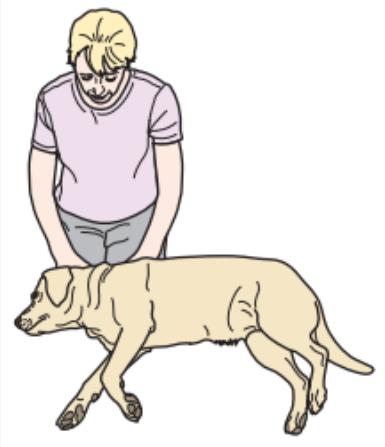
### EMERGENCY ACTIONS

#### Step 1. Check for alertness.

- Gently pat the animal on its back and call its name.
- See whether the animal moves or makes a noise.
- Take care not to be bitten if the animal is sleeping heavily and is startled awake.

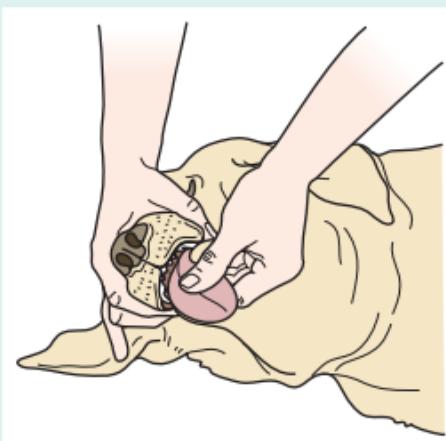


#### Step 2. If the animal does not respond, lay the animal down, on either side, on a hard, flat surface. Kneel on the floor at the animal's head.



**Step 3.** Open the airway.

- Straighten the animals' neck with the head in a natural, neutral position.
- Pull the animals' tongue forward between the front teeth, or to the side of the mouth. The tongue may be blocking the airway.
- Continue to Step 4 to check for breathing.

**Step 4.** Look, listen, and feel for breathing (no more than 10 sec).

- Look for the animals' chest to rise and fall.
- Listen for air.
- Feel for the animals' breath on your cheek or back of your hand.



*Continued*

## EMERGENCY ACTIONS—cont'd

**Step 5.** If the animal is not breathing, begin rescue breaths. Remember to keep the airway open by straightening the neck with the head in a natural, neutral position.

For medium-sized and large dogs, place your mouth completely over the animal's nose to create an airtight seal.

- Grasp the animal's muzzle and hold the mouth closed with both hands.
- Make sure your hands tightly cover the corners of the animal's mouth so air does not leak out when you give a breath.

For puppies/kittens and small dogs or cats, your mouth will seal over both the nose and mouth.

For any size animal, give **2 breaths** (1 sec each) strong enough to make the animal's chest rise. Larger animals need more air to fill their lungs; small animals need less.



Mouth over the animal's nose.



Mouth seals the animal's nose/mouth.

**Step 6.** After giving two breaths, locate the landmark for chest compressions.

- Take the animal's front leg and bend it at the elbow, flexing at the shoulder.
- The point where the elbow of the animal touches the body is where you place your hands for compressions.
- This should be the widest part of the chest.



**Step 7.** Begin chest compressions.

Puppies or kittens:

- Place your thumb on one side of the animal's chest and the rest of your fingers on the other side.
- Firmly compress the chest, with your thumb,  $\frac{1}{3}$ – $\frac{1}{2}$  its depth.
- Give 15 compressions at a rate of at least 100–150 times/min.
- Push hard and fast.
- Count 1, 2, 3, 4 ... up to 15.



**Chest compression: puppies or kittens.**

*Continued*

## EMERGENCY ACTIONS—cont'd

**Small dogs and cats (less than 30 lb [13.6 kg]):**

- Place the heel of one hand on the side of the animal's chest at its widest point (where the elbow is when the shoulder is bent). Keep your arm straight and locked at your elbow.
- Firmly compress the animal's chest to 1/3–1/2 its depth.
- Give 15 compressions at a rate of at least 100–150 times/min.
- Push hard and fast.
- Count 1, 2, 3, 4 ... up to 15.



**Chest compression: small dogs and cats.**

**Medium-sized and large dogs (30 lb [13.6 kg] or more):**

- Place the heel of one or both hands on the side of the animal's chest at its widest point (where the elbow is when the shoulder is bent). Keep your arms straight and locked at your elbows.
- Firmly compress the animal's chest to 1/3–1/2 its depth.
- Give 15 compressions at a rate of 80–100 times/min.
- Push hard and fast.
- Count 1, 2, 3, 4 ... up to 15.



**Chest compression: medium-sized and large dogs.**

**Step 8.** Give 2 breaths followed by 15 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. If these signs are not present, continue CPR until help arrives.

### WHAT TO DO NEXT

- If breathing begins, monitor the animal until help arrives.
- If the animal moves but is still not breathing, continue rescue breathing at 12–20 breaths/min for puppies/kittens and small dogs/cats or 10–12 breaths/min for medium-sized or large dogs until help arrives.
- If neither movement nor breathing occurs, continue CPR until help arrives.

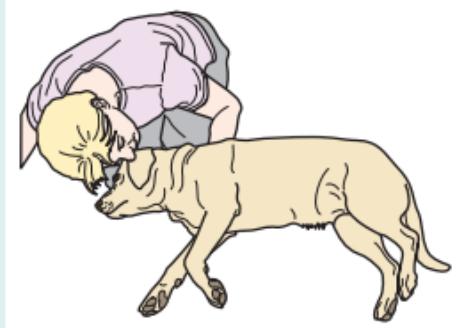
## CHOKING: ALERT DOG OR CAT

### What Signs Indicate a Dog or Cat Is Choking?

- Pawing at the mouth
- Change in sound of vocalizations/barking/meowing
- Change in breathing pattern
- Noisy breathing
- Gagging or coughing

## EMERGENCY ACTIONS

**Step 1.** Determine whether the airway is blocked. Listen for noisy or high-pitched breathing.

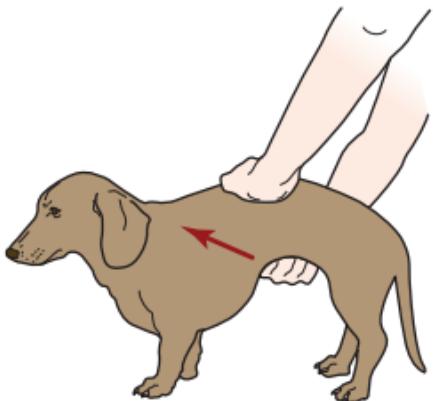


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## EMERGENCY ACTIONS—cont'd

**Step 2.** Place the animal on a hard, flat surface with all four feet on the ground.

- Puppies/kittens and cats/small dogs (less than 30 lb [13.6 kg]): Kneel on the floor behind the animal. Place two knuckles (for puppies/kittens) or a fist of one hand in the center of the animal's abdomen just below the ribs and the other hand on the back for support.
- Press your knuckles or fist abruptly into the animal's abdomen and use an upward, inward thrust. If nothing comes out, do it again. You must apply just enough force to move the animal's body. Do this three to four times, and check each time to see whether the foreign object has been expelled.



**Abdominal thrust: puppies/kittens and cats/small dogs.**

**For a larger dog (more than 30 lb [13.6 kg]):**

- Bend at the waist behind the animal and wrap your arms tightly around the center of the animal's abdomen just under the rib cage. Feel for the animal's ribs and make a fist with one hand just below the ribs.
- Place your other hand over your fist.
- Press your fist abruptly into the animal's abdomen and use an upward, inward thrust. Give one quick push upward. If nothing comes out, do it again. You must apply just enough force to move the animal's body. Do this three to four times, and check each time to see whether the foreign object has been expelled.



**Abdominal thrust: larger dog.**

### WHAT TO DO NEXT

- Continue thrusts until the object is coughed out and the animal can breathe.
- If the object cannot be removed, the animal will pass out.
- If the animal passes out, follow the steps for Dog or Cat That Becomes Unconscious From Choking (page 48).

## DOG OR CAT THAT BECOMES UNCONSCIOUS FROM CHOKING

### What Signs to Look For?

- No movement
- No breathing
- Inability to move air into lungs with rescue breaths

## EMERGENCY ACTIONS

### Step 1. Check for alertness.

- Gently pat the animal on its back and call its name.
- See whether the animal moves or makes a noise.
- Take care not to be bitten if the animal is sleeping heavily and is startled awake.



### Step 2. If the animal does not respond, immediately begin the steps for CPR (see page 40).

**Step 3.** Each time you open the animal's mouth to give rescue breaths:

- Look in the mouth for an object such as a piece of food, stick, or toy that may have become stuck in the throat.
- If seen, do not push the object further into the throat. Instead, use your finger to sweep the object out.
- If not seen, never perform a blind finger sweep.
- Do not place your fingers in the mouth of an alert animal, or you may get bitten.
- Chest compressions from CPR can help force air from the lungs to dislodge the object.

**Caution:** Do not attempt to remove the hard, bone-like structure deep in the throat at the base of the tongue called the hyoid apparatus (Adam's apple).

**Step 4.** Continue to give 2 breaths followed by 15 compressions for 2 min. Stop and look for signs of breathing, coughing, or movement. If these signs are not present, continue CPR until help arrives.



*Continued*

## EMERGENCY ACTIONS—cont'd

### WHAT TO DO NEXT

- If breathing begins, monitor the animal until help arrives.
- If the animal moves but is still not breathing, continue rescue breathing at 12–20 breaths/min for puppies/kittens and small dogs/cats or 8–10 breaths/min for medium-sized or large dogs until help arrives.
- If neither movement nor breathing occurs, continue CPR until help arrives.

## Tab 3: Medical Emergencies

Medical emergencies are characterized by the sudden appearance of a serious—sometimes life-threatening—problem such as an allergic reaction, a heart attack, or a seizure. Medical emergencies related to injuries, environmental factors, and poisoning are covered in later tabs. Here, we focus on emergencies resulting from underlying medical conditions such as heart disease or diabetes. We also discuss acute medical conditions such as vomiting and dehydration that can develop suddenly in a previously healthy person.

**Other medical problems include:**

- Appendicitis
- Allergies
- Emergency childbirth
- Dehydration
- Ear problems
- Fever
- Respiratory conditions
- Seizures
- Stroke

**The information in this tab should help you to**

- Recognize that an emergency exists.
- Look for the cause of the illness.
- Treat the problem immediately to the extent possible.

### PERFORM AN INITIAL ASSESSMENT

An initial assessment is a quick check for life-threatening problems in the body's respiratory, circulatory, and nervous systems. Follow the Personal Safety—Disease Transmission guidelines on page 3 to maintain proper safety precautions. To remember the steps, think ABCDE:

## A: Airway Management

- A blocked airway can lead quickly to respiratory arrest and death.
- Check for responsiveness. If the person is agitated, confused, lethargic, or unconscious, the airway could be blocked.
- If necessary, open the airway. Follow guidelines for cardiopulmonary resuscitation (CPR) and Choking in Tab 2: CPR.

## B: Breathing

- Respiratory arrest can quickly lead to cardiac arrest.
- Look, listen, and feel for air moving in and out of the person's chest. If the person is not breathing, follow the guidelines for CPR in Tab 2: CPR.

## C: Circulation

- Check for signs of circulation (coughing, movement, normal breathing). If there are none, follow the guidelines for CPR in Tab 2: CPR.
- Assess for bleeding: If present, is it well controlled? If not, control the bleeding (page 80) and treat for shock (page 96).

## D: Disability

- Determine whether the person is conscious or unconscious.
- Assess the level of consciousness. Is the person awake, verbal, reactive to pain?
- Check whether the person can move his or her arms and legs.
- Check for head, neck, or back injuries. If you suspect any, make sure the person is not moved. Once emergency personnel arrive on the scene, they should properly immobilize the person with a cervical collar and backboard.

## E : Environment and Exposure

- Protect the person from the elements (heat, cold, rain).
- Keep the person warm and dry.

## WHAT TO DO NEXT

Once you've identified and treated any life-threatening problems, you can perform a brief secondary assessment to help you determine

what's wrong and whether or not immediate medical attention is needed.

- Reassess the level of consciousness.
- Examine the person from head to toe to identify any medical issues such as a headache; itchy, watery eyes; runny, stuffy, or itchy nose; difficulty with speech or vision; skin rash; chest pain; abdominal pain; or back pain.
- Ask whether the person is allergic to certain foods (i.e., peanuts, seafood), medications (i.e., penicillin), or insect stings.
- Ask what events led up to the current problem. Was the onset sudden, or did it occur over several hours or days?

#### If the person is experiencing pain, ask the following questions:

- When did it begin?
- What brought it on?
- What does it feel like?
- Where is it located?
- Does it go anywhere (e.g., into the jaw or shoulder)?
- Has this happened before?
- Does anything make it feel better?
- How bad is it on a scale of 0 (no pain) to 10 (pain as bad as it can be)?

A report of chest pain or pain extending into the jaw or shoulder suggests that the person may be experiencing a heart attack and needs immediate medical attention. Also, any report of severe pain warrants immediate medical attention.

The rest of this tab provides information on initial care for specific medical conditions and emergencies.

### ABDOMINAL CONDITIONS

The location of abdominal pain, or bellyache, is useful in narrowing down the underlying cause. Pain in just one part of the abdomen may

point to a specific condition, such as appendicitis or gallstones. This interpretation is especially likely if the pain is bad, starts suddenly and doesn't go away, or gets worse when the person moves or coughs. Conditions such as diarrhea, dysentery, and vomiting may cause more generalized abdominal pain.

### Appendicitis

The appendix is a small sac attached to the large intestine. If the appendix is blocked, it can swell and become infected. This infection is called appendicitis.

- **Signs and symptoms:** Pain in the right lower abdomen; nausea, vomiting, low fever, and constipation.
- **Treatment:** Don't give anything to eat or drink. Don't use laxatives or pain medication. Seek immediate medical care. The appendix may need to be surgically removed; if not, it could burst and spread infection throughout the abdomen.

### Diarrhea

Diarrhea can be caused by a simple stomach flu virus, consumption of unusual kinds or amounts of food, or more serious intestinal problems such as bacterial or parasitic infection (from consumption of contaminated food or water), irritable bowel syndrome, celiac disease, inflammatory bowel disease (Crohn's disease or ulcerative colitis), or ischemic colitis.

- **Signs and symptoms:** *Mild:* Loose, runny stool. *Serious:* Loose, runny stool, signs of dehydration (see page 62), stomach or belly pain, and fever. Stool that is bloody, dark red, or black is a sign of internal bleeding.
- **Treatment:** *Mild:* Don't give any food for several hours until the person feels better. Have the person take small sips of water or a rehydration drink or sports drink. Try to match fluid intake to estimated fluid loss. *Serious:* Seek immediate medical care. For either mild or serious diarrhea, consider antidiarrheal agents such as Imodium

(loperamide). If the diarrhea persists more than 72 hours, the person may need antibiotics.



**SAFETY TIP—Rehydration drinks (Pedialyte, Rehydrate) and sports drinks (Gatorade, Powerade) replace fluids and electrolytes in amounts your body can use. Rehydration drinks are preferred for infants and young children.**

## Dysentery

Dysentery is a painful infection of the digestive system that results in severe diarrhea containing mucus and blood. The typical cause is consumption of unsanitary water or food containing microorganisms that damage the intestinal lining. There are two major types of dysentery: amebic and bacillary. Amebic dysentery is caused by a single-celled, microscopic parasite living in the large intestine. Bacillary dysentery is caused by a variety of bacteria, including *Salmonella*, *Shigella*, and *Escherichia coli* (*E. coli*). Poor hygiene and sanitation increase the risk of dysentery by allowing these organisms access to food or water via contaminated feces.

- **Signs and symptoms:** Frequent near-liquid diarrhea with mucus and blood. Sudden onset of high fever and chills, abdominal pain, cramps and bloating, fatigue, and vomiting. Vomiting may cause rapid and severe dehydration, which can lead to shock and death if it is not treated.
- **Treatment:** Maintain fluid intake using rehydration or sports drinks. If continued diarrhea or nausea and vomiting make adequate hydration impossible, seek immediate medical care. Imodium (loperamide) should not be used to treat acute dysentery because it can further damage the lining of the intestine. Most people will need antibiotic therapy and should see a doctor as soon as possible.

## Gallstones

The gallbladder is a small, saclike organ located in the abdomen just under the liver. It holds bile, which is made in the liver and helps to break down fat. The gallbladder moves bile into the small intestine through the common bile ducts. Gallstones are solid particles that form within bile and can easily obstruct the bile duct. They can be as small as a grain of rice or as large as a golf ball.

- **Signs and symptoms:** Severe pain in the right upper portion of the abdomen; may be referred to the right shoulder and increase with deep inspiration. Nausea and vomiting can occur, as can fever.
- **Treatment:** Most measures to relieve symptoms are just temporary. The person should avoid drinking or eating anything and seek immediate medical care.

## Vomiting

Vomiting can be caused by a stomach flu, unusual kinds or amounts of food, or bacterial infection (e.g., food poisoning). It can also point to serious problems such as head injury, meningitis, or a heart attack.

- **Signs and symptoms:** Inability to keep food or water down.
- **Treatment:** Avoid eating and drinking for several hours until the person feels better. If the person has not vomited for 1 hour, he or she can take small sips of water or a rehydration or sports drink. If vomiting continues, or if it contains blood or what looks like coffee grounds, seek immediate medical care.

## ALLERGIES

Most allergies are caused by pollen, dust, molds and mildew, animal dander, and other irritants in the air. A few people have severe allergies to insect stings, nuts and shellfish or other foods, or drugs such as penicillin.

## Allergic Reaction

Allergies are very common and can have many causes. Simple allergic reactions cause mild to moderate symptoms, such as a rash or sneezing, but are not life-threatening.

- **Signs and symptoms:** Itchy, watery eyes; runny, stuffy, or itchy nose; sneezing, fatigue, rash, and hives.
- **Treatment:** The person should consult a physician, because over-the-counter and prescription decongestants and antihistamines may help with some allergies. If the person knows what he or she is allergic to, the best treatment is to avoid it whenever possible. The person should also keep a record of reactions to plants, animals, foods, medicines, or chemicals that seem to trigger symptoms.

### Anaphylaxis

Anaphylaxis is a potentially fatal allergic reaction with a rapid onset. Anyone with severe allergies should learn to recognize warning signs early, have medication available for self-treatment, and seek immediate medical care if warning signs occur.

- **Signs and symptoms:** Rash, itching, hives, or swelling around the site of exposure. Trouble breathing, swelling of the tongue or throat, hoarse voice, chest tightness, and a drop in blood pressure causing lightheadedness and dizziness. The reaction is sudden, severe, and potentially fatal.
- **Treatment:** People who have a history of anaphylaxis should carry an autoinjector of epinephrine (e.g., EpiPen). Epinephrine is most effective if given before symptoms become severe. Epinephrine treats anaphylaxis more effectively than either antihistamines or asthma inhalers. If the person has been stung by an insect, dislodge the stinger (see page 138). If epinephrine isn't available, keep the person's airway open and seek immediate medical care. Immediate medical care is required even after an epinephrine injection. If the person becomes unconscious and stops breathing, follow guidelines for CPR in Tab 2: CPR.



**SAFETY TIP—**If you are at risk for anaphylaxis, your doctor may suggest that you carry an allergy kit. These kits contain anti-histamine pills, an injection of epinephrine (e.g., EpiPen) that you can give yourself in an emergency, and alcohol wipes for cleaning the site before and after the injection. Seek immediate medical care even after using an allergy kit.

## EMERGENCY CHILDBIRTH

Childbirth is a natural event, even when it happens unexpectedly at home or on the way to the hospital. Labor is the process of passing the baby and placenta from the uterus through the vagina. The powerful contractions of labor result from coordinated activity of the uterine muscle.

- **First stage of labor:** Mild contractions occurring 10 to 15 minutes apart. The mother may experience discomfort in the back and abdomen.
- **Second stage of labor:** Rupture of the amniotic sac, or “water breaking,” usually early in the second stage. Toward the end of this stage, the urge to push or bear down becomes strong. Contractions last 50 to 70 seconds and occur at intervals of 2 to 3 minutes. A discharge of blood and mucus is a sign of impending birth.
- **Third stage of labor:** Delivery of the baby followed by delivery of the placenta.

## GUIDELINES FOR CHILDBIRTH

**Step 1.** If birth is imminent, stay calm, call 911 for immediate medical care, and reassure the mother.

**Step 2.** Have the mother lie down on a flat, comfortable surface.

Position her on her back with her knees bent, feet flat, and legs spread wide apart. Place layers of linens, towels, or blankets under her.



**Step 3.** Encourage the mother not to push. Your job is to support her until medical care arrives.

**Step 4.** Never let the mother hold her knees together; it won't slow the process and may complicate the birth or harm the baby.

**Step 5.** Use a watch to time contractions. If the baby is on the way, contractions will occur less than 2 minutes apart.

**Step 6.** Once you see crowning—the top of the baby's head appearing in the vaginal opening—wash your hands with soap and water, put on the gloves from your first aid kit, and prepare for delivery.

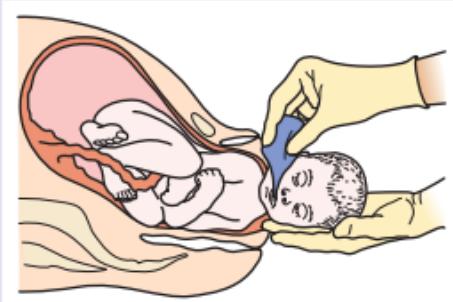


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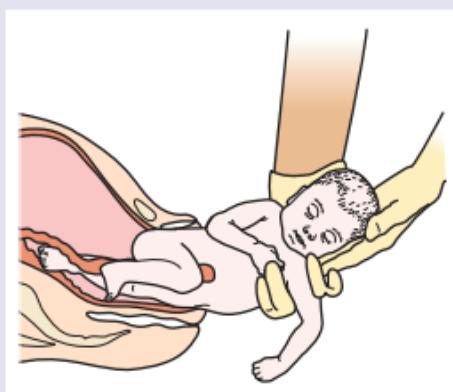
## GUIDELINES FOR CHILDBIRTH—cont'd

**Step 7.** Never pull on the baby during delivery.

**Step 8.** Once the baby's head has cleared the birth canal, make sure the umbilical cord isn't wrapped around the baby's neck. If it is, gently ease it over the baby's head. Also use a suction bulb to remove secretions from the nose and mouth.

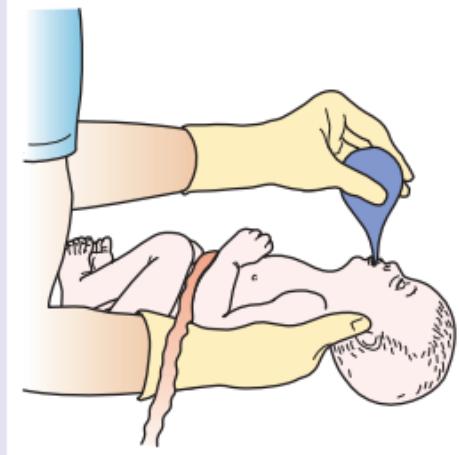


**Step 9.** After the head is clear, the next contraction should deliver the baby's shoulders, and then the rest of the body will slip out.



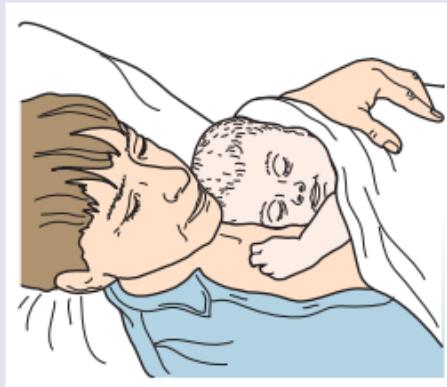
**Step 10.** Wipe the baby's face with a clean towel.

**Step 11.** Hold the baby with the head slightly lower than the body to drain fluid from the nose and mouth. Once again, use a suction bulb to remove secretions from the nose and mouth.



**Step 12.** Use a clean towel to grasp the baby firmly; newborn babies are very slippery.

**Step 13.** Warm the baby with a clean blanket or large towel and place the baby in the mother's arms.



### WHAT TO DO NEXT

- Don't cut the umbilical cord. If the placenta is delivered before help arrives, handle it gently and place it in a plastic bag.
- Massage the mother's belly firmly to help the uterus contract and stop further bleeding once the placenta is out.



**SAFETY TIP—If the baby does not start breathing within 30 seconds, rub his or her back or stroke the bottom of the feet. If the baby is still not breathing, begin infant CPR (see Tab 2: CPR).**

## DEHYDRATION

Dehydration is a loss of too much fluid from the body. The person loses not only water, but also important minerals called electrolytes. When a viral stomach flu or an intestinal “bug” causes vomiting and/or diarrhea, the person may be too sick to hold down even sips of fluid, and dehydration can develop rapidly. Dehydration can also be caused by intense exercise and excessive sweating without adequate fluid replacement. Severe dehydration can be life-threatening, especially for infants, children, and the elderly.

- **Signs and symptoms:** *Mild:* Vomiting and diarrhea, dry mouth and tongue, and dark or not much urine. *Severe:* Sunken eyes, no tears, fast breathing and heartbeat, little or no urine for 8 hours, confusion, and skin that sags when you pinch it.
- **Treatment:** *Mild:* To stop vomiting or diarrhea, the person should avoid eating solid foods. During the first 24 hours, the person should sip water or a rehydration or sports drink. The person should keep the sips small until the stomach can handle larger amounts. Drinking too much fluid can make the person vomit again. *Severe:* Seek immediate medical care if vomiting and diarrhea last more than 24 hours, or the person is very young or elderly with severe symptoms. Intravenous fluids may be required.



**SAFETY TIP—If you exercise or work in the heat, avoid caffeine. It makes you urinate more often, which dehydrates you faster. Drink water or a sports drink before, during, and after exercise and work. If you start feeling dehydrated, stop what you’re doing, rest, and drink plenty of fluids.**

## DIABETES

A person with diabetes either doesn't make enough insulin or can't use it effectively. Insulin is a hormone that helps your body use sugar (glucose) from food as energy or store it for later use. With diabetes, too much sugar accumulates in your blood and does not reach the body's cells. This excess sugar can cause both acute and chronic complications. Insulin and sugar must be balanced in the body or the cells will starve. Imbalances of blood sugar are called hyperglycemia and hypoglycemia.

### **Hyperglycemia**

Hyperglycemia is an excess of sugar in the blood. The amount of sugar and the rate at which it accumulates will determine associated symptoms. When both the amount and the rate are high, diabetic ketoacidosis (DKA) or a diabetic coma may develop.

- **Signs and symptoms:** Confusion, weakness, rapid breathing and pulse, excessive thirst, frequent urination, nausea, loss of consciousness, coma, and blood glucose greater than 180 mg/dL.
- **Treatment:** Severe hyperglycemia needs immediate medical attention. It may be treated with insulin or oral medication, but only under medical supervision.

### **Hypoglycemia**

In hypoglycemia, the blood is too low in sugar. If a person takes too much insulin or doesn't eat after injecting it, blood sugar will fall rapidly. Hypoglycemia may also be caused by taking too large a dose of an oral medication. These medications are long lasting, and hypoglycemia caused by them generally requires hospital admission.

- **Signs and symptoms:** Headache, shakiness, dizziness, anxiety, loss of consciousness, and blood glucose less than 70 mg/dL. The person probably has a history of diabetes and takes insulin or some oral medication (metformin, glyburide, and glipizide are common ones).
- **Treatment:** If the person can swallow, give fruit juice, a nondiet soft drink, or table sugar dissolved in water. If the problem is low

blood sugar, the added sugar will help quickly. If the problem is too much sugar, the sugar will not cause further harm. Seek immediate medical care.



**SAFETY TIP—**Your blood sugar level changes throughout the day and varies with diet and exercise. If it's normal, a "random" blood sugar test taken at any time will show a range of 70–130 mg/dL before meals and less than 180 mg/dL 2 hours after starting a meal. A fasting blood sugar level (no food or liquids for 8 hours) is normal if less than 100 mg/dL. A fasting level between 100 and 125 mg/dL signals prediabetes; a level of 126 mg/dL or higher signals diabetes.

## EAR PROBLEMS

### Earache

Earaches are particularly common in children and are usually caused by infection of the middle ear. Unlike swimmer's ear and other ear canal infections, these infections develop deeper in the ear and can cause more serious problems. They often begin during a cold. Colds can swell and close the eustachian tube (which connects the middle ear to the throat), with a resulting buildup of fluid. Bacteria or viruses can grow in the fluid and cause the infection.

- **Signs and symptoms:** Pain, swelling, or redness around or behind the ear, fever, hearing loss, and crying and/or ear-pulling in a baby or toddler. Pus or blood may be draining from the ear. Headache, stiff neck, or fever may indicate a more serious illness.
- **Treatment:** Put a warm washcloth on the ear to relieve pain. Seek immediate medical care and report fever or discharge. Use any prescribed medication as directed. Keep the ear dry during bathing.

### Swimmer's Ear

Swimmer's ear is an irritation or infection of the ear canal. It often happens after water, sand, or dirt gets inside the ear.

- **Signs and symptoms:** Pain, itching, and full feeling; redness and swelling in both the outer ear and the ear canal. Pus or blood may be draining from the ear.
- **Treatment:** Gently rinse the ear using a bulb syringe and a mixture of equal parts white vinegar and rubbing alcohol. Make sure the mixture is at body temperature. If the ear itches, try nonprescription swimmer's eardrops before and after the ears get wet. If symptoms persist, seek medical care.

## FAINTING

Fainting is a brief loss of consciousness followed by reawakening. It occurs when the brain receives an insufficient supply of blood for a short time. Fainting is generally not harmful, and someone who has fainted usually recovers quickly with no lasting effects. However, fainting may be life-threatening if there is a serious underlying health condition such as an abnormal heart rhythm. Any episode of fainting warrants medical evaluation unless the person has a recurrent condition and has been instructed in managing it.

- **Signs and symptoms:** Sudden, temporary loss of consciousness and collapse. Someone about to faint becomes pale and weak or dizzy, begins to sweat, and then loses consciousness.
- **Treatment:** Lower the person to the ground or any flat surface in a face-up position, if possible. Loosen any tight clothing, and try to raise the person's legs to increase blood flow to the head. Don't give anything to eat or drink. Because fainting can signal a more serious condition, seek immediate medical care.

## FEVER

A fever is a rise in body temperature above the normal 98.6°F (37°C). Fevers have a variety of causes, the most common of which are bacterial and viral infections. Fevers can be a sign of serious illness, especially in an infant less than 1 year old or an adult more than 65 years old.

- **Signs and symptoms:** Flushing, sweating, and skin hot to the touch. Body temperature is at least 100°F (37.8°C) measured orally or at least 101°F (38.3°C) measured rectally. Confusion signals a more serious problem.
- **Treatment:** Increase fluid intake by giving small sips of water or a rehydration or sports drink, sponge with warm water, and give acetaminophen or ibuprofen. Seek immediate medical care if the oral temperature is more than 102° F (38.9°C), if the fever persists, or if the person is confused.



**SAFETY TIP—**A fever in a child is always cause for parental concern. Most fevers are caused by viral illness, but occasionally they indicate a significant underlying problem. Be especially careful if fever develops in an infant less than 3 months old; infants this young are at risk for hidden infection. Seek immediate medical care if your child is less than 3 months old or shows signs of confusion or restlessness.



**SAFETY TIP—**Never give aspirin to a child less than 18 years old. Aspirin use during childhood has been linked with a rare but life-threatening condition known as Reye's syndrome. This condition occurs suddenly and affects the brain and liver. Instead of aspirin, use acetaminophen (Tylenol) or ibuprofen (Motrin) for children who have or are recovering from chickenpox or flu-like symptoms.

## HEART EMERGENCIES

### Chest Pain (Angina)

Angina, a form of chest pain, is a symptom of heart disease. The pain originates in the heart muscle when the heart has too little blood to work with. Blood flows to the heart through the coronary arteries. Sometimes these arteries become narrowed by inflammation and fatty deposits. If an artery becomes too narrow, it may not be able to carry enough blood to the muscle. When a person with angina is excited,

exercising, or emotionally upset, the heart beats harder, but the narrowed blood vessels don't allow enough oxygen to reach the heart cells. As a result, cells die, causing chest pain, pressure, or discomfort.

- **Signs and symptoms:** Chest pain or discomfort that comes and goes, with onset usually related to exertion. The person may be taking a medication such as nitroglycerin to stop the pain.
- **Treatment:** Even if rest or medication has relieved the pain, call for immediate medical attention. Prompt action is the key to saving a life. After calling for help, give one adult aspirin if the person is still conscious and is more than 18 years old. If the person collapses, begin CPR (see Tab 2: CPR).

### **Heart Attack**

Unlike in angina, symptoms of a heart attack usually last longer than 10 minutes and do not go away. At least one coronary artery is partially or completely blocked, and without rapid intervention, part of the heart muscle previously supplied by that artery may die. Health factors that put a person at higher risk for having a heart attack include diabetes, high blood pressure, obesity, smoking, and lack of physical activity.

- **Signs and symptoms:** Chest pain or heaviness, often radiating to the left arm or jaw, difficulty breathing, and sweating. Women are likely to experience warning signals such as nausea or vomiting, back pain, and fatigue.
- **Treatment:** Call for immediate medical attention. After calling for help, give one adult aspirin if the person is still conscious and is more than 18 years old. If the person collapses, begin CPR (see Tab 2: CPR).



**SAFETY TIP—Reducing the risk for a heart attack usually means making healthy lifestyle changes by following a low-fat diet rich in fruits and vegetables, lowering salt intake, losing weight, quitting smoking, and getting regular exercise.**

## Congestive Heart Failure

Congestive heart failure is caused by a decrease in the pumping action of the heart. Blood “backs up” in the body and causes circulatory congestion that leads to fluid retention. Fluid can accumulate in the lungs and body tissues.

- **Signs and symptoms:** Shortness of breath, coughing or wheezing, swelling in the legs, ankles, or feet; and fatigue, nausea, and confusion. The person may appear restless and anxious.
- **Treatment:** The person may be more comfortable sitting up or leaning forward. Immediate medical care is required.

## RESPIRATORY CONDITIONS

### Asthma

Asthma is a chronic inflammatory disease of the airways. In acute episodes (asthma attacks), the small air passages become blocked. Common triggers are respiratory infections, exercise, and exposure to dust, pollens, smoke, certain foods, climatic changes, and pet dander. A person having an asthma attack may not be able to breathe because the chest, air passages, and throat are too constricted.

- **Signs and symptoms:** Sudden onset of labored breathing, progressive shortness of breath, chest tightness, wheezing, and coughing.
- **Treatment:** Medication can work in the short term. Any asthma attack should be treated aggressively, and the person should seek immediate medical care. For a severe attack, inhaled medication is preferred over liquid or tablets. A person with chronic asthma may already be using an inhaled medication such as albuterol. If so, administer the medication and seek immediate medical care.

### Carbon Monoxide Poisoning

Carbon monoxide is a poisonous gas produced by fires and furnaces and present in large quantity in motor vehicle exhaust. It has no color, no odor, and no taste. Carbon monoxide bonds with red blood cells to form a stable compound, carboxyhemoglobin, which reduces the

ability of red blood cells to carry oxygen. The result can be loss of consciousness and death.

- **Signs and symptoms:** Headache, nausea, fatigue, confusion, vomiting, and dizziness. High-risk groups include infants, elderly people, pregnant women, and anyone with a previous history of cardiac insufficiency or chronic obstructive lung disease.
- **Treatment:** First, move all victims into fresh air. Then seek immediate medical care for anyone affected, including pets. There is no home therapy for carbon monoxide poisoning.



**SAFETY TIP—Carbon monoxide poisoning is sometimes called the “silent killer” because the toxic gas can’t be seen, tasted, or smelled. Be careful around malfunctioning furnaces, when using kerosene or propane heaters or stoves, and around gas-powered engines and tools. Have your furnace checked annually, avoid using open stoves for heat, and make sure there is plenty of ventilation. Consider placing a carbon monoxide sensor in your home.**

## Emphysema

Emphysema results from damage to the elastic properties of the lungs, almost always by smoking. It decreases the ability of small air sacs (alveoli) to contract and expand. The alveoli are essential in exchanging oxygen and the waste product of breathing, carbon dioxide. When “old” air becomes trapped in the alveoli, it takes up space and prevents the influx of “fresh” air.

- **Signs and symptoms:** Shortness of breath, coughing, and wheezing. Bluish lips and skin indicate a dangerously low oxygen supply to the body.
- **Treatment:** The person may be more comfortable sitting up or leaning forward. Restlessness and anxiety are common. Many people with emphysema use a home oxygen supply and carry portable

oxygen with them. Administer oxygen, if available, and seek immediate medical care.

## Flu (Influenza)

Flu (influenza) is a highly contagious disease caused by viruses that infect the respiratory tract. It lasts from 3 to 5 days and can be followed by fatigue for 2 or 3 weeks. It can cause mild to severe illness and at times can lead to death. At increased risk of complications from the flu are people 65 years old or older, pregnant women, and those with a chronic health problem (e.g., asthma, diabetes, or heart disease) or a weakened immune system.

Flu viruses spread easily from one person to another through droplets expelled when the infected person coughs or sneezes or by direct contact with the infected person. You can also be infected by touching an object that an infected person has touched, such as a door handle or child's toy. To prevent these contaminations, anyone with symptoms should wash his or her hands often and cover the nose and mouth when sneezing or coughing.

- **Signs and symptoms:** Cough, sore throat, headache, fever, aching muscles and joints, and extreme tiredness. Stomach upsets such as nausea, vomiting, and diarrhea can occur but are more common in children than in adults.
- **Treatment:** Some over-the-counter medications can help with the symptoms but don't cure the flu or shorten its duration. The best advice is to get plenty of rest, drink fluids, and take aspirin (if more than 18 years old) or acetaminophen to relieve a fever. Seek immediate medical care if symptoms become more severe. Antiviral medications are available but must be started within 72 hours after symptoms appear.

## COVERING YOUR COUGH



**Use your upper sleeve. Use a tissue.**

**SAFETY TIP—**The best way to prevent the flu is by getting a flu vaccination each year. The strains of flu virus change each year, so vaccines are updated to keep them effective. Check with your doctor about getting a yearly flu vaccine.

### Hyperventilation

Hyperventilation is an excessively rapid respiratory rate. Breathing too fast causes the carbon dioxide level in your blood to drop too low. Hyperventilation may be caused by a panic attack or anxiety.

- **Signs and symptoms:** Numbness or tingling around the nose and mouth or in the hands and feet; a feeling of panic or anxiety along with a rapid heart rate; and lightheadedness or fainting.
- **Treatment:** Try a relaxation technique. Instruct the person to sit down and focus on slowing breathing by taking one breath every 5 seconds. Breathing through a paper bag on and off for a few minutes may also help slow breathing. Never use a plastic bag for this technique. If the person has chest pain or an underlying illness, or if breathing doesn't return to normal within a few minutes, seek immediate medical care.

## Smoke Inhalation

A fire that produces smoke will rob the air of available oxygen and lead to asphyxia (lack of oxygen). Also, smoke is highly irritating to the airway and may cause the vocal cords to swell shut and cut off the airway. Some types of smoke are very poisonous.

- **Signs and symptoms:** Coughing, shortness of breath, headache, and change in mental status. Smoke can irritate the eyes and cause redness and tearing. In serious cases, the skin may turn white or blue from lack of oxygen. Changes in skin color can best be seen in mucous membranes such as the mouth.
- **Treatment:** The first thing to do is help the person to get fresh air. Then seek immediate medical care—oxygen is often required. Further evaluation for more serious respiratory issues will be needed.

## SEIZURE

The brain is the control center for the body's electrical signals. A seizure, sometimes called a convulsion, occurs when the normal signals from the brain change. Although it may be frightening to watch, a single seizure usually lasts only a few minutes. Seizures can be brought on by acute or chronic conditions such as fever or infection, epilepsy, brain injury, extreme heat, or disease.

- **Signs and symptoms:** Body stiffness followed by uncontrolled jerking movements; loss of consciousness. Some seizures cause only slight shaking of a hand or other body part. In some cases, the person may stare blankly and not be aware of the surroundings.
- **Treatment:** Protect the person from injury. Clear a space; move furniture or other objects out of the way. Don't force your fingers or anything else into the person's mouth or try to stop the jerking motion. Loosen tight clothing. Try to stay calm. After the seizure, check for injuries. Turn the person's head to the side so any vomit or saliva will not block the airway. Provide a safe area where the person can rest until medical help arrives.



**SAFETY TIP—**Infants and young children may develop seizures in response to a high fever. These are called febrile (fever-induced) seizures. Such children are at increased risk of recurrent febrile seizures, but few go on to develop a chronic seizure disorder.

## STROKE

A stroke occurs when a blood vessel ruptures and bleeds into the brain or when the vessel is blocked by a blood clot or an injury. Within minutes, nerve cells in that part of the brain die. As a result, the part of the body controlled by those cells can't work properly. A stroke can affect vision, speech, behavior, thought processes, and the ability to move. Sometimes it can cause a coma or death. The risk factors for stroke include high blood pressure, smoking, a diet high in saturated fats and cholesterol, diabetes, heart disease, family history of stroke, and older age.

- **Signs and symptoms:** Sudden weakness; numbness; and loss of movement in the arm, leg, or face, usually on only one side. Headache, paralysis, difficulty with speech or vision, confusion, and loss of consciousness.
- **Treatment:** If possible, note the time that the symptoms began. Have the person rest comfortably and offer reassurance. Don't let the person eat or drink. If the person collapses, check for breathing and circulation and begin CPR (see Tab 2: CPR) if necessary. Seek immediate medical care. Medical treatment can limit or reduce the damage but must be given quickly to be effective.



**SAFETY TIP—**You can help prevent a stroke if you control your blood pressure, don't smoke, eat a healthy diet, exercise regularly, and control diabetes.

## TOOTH PAIN

Tooth pain is either continuous or throbbing and may be felt in either the jaws or the teeth. Causes include tooth decay or infection, a tooth fracture, or another injury to the jaw.

- **Signs and symptoms:** Pain and facial swelling; and sensitivity to heat, cold, and sweets.
- **Treatment:** Give aspirin (for a person more than 18 years old), ibuprofen, or acetaminophen for pain. Consult a dentist immediately.

## Tab 4: Injuries and Wounds

Injuries and wounds result from some form of trauma: a blunt or penetrating force, intense heat, electricity, or exposure to a harmful chemical. They can be mild, requiring only home care, or serious, sometimes even life-threatening.

The information in this tab should help you to

- Recognize when an emergency exists.
- Survey the scene for potential hazards.
- Look for the cause of the injury or wound.
- Treat the problem immediately to the extent possible.

### PERFORM AN INITIAL ASSESSMENT

An initial assessment is a quick check for life-threatening damage to the respiratory, circulatory, and nervous systems. Follow the Personal Safety—Disease Transmission guidelines on page 3 to maintain proper safety precautions. To remember the steps, think ABCDE:

#### A: Airway Management

- A blocked airway can quickly lead to respiratory arrest and death.
- Check for responsiveness. If the person is agitated, confused, lethargic, or unconscious, the airway could be blocked.
- If necessary, open the airway. Follow the guidelines for cardiopulmonary resuscitation (CPR) and Choking in Tab 2: CPR.

#### B: Breathing

- Respiratory arrest can quickly lead to cardiac arrest.
- Look, listen, and feel for air moving in and out of the person's chest. If the person is not breathing, follow the guidelines for CPR in Tab 2: CPR.

#### C: Circulation

- Check for signs of circulation (coughing, movement, normal breathing). If there are none, follow the guidelines for CPR in Tab 2: CPR.

- Assess for bleeding: If present, is it well controlled? If not, control the bleeding (page 80) and treat for shock (page 96).

#### D: Disability

- Determine whether the person is conscious or unconscious.
- Assess the level of consciousness. Is the person awake, verbal, reactive to pain?
- Check whether the person can move his or her arms and legs.
- Check for head, neck, or back injuries. If you suspect any, make sure the person is not moved. Once emergency personnel arrive on the scene, they should properly immobilize the person with a cervical collar and backboard.

#### E: Environment and Exposure

- Protect the person from the elements (heat, cold, rain).
- Keep the person warm and dry.

### WHAT TO DO NEXT

Once you've identified and treated the life-threatening injuries, you can perform a brief secondary assessment to help you determine what's wrong and whether or not immediate medical attention is needed.

- Reassess the level of consciousness.
- Examine the person from head to toe to locate injuries and wounds.
- Ask whether the person is allergic to certain foods (i.e., peanuts, seafood), medications (i.e., penicillin), or insect stings.
- Ask what events lead up to the current problem. Was the onset sudden, or did it occur over several hours or days?

If the person is experiencing pain, ask the following questions:

- When did it begin?
- What brought this on?
- What does it feel like?
- Where is it located?
- Does it go anywhere (e.g., into the jaw or shoulder)?
- Has this happened before?
- Does anything make it feel better?
- How bad is it on a scale of 0 (no pain) to 10 (pain as bad as it can be)?

A report of chest pain or pain extending into the jaw or shoulder suggests that the person may be experiencing a heart attack and needs immediate medical attention. Also, any report of severe pain warrants immediate medical attention.

The rest of this tab provides information on initial care for specific injuries and wounds.

## ABDOMINAL INJURIES

### Blow to the Abdomen

A blow to the abdomen can cause severe bruising and bleeding inside the body. Organs and tissues near the point of impact are most likely to be damaged. Abdominal injuries often occur during athletic events or in car or motorcycle accidents in which the person is thrown into an object or onto the ground.

■ **Signs and symptoms:** Mild or severe abdominal pain that increases when an area is palpated (pressed lightly); and pain that gets worse or does not improve. Swollen, firm abdomen, nausea and vomiting (blood or coffee-ground type of material), restlessness, bloody stools, or blood in the urine. Look for signs of bruising or abrasion on the skin. Significant internal bleeding may lead to signs and

symptoms of shock (lightheadedness, confusion, pale appearance, and cool extremities).

- **Treatment:** Have the person lie down. Loosen the person's clothing, and cover the person with a blanket for warmth. If shock is present (see page 96), elevate the legs (unless you suspect neck, back, or lower extremity injury). Do not give anything by mouth, and seek immediate medical care.

### Deep Open Wounds

Knives, bullets, sharp tools, and other sharp objects can cause penetrating trauma to the abdomen. The result is typically a deep open wound. Whereas the chest is largely protected by the rib cage, a large portion of the abdomen is protected only by soft tissue and muscle, thus leaving it vulnerable to penetrating trauma. Solid organs such as the liver, spleen, kidneys, and pancreas can bleed extensively when injured. A person can bleed to death if major abdominal blood vessels are cut.

- **Signs and symptoms:** Obvious open injuries, external bleeding, protruding object, mild or severe abdominal pain, and cool, moist skin.

- **Treatment:** Have the person lie down, loosen clothing, and cover with a blanket. Make sure the person is breathing and control external bleeding. Do not remove a knife or any other protruding object still embedded in the abdomen. Removal could cause severe internal bleeding. Secure the object in place with a bandage and tape. Give nothing by mouth, and seek immediate medical care.

## BACK INJURIES

### Back Pain

"Back" is a general term for the spinal column, which extends from your neck to your tailbone. It includes the bones and joints of the spine, the disks that separate the bones and absorb shock as you move, and the muscles and ligaments that hold them all together. People can stress or injure any of these structures. Direct trauma, repetitive motion,

sudden twists, and sustained positions that strain the back can all cause significant injury and pain.

- **Signs and symptoms:** Severe pain in a specific area. Particularly severe pain may be caused by damage to a disk—the gel inside the disk may push out and press against a nerve.
- **Treatment:** Give aspirin (for a person more than 18 years old), ibuprofen, or acetaminophen for pain. Put heat on the sore spot for 20 minutes at a time. Moist heat (hot pack, bath, shower) works better than dry heat. Try switching between heat and ice or cold packs to see which works best. Seek immediate medical care for severe back pain, especially with weakness, tingling, and numbness in the arms or legs.

### Spinal Cord Injury

The bones of the spine provide structure and support to the body. They also surround and protect the delicate nerves of the spinal cord that send motor and sensory information. Any injury that interrupts these signals may cause permanent loss of feeling and movement (paralysis).

- **Signs and symptoms:** Severe pain in any area from the neck to the tailbone following traumatic injury. Weakness, tingling, or numbness in the arms or legs. Loss of bowel or bladder control.
- **Treatment:** Do not move the person unless there is an immediate threat to life, such as a fire. If the injury occurred in a diving accident, float the person face up until help arrives. The water will act as a splint to keep the spine from moving. In any spinal injury, do not allow the person to move. Keep the person still until emergency medical care arrives.

### BITES (ANIMAL AND HUMAN)

Bites from both animals and humans are dangerous. Simple bacterial infections are the most common complications. However, more severe consequences such as rabies and tetanus are always a concern.

**Check with the person's health-care provider about the need for a tetanus shot or booster.** If an animal bites hard enough to break the skin, the person may need a rabies shot. Rabies, although rare, is deadly if not treated soon after a bite from an infected animal. The main carriers of rabies in North America are bats, raccoons, skunks, foxes, and coyotes. Vaccinated pets such as dogs and cats rarely have rabies. However, stray animals may not have been vaccinated. If someone is bitten, notify animal control, which may be able to capture and quarantine the animal safely.

- **Signs and symptoms:** A superficial wound or a deep, bleeding one. Infection, pain, swelling, warmth or redness at the injury site, and fever.
- **Treatment:** Stop bleeding by direct pressure. Wash the wound with soap and water, and cover with a clean dressing. Seek immediate medical care. Nearly all bites require an antibiotic to control potential infection. X-rays may be taken to rule out a fracture or retained tooth fragments.



**SAFETY TIP—If someone is bitten by a pet dog or cat, find out whether the animal has a current rabies vaccine. A healthy pet that doesn't have a current vaccination should be confined and watched for up to 10 days by a veterinarian.**

## BLEEDING

External bleeding can be minimal or severe, depending on the seriousness of the wound. Any external bleeding must be controlled immediately.

### Types of Bleeding

Bleeding can occur from an artery, vein, or capillary.

- **Arterial bleeding:** Arteries carry blood away from the heart. Blood from a cut artery is bright red and spurts out under high pressure, reflecting the pumping action of the heart. A large volume of blood

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can be lost in a short time. Arterial bleeding must be controlled immediately or the person may die.

- **Venous bleeding:** Veins carry blood back to the heart under low pressure. Blood from a cut vein is dark red. Venous bleeding is more easily controlled than arterial bleeding but is still considered serious.
- **Capillary bleeding:** Capillaries are small vessels that connect arteries and veins. Capillary bleeding is easily controlled and usually results from small cuts and abrasions.

### Bleeding Management

Check for severe bleeding by looking over the person's body from head to toe.

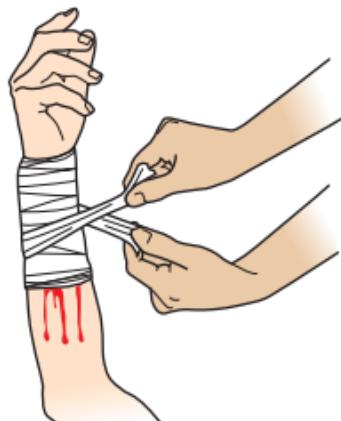
- **Signs and symptoms:** External bleeding from an exposed wound; and blood-soaked clothing.
- **Treatment:** Control the bleeding by direct pressure, elevation, or use of a pressure dressing:
  - **Direct pressure:** Press directly on the wound through a clean dressing to stop the blood flow. The pressure must be firm and should be maintained long enough to close the damaged surface.
  - **Elevation:** Whenever possible, the bleeding area should be elevated above the level of the heart (e.g., by raising an arm or leg) to slow the blood flow.
  - **Pressure dressing:** If bleeding continues after direct pressure and elevation, consider a pressure dressing. Apply a thick pad of gauze or other material and hold it in place with a bandage that's tightly wrapped but not overly constricting. Keep it loose enough to permit circulation.

In most situations, it's best to cleanse the wound with soap and water but not close it. Leaving the wound open will allow drainage from any infection that may occur. Once bleeding is controlled, cover the

wound with a clean dressing and bandage, and seek immediate medical care. The dressing should be changed daily if possible.



**Direct pressure and elevation.**



**Pressure dressing.**



**SAFETY TIP—Tourniquets are an extremely dangerous way to control bleeding. They should be used only for massive wounds with severe bleeding when all other methods have failed. Loss of a limb can result if the tourniquet is improperly placed.**

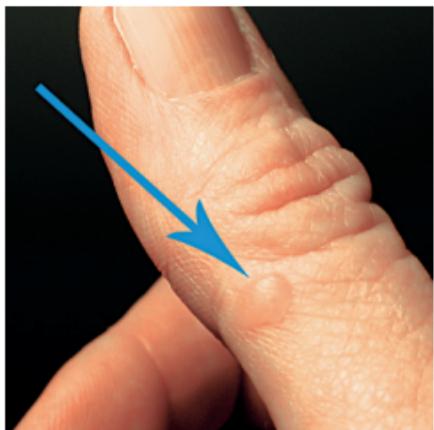
## BLISTERS AND “HOT SPOTS”

Blisters and “hot spots” develop most commonly on the feet, following constant friction or rubbing from poorly fitting shoes.

### BLISTERS

A blister is a fluid-filled area that forms under the skin. Blisters commonly arise when constant friction or rubbing of footwear over the skin’s surface causes microscopic tears under the skin. Most blisters can be avoided with proper footwear and some preventive measures. For prevention, apply a special material such as moleskin or an adhesive knit on blister-prone areas.

- **Signs and symptoms:** Red, irritated skin with trapped fluid forming a small lump filled with clear fluid and sometimes blood.
- **Treatment:** It's best to never drain a blister. Instead, make a doughnut-shaped cover to keep pressure off the blister by cutting a hole in a piece of moleskin. If you do find it necessary to drain a blister, be sure you have adequate first aid supplies. First, clean the area around the blister. Then, using a clean needle, make a small hole in the top of the skin and press out the fluid. Next, apply an antibiotic ointment. Finally, cover the area using the technique for hot spots (see the following discussion of hot spots).



**Blister on side of thumb.**



**Doughnut-shaped cover.**

## Hot Spots

A hot spot is a red, painful area, caused by irritation and friction, that hasn't become a true blister yet.

- **Signs and symptoms:** Redness, pain, oozing, and itchiness of the skin.
- **Treatment:** Treat with a bandage-type covering made from tape or Moleskin. Cut a piece of clean cotton dressing a bit larger than the hot spot. Put the dressing over the hot spot and cover with

moleskin or tape. This dressing works like an adhesive bandage but holds better and lasts longer.



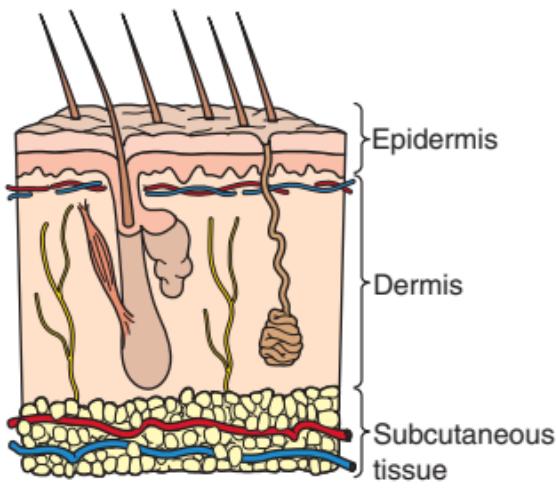
**SAFETY TIP—Prevention is the key to avoiding blisters and hot spots. Boots and shoes should be broken in before being used for sports and backcountry travel. Blister prevention pads and patches provide protection, and over-the-counter products such as petrolatum (Vaseline petroleum jelly) give feet some lubrication and reduce friction.**

## BURNS

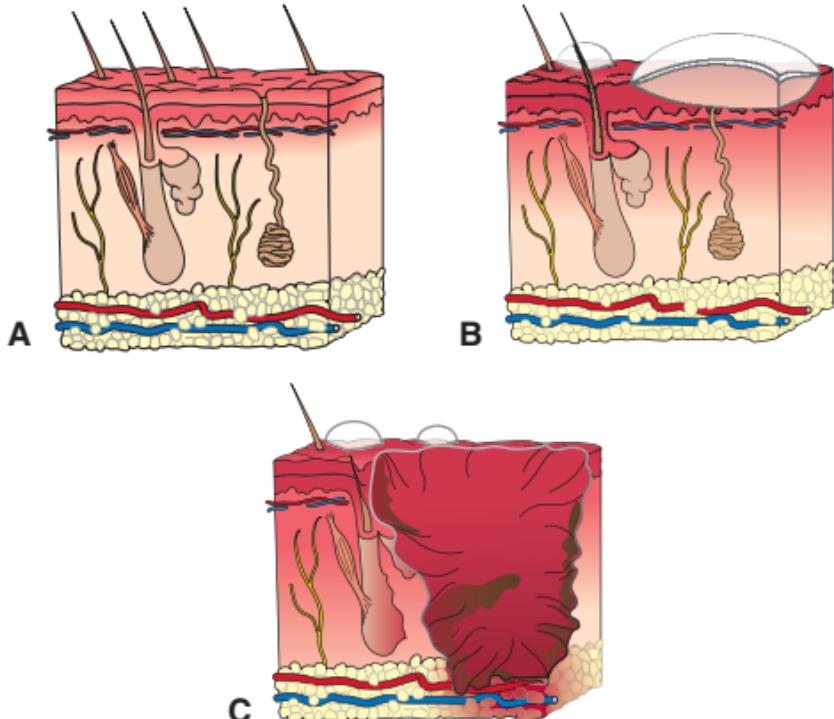
The severity of a burn injury is related to the cause of the burn (heat, chemical, electrical), its depth and size, and the part of the body injured. Recovery from a burn can be more difficult in people who are older, are in poor general health, or have associated injuries. Inhalation injuries, which are common, are caused by carbon monoxide, smoke, and toxic products.

### Depth of the Burn

Classification of burn injuries depends on the depth, or tissue layers, of damaged skin.



Cross section showing layers of the skin.



**Classification of burn injury: (A) first-degree, (B) second-degree, and (C) third-degree.**

### **First-Degree Burn (Superficial Burn)**

A first-degree burn involves only the outer layer of skin (the epidermis). A common example is a sunburn, which occurs after exposure to the ultraviolet rays of the sun.

- **Signs and symptoms:** Red, painful, swollen skin; and possible chills and fever.
- **Treatment:** Treat smaller burns by applying cold cloths or flushing with cool water. Give acetaminophen or ibuprofen for pain. After cooling apply an aloe vera gel or skin moisturizer lotion to keep the skin moist and reduce itching and peeling. If a large area is burned and the person has a fever and chills, a trip to the doctor would be in order.

### **Second-Degree Burn (Partial-Thickness Burn)**

A second-degree burn involves the outer layer of skin (the epidermis) and the second layer (the dermis). The burn does not pass through to the underlying tissues.

- **Signs and symptoms:** Deep, intense pain, red and swollen skin; and moist, oozing, blistered skin appearing within hours.
- **Treatment:** Treat burns by applying cold cloths or flushing with cool water. If blisters form, don't break them. Give acetaminophen or ibuprofen for pain. Give fluids by mouth if the person's airway is not impaired. Use an antibiotic ointment. Do not use butter (it increases the risk of infection and doesn't help heal the burn). Cover the burn with sterile, dry bandages. Seek immediate medical care.

### **Third-Degree Burn (Full-Thickness Burn)**

A third-degree burn involves all three layers of the skin: the epidermis, dermis, and fatty layer (subcutaneous tissue). If the burn is severe, even the muscle and bone may be involved.

- **Signs and symptoms:** Dry and white, or black and swollen, skin. Intense pain or absence of pain, depending on the number of nerve cells damaged.
- **Treatment:** Check the airway and administer oxygen if smoke inhalation is suspected. Remove all burned clothing and jewelry (especially rings) if not stuck to the skin. Swelling may make these items hard to remove later. Cover the burn with a dry, nonstick, sterile dressing or a clean cloth. Treat for shock (see page 96), and seek immediate medical care. Critical burn areas involve the face, hands, feet, and genital region.



**SAFETY TIP—Be careful around campfires! Contact burns often result from handling hot rocks or stepping on hot embers around a campfire. Never attempt to start or refresh a campfire with gasoline or other liquid fuels: these are explosive, and fatal injury can result.**

## Scald Burn

A scald burn is caused by a hot liquid at 140°F (60°C) that creates a first- or second-degree burn within 3 seconds. At 156°F (68.9°C), the same burn occurs in 1 second.

- **Signs and symptoms:** Redness of the outer layer of skin (epidermis) and second layer (dermis), blisters, and extreme pain.
- **Treatment:** Apply cold cloths or flush with cool water. If blisters form, don't break them. Give acetaminophen or ibuprofen for pain. Use an antibiotic ointment. Cover the burn with sterile, dry bandages. Seek immediate medical care. Critical burn areas involve the face, hands, feet, and genital region.

## Chemical Burn

- **Signs and symptoms:** Severe pain, redness, and irritation at the site of the burn. Cough or shortness of breath if the chemical has been inhaled.
- **Treatment:** A chemical burn caused by an acid or lye spill should be flushed with large amounts of water. If the chemical has splashed into an eye, the eye may be red or blistered. Keep rinsing the eye with water, and seek immediate medical care. Chemical fumes can also burn the eyes, skin, and respiratory system (nose, mouth, and lungs). Caustic agents in some chemicals may continue to eat away at the skin even after being rinsed off with water. Brush dry powder chemicals from the skin before flushing with water unless large quantities of water are immediately available. Cover the burn with a dry, nonstick, sterile dressing or a clean cloth. Seek immediate medical care.



**SAFETY TIP—Be careful with chemicals. Store them where children and pets can't reach them. Wear safety glasses, goggles, or gloves when working with chemicals. Follow the product's warning label.**

## Electrical Burn

An electrical burn from even a mild electric shock can cause external and internal damage. A current of 1000 volts or more is considered high voltage, but even the ordinary household current of 110 volts can be deadly. Children and pets may chew through an electrical cord, or an electric shock may be caused by a downed power line.

- **Signs and symptoms:** Electrical burns can cause severe pain and can penetrate deep into body tissues. In a serious electrical shock, the person may lose consciousness and need CPR (see Tab 2: CPR).
- **Treatment:** Call for help. Unplug or turn off the power source. Then remove the person from the electrical source. If the person is not breathing, begin CPR (see Tab 2: CPR) if you are trained or being guided by an emergency dispatcher. Treat for shock (see page 96) and burns if necessary. If the power source cannot be turned off, do not touch the person or you will become a victim yourself. Wait until the fire department or power company service arrives to shut off the live current of electricity.

## CHEST INJURIES

Chest injuries include injuries to the lungs, heart, and large blood vessels such as the aorta and vena cava. Injuries to the ribs and diaphragm may also be involved. Because so many life-sustaining functions are performed by the organs of the chest, any injury in this region may be critical.

### Blow to the Chest

A blow to the chest from a steering wheel, baseball bat, or other blunt object can damage the bones surrounding the chest and injure the heart, lungs, and large blood vessels.

- **Signs and symptoms:** Bruising, mild or severe chest pain, and trouble breathing. Signs of shock such as cool, moist skin may indicate internal bleeding.

- **Treatment:** Have the person lie down or sit up if breathing is impaired. Loosen the person's clothing, and cover with a blanket. Make sure the person is breathing, and seek immediate medical care.

### Deep Open Wounds

Pieces of glass or metal, bullets, knives, steel rods, and other sharp objects can penetrate the chest wall, impair breathing, and damage internal organs.

- **Signs and symptoms:** Bruising, external bleeding, mild or severe chest pain, trouble breathing, and cool, moist skin.
- **Treatment:** Have the person lie down or sit up if breathing is impaired. Loosen the person's clothing, and cover with a blanket. Make sure the person is breathing. Control external bleeding. Do not remove any knife or other protruding object still embedded in the chest; removal could cause severe internal bleeding. Secure the object in place with a bandage and tape. Seek immediate medical care.

### Rib Fractures

Rib fractures—or broken ribs—are often caused by a blow to the chest. Even the fracture of a single rib can affect a person's ability to breathe. A rib fracture may cause substantial pain when the chest wall moves in with the process of normal breathing.

- **Signs and symptoms:** Bruising, external bleeding, mild or severe chest pain, and trouble breathing.
- **Treatment:** Place the person in a comfortable position. Rib injuries are painful, and the person may feel better seated or lying down with the injured side up. Because a fractured rib can penetrate internal organs, keep the person still, and seek immediate medical care.

### EAR INJURIES

Children sometimes place small objects in their ears. Adults often injure their eardrums while cleaning the ear canal with cotton swabs. Earwax may block the ear canal, or an insect may crawl into the ear.

- **Signs and symptoms:** Pain (especially if the eardrum is ruptured) or strange noises in the ear. If an object stays in the ear too long, redness, swelling, pus drainage, or other signs of infection may develop.
- **Treatment:** Never try to kill an insect in the ear. In an adult or child, pull the earlobe up and back (in an infant pull the earlobe down and back) near a bright light to encourage the insect to crawl out. If you fill the ear canal with warm mineral oil or baby oil, the insect may float out. To remove an object other than an insect, gently tilt the head to the side to see if the object will fall out. If you can see the object, you can try removing it with blunt-nosed tweezers. Use care not to push the object farther in. If the object is too deep in the ear canal, don't attempt to remove it, but seek immediate medical care. If a ruptured eardrum is suspected (hearing change or loss, ringing, intense pain), do not put anything else in the ear, and seek medical care.

## ELECTRIC SHOCK

An electric shock can occur when someone is using an electric appliance with wet hands or standing on a wet bathroom floor or otherwise around water. Someone can also receive an electric shock from exposed or faulty wiring, or, in rare circumstances, from being struck by lightning (see page 119).

- **Signs and symptoms:** Unconsciousness, breathing difficulty or no breathing, and no pulse. Burns at contact points; muscle spasms; and possible blunt trauma, especially if the person has been thrown in the air.
- **Treatment:** Call for help. Unplug or turn off the power source. Then remove the person from the electrical source. If the person is not breathing, begin CPR (see Tab 2: CPR) if you are trained or being guided by an emergency dispatcher. Treat for shock (see page 96) and burns (see page 84) if necessary. If the power source cannot be turned off, do not touch the person or you will become a victim.

yourself. Wait until the fire department or power company service arrives to shut off the live current of electricity.

## EYE EMERGENCIES

### Foreign Bodies

- **Signs and symptoms:** Watery, irritated, painful eye; reluctance to open the eye; and visible foreign object.
- **Treatment:** Let the eye tear; don't rub it. Wash your hands before you touch the eye. If the object is loose, it may dislodge itself; otherwise, do not try to dislodge it yourself. Never use tweezers or any other sharp, hard instrument to remove an object. If the object is embedded, cover the person's two eyes (to restrict eye movement), and seek immediate medical care.

### Corneal Abrasion

A speck of dirt or another small object can become embedded in the eye and scratch the surface (the cornea).

- **Signs and Symptoms:** A speck or a small object washing out with tears.
- **Treatment:** Although most corneal scratches heal on their own, they can become infected and put you at risk for tetanus. If you suspect a corneal abrasion, flush the eye with water, and seek immediate medical care.

### Black Eye

A black eye is a bruise caused by a blow to the eye. The soft tissue around the eye, the facial bones, or the eye itself may be injured.

- **Signs and symptoms:** Bruising over the bony area that protects the eye. Blood in the colored part of the eye (iris) or in the white part (sclera). Vision changes and severe pain. If the bone is injured, it may be difficult to move the eye in all directions.
- **Treatment:** Make sure the person has the affected eye closed, and cover it with a clean cloth. Then put an ice or cold pack over the

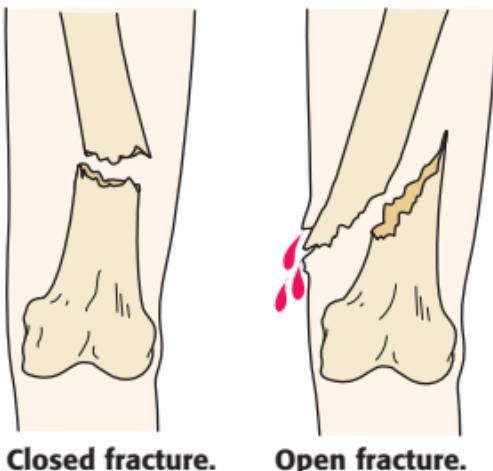
eye for 10 minutes. Do not attempt to remove any debris from the injured eye. All eye injuries should be seen by a doctor. Seek immediate medical care.

## FRACTURES AND DISLOCATIONS

### Fractures

A broken bone is called a fracture. A fracture may occur from direct trauma or from any motion that bends or twists the bone suddenly. If the force shatters the bone, its fragments can cause extensive damage to adjacent blood vessels, peripheral nerves, muscles, and ligaments.

**Fractures may be closed or open.** In a closed fracture, the skin is not broken. Open fractures involve broken or torn skin and possible protruding bone fragments. An open injury increases the likelihood of infection.

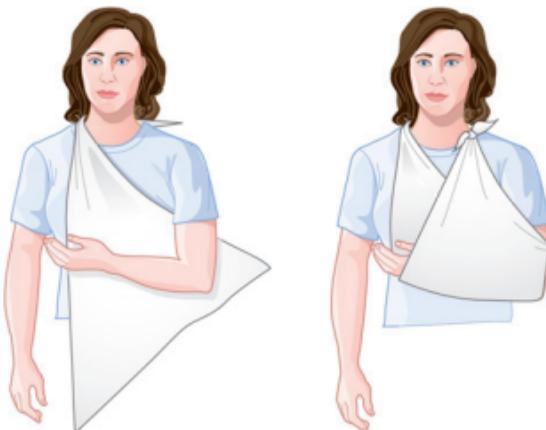


- **Signs and symptoms:** Severe pain, swelling or bruising, loss of motion, and protruding bone or deformity.
- **Treatment:** Don't move the person if neck or back injuries are suspected. Treat breathing, bleeding, and shock first. For an open fracture (bone protruding from the skin), control the bleeding and cover the open wound with a clean dressing or cloth. Immobilize the injury before moving the person. Seek immediate medical care.

## Immobilization Techniques

Fractures should be immobilized to prevent injury to blood vessels and nerves. Splinting is the primary immobilization technique. It helps prevent further damage and protects the injury until you can seek medical help. An improvised splint will immobilize an injured limb, reduce pain, and prevent further injury. A simple splint can be used on an arm, finger, leg, or toe.

- Remove all rings, watches, and bracelets. Swelling may make these items hard to remove later.
- Tie or tape the injured limb to a stiff object, such as rolled-up newspapers or magazines or a large stick. Ties can be made out of items such as a torn sheet, rope, or belt. Don't tie too tightly. Try to splint the joint above and below a suspected fracture to keep the injury from bending. For example, splint a fractured leg from above the knee to below the ankle.
- Tape a fractured finger or toe to the next uninjured finger or toe with padding between them.
- For joint injuries, immobilize the bone above and below the joint.
- Use a triangular arm sling to secure arm and shoulder injuries.



**Applying a triangular arm sling.**

## Dislocations

Dislocation occurs at a joint, when one end of a bone is pulled or pushed out of its normal position. Ligaments (bands of tissue that hold bone to bone) can tear during a dislocation.

- **Signs and symptoms:** Swelling, intense pain, and immobility of the affected joint.
- **Treatment:** These injuries should be treated as fractures and splinted in place. Never try to reduce (put back in place) a dislocated joint. Seek medical care.

## HEAD INJURIES

Head injuries can range from a minor bump to a major cut or a blow severe enough to cause brain injury. Minor cuts on the face or scalp often look worse than they are because the blood vessels are close to the skin surface and bleeding occurs easily. However, a head injury of any kind should be taken seriously. Blunt injuries often cause bleeding inside the skull. The more force is involved, the more serious the injury usually is. A head injury may also involve a neck injury that requires spinal precautions and immobilization.

### Bleeding in the Brain

- **Signs and symptoms:** Sleepiness, dazed manner, or unconsciousness. Vomiting, pale skin, headache, and uneven pupils (one pupil may be smaller or larger than the other).
- **Treatment:** Treat the injury as an emergency. Keep the person still while immobilizing the neck. Call for immediate medical attention. Stay with the person, and monitor closely for unconsciousness.

### Concussion

- **Signs and symptoms:** Headache; and loss of consciousness for a few seconds.
- **Treatment:** Treat any head injury as an emergency. Call for immediate medical attention. Stay with the person and monitor closely for

unconsciousness. Anyone who has a head injury, no matter how minor, should be watched for 24 hours for signs of a serious problem.

## Skull Fracture

A forceful blow to the head may cause a skull fracture (a broken bone). The fracture may or may not cause a depression with bone fragments showing. In either case, the injury can cause bleeding into the brain and must be taken seriously.

- **Signs and symptoms:** A dent or deformity in the skull; and sleepiness, dazed manner, or unconsciousness. Vomiting, pale skin, headache, and uneven pupils. Blood or clear fluid, not caused by a cut or direct hit, draining from the ears or nose.
- **Treatment:** Treat the injury as an emergency and use spinal precautions. Keep the person still while immobilizing the neck. Call for immediate medical attention. Stay with the person, and monitor closely for unconsciousness.



**SAFETY TIP—Children and adults should always wear a properly fitted helmet when participating in activities such as bicycling, snowboarding, skiing, and riding a scooter or motorcycle. Seat belts and child seats should be used for traveling in a car. Never dive into shallow or unfamiliar water.**

## NOSE INJURIES

### Nosebleed

Nosebleeds are not usually serious. They commonly occur because of dry air or high altitude, an injury to the nose, or a medication (especially a blood thinner such as warfarin [Coumadin]). Blowing or picking the nose can also cause a nosebleed.

- **Signs and symptoms:** Blood coming from the nostrils after nose blowing, sneezing, picking, illness, or injury.

■ **Treatment:** Tilt the head forward. Squeeze the nose shut by pinching the nostrils and breathe through the mouth. If bleeding does not stop, apply a cold compress and reapply pressure. If bleeding continues after 30 minutes, seek immediate medical attention.

### Object in the Nose

Children sometimes put small objects such as beads, marbles, or candy up their noses.

■ **Signs and symptoms:** A tender, swollen nose with a yellow discharge draining from it.

■ **Treatment:** Have the child pinch the other nostril closed and try to blow the object out. If you can see the object, try to remove it with blunt-nosed tweezers. Hold the child's head still, and use care not to push the object farther in. If the child resists and the object is still not dislodged, seek immediate medical attention.

### SHOCK

Shock is caused by inadequate delivery of blood to the vital organs, especially the brain, heart, and kidneys. It may develop after sudden illness, infection, injury, burns, heart failure, bleeding, anaphylaxis, or fluid loss (vomiting or diarrhea). Sometimes even mild injury will lead to shock. Prompt treatment can save a person's life.

■ **Signs and symptoms:** Cool, pale, moist skin; fast breathing; and rapid, weak pulse. Weakness, dizziness, excessive thirst; confusion or anxiety; and nausea or vomiting.

■ **Treatment:** Check for breathing problems and any bleeding. Lay the person face up with feet raised unless you suspect head, neck, or back injuries. Try to control bleeding with direct pressure. Keep the person warm; use a blanket or sheet, depending on the weather. Don't give anything to eat or drink. Seek immediate medical attention. Continue to monitor airway, breathing, and circulation until help arrives.

## SPRAIN AND STRAIN

Ligaments connect one bone to another; tendons connect muscle and bone. A sprain is the stretching or tearing of ligaments when a joint is twisted beyond its normal range of motion. A strain is caused by over-stretching or tearing a muscle or tendon.

- **Signs and symptoms:** Swelling, severe pain, and inability to move the limb normally because of both weakness and pain.
- **Treatment:** During the first 48 to 72 hours, apply an icepack or cold pack for 10 to 15 minutes at a time each hour. This treatment reduces swelling. Keep a damp cloth between the skin and the pack so the cold doesn't damage the skin. Heat should not be used because it encourages internal capillary bleeding and increases swelling. Use a compression wrap such as an elastic bandage to prevent swelling and support the joint. Don't wrap it too tightly. If possible, elevate the injury above the level of the heart to reduce swelling.



**SAFETY TIP—Create a homemade flexible cold pack with rubbing alcohol. Mix one part rubbing alcohol with three parts water in a heavy-duty self-closing plastic freezer bag. Mark it "Cold pack: Do not eat," and set in your freezer. Soon you'll have a slushy, comfortable cold pack.**

## TOOTH INJURIES

A tooth can be knocked out by blunt trauma or another injury. It can also be chipped by a blow to the mouth or by inadvertently chewing on a hard object.

- **Signs and symptoms:** Sensitivity to heat, cold, and sweets. Pain and facial swelling. Bleeding will occur if a tooth is partially or fully knocked out.
- **Treatment:** Call a dentist if the injury is localized to the tooth. Otherwise, seek emergency care. Give aspirin (for a person more than

18 years old), ibuprofen, or acetaminophen for pain. If a permanent tooth is knocked out, the dentist may be able to reimplant it. This works best within about 30 minutes of the injury. Touch the tooth only by the top (crown), not the root. On the way to the dentist's office, keep the tooth moist or it will die within minutes. Transport it in milk or saliva; water is not recommended. To control bleeding around the injury site, have the person bite down gently on a gauze pad.

## WOUNDS

### Closed Wounds

Closed wounds can occur when a person is punched in the face or abdomen, falls down a flight of stairs, or suffers other mishaps. The skin will remain intact, with bleeding occurring just under the skin or deeper in the body. On the body surface, closed wounds are called bruises. Internal bleeding is caused by wounds deeper in the body.

#### **Bruise**

A bruise (contusion) is caused when small blood vessels under the skin bleed after a hit or fall. People who take aspirin or blood thinners may bruise more easily because the medication increases the length of time it takes for their blood to clot.

- **Signs and symptoms:** Redness on impact, with the area turning deep blue later. Pain, especially if a large area is affected.
- **Treatment:** Apply ice or cold packs to the affected area for 10 minutes. If an arm or leg is affected, elevate the limb. Give acetaminophen or ibuprofen for pain and swelling. If the bruising is severe, there may be underlying tissue, organ, or bone damage; seek immediate medical attention.

#### ***Internal Bleeding***

Internal bleeding is often hard to detect but should be suspected when injuries are severe, as in a motor vehicle accident or a serious fall.

- **Signs and symptoms:** Bleeding from the nose, mouth, ears, or rectum. Growing swelling and tension in the chest, abdomen,

or another region. Extensive bruising, restlessness, and signs of shock (page 96).

- **Treatment:** Treat for shock (page 96), and seek immediate medical care.

## Open Wounds

In open wounds, the protective barrier of the skin has been breached. Bleeding is visible, and the potential for infection is significant.

### *Abrasion or Scrape*

Abrasions are small tears to the skin caused, for example, by rubbing your arm against a brick or stone surface or “skinning” your knee when falling off a bike. Abrasions may have dirt and grime embedded in them. A scrape is a series of tiny cuts that may occur if you brush up against a bush or plant that has thorns. Abrasions and scrapes are usually minor. The first step is to control the bleeding.

- **Treatment:** Bleeding from a minor wound will usually stop on its own after you apply pressure with a clean cloth or bandage. Once the bleeding is under control, wash the wound with soap and water. Bandage the wound to keep it clean. Use an antibiotic ointment to prevent infection.

### *Amputation*

A traumatic amputation is the partial or full severing of a body part, most commonly a finger, toe, ear, or limb (arm or leg).

- **Treatment:** A complete amputation may not bleed because the blood vessels tend to constrict. In some cases, however, superficial or deep bleeding may be severe. Follow page 80 on bleeding control. Wrap the amputated part in clean, slightly moist gauze, and place it in a plastic bag. Keep the part cool but **do not put it directly on ice**. Seek immediate medical attention.

### *Bullet Wounds*

A bullet wound will cause extensive tissue damage beyond the path of the bullet. Damage from a bullet is affected by several factors: the

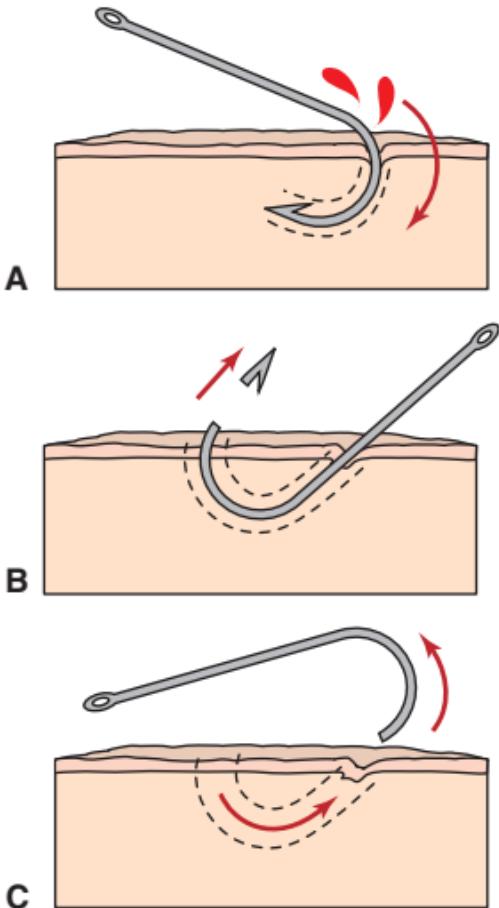
distance from origin, the size and speed of the bullet, its tumble (rotation), and its degree of fragmentation. In .22-caliber rifles and M-16 firearms, the bullet sizes are similar, yet the resulting damage differs considerably. The wound caused by the M-16 is much more extensive. In this case, the speed of the firearm makes a difference. A bullet that fragments when it leaves the gun, such as a shotgun shell filled with small pellets, will move more slowly but cause damage over a wider area of the body.

■ **Treatment:** Apply direct pressure with a clean cloth or bandage to control bleeding. The bullet may stay lodged in the body or pass right through. If possible, check for entry and exit wounds. Check airway, breathing, and circulation. Seek immediate medical care.

### ***Fishhook Injury***

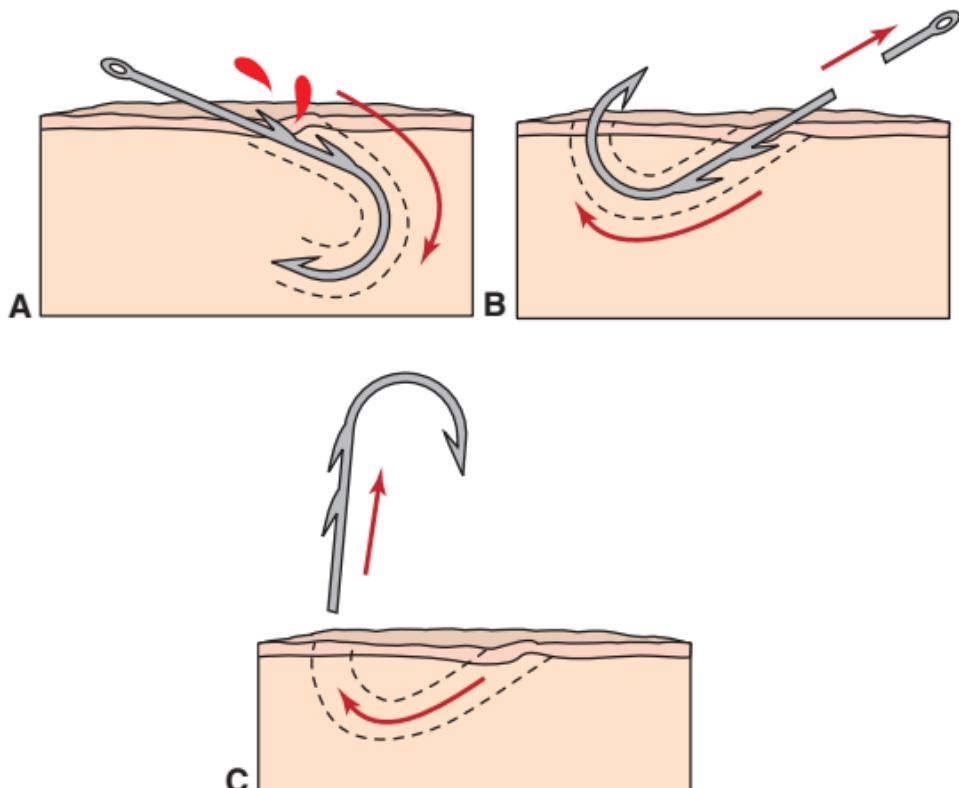
Fishhook injuries generally occur on the face, ears, back, or hands. These injuries can be serious if the barb of the hook is close to the eye. Because fishhooks are dirty and contaminated with bacteria, the wound is at risk for a skin infection.

■ **Treatment:** Cut the fishing line, stop the bleeding, and clean the wound with soap and water. In some cases, the hook can be backed out of the injury site with little pain. Avoid removing hooks near joints, tendons, bones, ligaments, or arteries. If the injury is to the face or in or near the eye, shield the hook from further movement and seek immediate medical care. If the hook is removed, clean the wound with soap and water, use antibiotic ointment, and bandage the area. Even if the wound is minor, check with the health-care provider about the need for a tetanus shot or booster.



**Simple fishhook removal:** (A) push barb through skin, (B) cut barb off, and (C) back hook out of skin.

- If the hook is in a finger and has only one barb, a **simple removal technique** is to force the barb through the skin and cutting the barb off with wire cutters. Back the remainder of the hook out of the wound the way it went in.



**Multiple-barb fishhook removal:** (A) push hook through skin, (B) cut eye off hook, and (C) remove hook.

- If the **hook has multiple barbs**, force the point through the skin, cut off the eye of the hook, and push the shank forward until you can remove it.

### ***Impaled Objects***

An impaled object is a sharp object that has become imbedded in the skin or body.

- Treatment:** Do not remove an impaled object if removal would result in more bleeding or pain. For example, do not remove a large impaled object (e.g., a stick) or an object lodged in the eye.

For minor wounds, dirt and other loose foreign material should be carefully washed out with soap and water. Seek immediate medical attention.

### **Laceration (or Cut)**

A laceration, or cut, may have a clean edge or may be irregular and torn. The injury can be minor or severe. The first step is to control the bleeding.

■ **Treatment:** Bleeding from a minor wound will usually stop on its own after you apply pressure with a clean cloth or bandage. If the wound is bleeding heavily or spurting blood, follow the steps for bleeding management on page 80. Once the bleeding is under control, wash the wound with soap and water. Bandage the wound to keep it clean. Apply an antibiotic ointment. Check with the health-care provider about the need for a tetanus shot or booster. If you think the person may need stitches or if the bleeding is severe, seek immediate medical attention.



**SAFETY TIP—Does the wound need stitches? For best results, cuts that need stitches should get them within 6 to 8 hours.**

**Stitches can help cuts heal with less scarring. After you've washed the cut with soap and water and the bleeding has stopped, pinch the sides of the cut together. If it looks better that way, the wound may heal faster and better with stitches.**

### **Puncture Wound**

Sharp, pointed objects (nails, needles, teeth, and knives) cause puncture wounds that go through the skin. This type of wound can easily get infected because it's deep: this makes it hard to clean and creates a warm, moist place for bacteria to grow. Puncture wounds can lead to tetanus if left untreated.

■ **Treatment:** Control the bleeding, and then clean the wound with soap and water. If the wound is minor, place some antibiotic ointment (or cream) over the wound to prevent infection and cover

with a bandage to keep it clean and protected. If it's major, seek medical attention and check with the health-care provider about the need for a tetanus shot or booster.

### ***Splinter***

A splinter is a small, sharp object, usually a thorn or a tiny piece of wood or metal, embedded in the skin.

■ **Treatment:** Put a piece of tape over the splinter and pull it up. If that doesn't work, grip the end of the splinter with tweezers and gently try to pull it out. If the splinter isn't sticking out where you can reach it, clean a needle with alcohol and make a small hole in the skin over the end of the splinter. Then lift the splinter with the tip of the needle until you can grab it with the tweezers. After the splinter is removed, wash the area with soap and water. Watch for signs of infection. If the splinter is large, deep in the skin, or in the eye, do not try to remove it and seek immediate medical attention.

### ***Stab Wound***

Stab wounds produced by a knife or ice pick, for example, may go deep enough to penetrate tissues and organs, including bones.

■ **Treatment:** Stop the bleeding with direct pressure; clean with soap and water and cover with a sterile bandage. Seek immediate medical care.



**SAFETY TIP—Any injury involving an open wound can lead to tetanus. This disease is caused by soil bacteria introduced into open wounds. As the bacteria grow, they produce a toxin that provokes severe muscle spasms and interferes with breathing. Puncture wounds are fertile ground for tetanus. If you haven't had a tetanus shot in the last 5 years or don't know when your last shot was, see your health-care provider within 2 days of the injury and get a shot.**

## Tab 5: Environmental Emergencies

The human body has evolved over thousands of years to thrive in an environment providing just the right range of temperature, pressure, and humidity, as well as shelter from storms. That's why exposure to environmental extremes such as altitude, cold or heat, lightning, and water can have a disastrous effect on your body.

### ALTITUDE SICKNESS

**Altitude is measured by feet (or meters) above sea level.** The pressure that the air around you (the atmosphere) exerts on your body decreases with an increase in altitude. This means that the higher you go, the less oxygen is available for breathing.

The amount of oxygen your body needs to function doesn't change. So initially, as you move to higher altitudes, your breathing rate increases spontaneously, even while you're at rest. Over time, your oxygen-deprived body develops mechanisms to adapt. Your heart's output increases, your blood becomes more acidic, more red blood cells are produced, and your oxygen use changes. This process is called *acclimatization*.

**Altitude sickness, or acute mountain sickness, occurs when people go to a higher altitude faster than their bodies can acclimatize.** Most problems at high altitude are preventable, but climbing higher without proper acclimatization can lead to potentially serious, even life-threatening, situations.

**HIGH ALTITUDE:** 4950–11,500 ft (1509–3505 m). Exercise performance decreases and resting respiration increases. Altitude sickness is common with rapid ascent above 8200 ft (2500 m).

**VERY HIGH ALTITUDE:** 11,500–18,050 ft (3505–5502 m). Extreme shortness of breath may occur during exercise or sleep and with altitude sickness.

**EXTREME ALTITUDE:** Above 18,050 ft (5502 m). Severe shortness of breath occurs and acclimatization is impossible. Sudden ascent to this altitude without supplemental oxygen is dangerous.

### Guidelines for Acclimatization

- Train for both endurance and strength before going to high elevations.
- Make day trips to a higher altitude and return to a lower altitude for sleep.
- Drink plenty of water to prevent dehydration. In high altitudes, people have a tendency to breathe deep and fast. This will cause the body to lose moisture and result in dehydration.
- Avoid alcohol, caffeine, and salty foods because these will increase the likelihood of dehydration.
- Ascend gradually to allow for acclimatization. Above 10,000 ft (3048 m), ascend no more than 2000 to 3000 ft (610 to 915 m) in a 24-hour period.
- Follow the “golden rule”: climb high, sleep low. Above 10,000 ft (3048 m), no matter how high you climb always make sure you come back to a base camp that’s no more than 1000 ft (310 m) higher than your previous night’s sleeping elevation.
- Take a rest day every 2 to 3 days.
- Until acclimatized, avoid excessive exercise and fatigue.
- Consider taking Diamox (acetazolamide, a prescription drug) or ginkgo biloba (an herbal medication) when you arrive at high altitude to reduce the chances of mountain sickness.



**SAFETY TIP—Do not ascend to a higher altitude if you are feeling sick; take a rest day or descend. Descend if you do not feel better within 24 hours.**

## Acute Mountain Sickness

### Mild

- **Signs and symptoms:** Headache, nausea, insomnia, fatigue, and loss of appetite. Usually develops at elevations over 8200 ft (2500 m).
- **Treatment:** Stop ascent and rest for a day. Maintain adequate hydration and nutrition. Use medications for pain, nausea, and acclimatization.

### Moderate

- **Signs and symptoms:** More significant than mild acute mountain sickness. Headache not relieved by rest or medication, nausea and vomiting, shortness of breath at rest, fatigue and weakness at rest, loss of appetite, and insomnia.
- **Treatment:** Treat as for mild acute mountain sickness, but if the person is short of breath at rest, supplemental oxygen is a necessity. Descent is mandatory and immediate.

### Severe

- **Signs and symptoms:** All the signs and symptoms of moderate acute mountain sickness, along with difficulty walking, extreme shortness of breath at rest, increased heart rate, persistent dry cough, and confusion or delirium.
- **Treatment:** Descent is mandatory and immediate, with evacuation to a medical facility. Administer oxygen and maintain proper hydration in the process. If the person is vomiting, an antiemetic (a drug to counteract vomiting and nausea) may be helpful.

## High-Altitude Cerebral Edema

- **Signs and symptoms:** Mental status changes (confusion, lethargy), decreased consciousness or coma, severe headache, and nausea

and vomiting. High altitude and lower air pressure have caused fluid to leak from the capillaries and build up in the brain.

- **Treatment:** Descent is mandatory and immediate. Follow general respiratory protocols: administer oxygen, open the airway, and give rescue breathing if necessary. Request an emergency response team and begin emergency medications. Administer Decadron (dexamethazone, a drug to decrease brain swelling) if available.

### **High-Altitude Pulmonary Edema**

- **Signs and symptoms:** Shortness of breath, cough, cyanosis (blue tinge) around the lips and mouth, crackles (fluid in lungs), gurgling, blood-tinged sputum, and increased respiratory and heart rates. High altitude and lower air pressure have caused fluid to leak from the capillaries and build up in the lungs.
- **Treatment:** Descent is mandatory and immediate. Follow general respiratory protocols: administer oxygen, open the airway, and give rescue breathing if necessary. Request an emergency response team, and begin emergency medications.

### **COLD-RELATED PROBLEMS**

Cold-related problems include frostnip, frostbite, and hypothermia. In some settings, snow blindness and trench foot may also occur. Appropriate clothing is the most important protection from cold-related injury. Layers provide insulation by trapping body heat; the best cold-weather clothing includes several lightweight layers made of materials that conserve body heat and prevent moisture from building up. A warm head covering, gloves or mittens, and warm socks inside boots or heavy shoes prevent heat loss from the head, hands, and feet.

*"Drinking alcohol will help you stay warm."*

**False:** Alcohol causes blood vessels to dilate. This increases blood flow to the surface of the skin and away from your body's core (brain and vital organs). Heat is then quickly radiated away from the body.

### What Is Wind Chill?

**Wind chill** is a measure of how quickly the combination of wind speed and temperature remove warmth from exposed skin. As wind speed increases and air strikes your body, convective heat transfer draws away heat more quickly, and the air feels much colder than the temperature the thermometer displays.



**SAFETY TIP—Conversion formulas for Celsius(°C) and Fahrenheit (°F).**

$$^{\circ}\text{C} = (\text{ }^{\circ}\text{F} - 32) \times 5/9$$

$$^{\circ}\text{F} = ^{\circ}\text{C} \times 9/5 + 32$$



# Wind Chill Chart



	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times

30 minutes

10 minutes

5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F) V = Wind Speed (mph)

Effective 11/01/01

## Frostnip

In **frostnip**, vulnerable areas such as the ear lobes, nose, fingers, and toes become cold. **Frostnip is the precursor to frostbite**, so it must be taken care of immediately.

- **Signs and symptoms:** A sense of cold in vulnerable or unprotected areas of the body. Pale skin that feels numb or tingles until warming begins.
- **Treatment:** Frostnip is easily reversible with rewarming techniques, extra clothing, and shelter from the elements. If frostnip is not treated immediately, it may lead to frostbite.

## Frostbite

**Frostbite is the actual freezing of water in the cells.** Vulnerable areas are the same as in frostnip: ear lobes, nose, fingers, and toes. You are more likely to suffer frostbite if you are already experiencing frostnip or hypothermia, or if areas of your body are exposed to cold and wind. In addition, if you are dehydrated, exhausted, or wearing constricting clothing such as tight boots or straps, or if you use substances that cause vasoconstriction, such as caffeine and nicotine, you're more vulnerable to frostbite.

- **Signs and symptoms:** Redness in the affected body area changing to gray, then white; numbness from affected nerves and blood vessels. In **partial-thickness frostbite**, the skin is pale and soft. In **full-thickness frostbite**, the skin is pale and hard (freezing has produced ice crystals).
- **Treatment:** Loosen constrictive clothing and straps. Don't rub affected areas. Slowly warm by immersing the body part in warm (not hot) water. Give warm drinks, and wrap the person in blankets. Seek immediate medical care.



**SAFETY TIP—**In the initial stages of frostbite, the skin is red, gray, or white. Only after frostbite has caused severe damage will the affected area turn black. The black coloration usually occurs within a few days after the initial injury as the skin and surrounding tissue begin to die.

## Hypothermia

**Hypothermia**, a lowering of the body's core temperature, can strike in any season and in almost any climate. Just combine the following factors: an air temperature of 30° to 50°F (-1° to 10°C); rain, sweat, or other wetness; slight wind; and a tired person. This combination overwhelms the body's ability to produce and retain heat.

**Hypothermia occurs when your body begins to lose heat faster than it produces it.** At this point, you are aware of feeling cold. Structures in your brain stimulate your muscles to contract repeatedly, and you begin to shiver. This action produces heat, but not enough to maintain your functioning. When the cold reaches the brain and deprives you of good judgment, confusion will override your decision-making abilities. Without medical help, your core body temperature will decrease, and you will go into a coma, collapse, and die.

### **Guidelines to Preventing Hypothermia**

- **Stay dry.** When clothing is wet, it may lose 90% of its insulating value. Even sweating can bring on hypothermia.
- **Stay out of the wind.** A slight breeze carries heat away from bare skin faster than still air does. Evaporation can turn wet clothing into a refrigerator.
- **Understand the effects of cool temperatures.** Most hypothermia cases develop in air temperatures that are considered mild, with wind chills in the range of 40° to 50°F (5° to 10°C). Most people don't believe such temperatures can be dangerous.

- **Avoid exposure to cold.** When you can't stay warm and dry, get out of the wind and dampness and get warm as fast as possible.
- **Never ignore shivering.** Persistent or violent shivering is a clear warning that you are in the early stages of hypothermia.

***Mild Hypothermia (body temperature 98.6° to 91°F [37° to 32.7°C])***

- **Signs and symptoms:** Poor judgment, uncontrolled shivering, difficulty in speaking, apathy or moodiness, loss of fine motor coordination, ataxia (trouble walking), and amnesia.

***Moderate Hypothermia (body temperature 90° to 78°F [32.2° to 25.5°C])***

- **Signs and symptoms:** Mental status changes progressing to unconsciousness, loss of shivering reflex, irregular heartbeat, low blood pressure, decreased respiration, and diminished reflexes and voluntary movement.

***Severe Hypothermia (body temperature less than 77°F [25°C])***

- **Signs and symptoms:** Unconsciousness, no shivering, absent neurological reflexes, no response to pain, pulmonary edema, and significant decreases in pulse, respiration, and blood pressure. The person is at high risk for an erratic heartbeat, heart failure, and death.

## BODY TEMPERATURE AND HYPOTHERMIA

Body Temperature	Body Response
98.6°–96°F (37°–35.5°C)	Shivering becomes uncontrollable, and ability to perform complex tasks is impaired.
95°–91°F (35°–32.7°C)	Shivering becomes violent, and speaking is difficult.
90°–86°F (32.2°–30°C)	Shivering decreases, and muscles begin to stiffen. Mind becomes dull; in some cases, amnesia occurs.
85°–81°F (29.4°–27.2°C)	Person becomes irrational and drifts into a coma. Pulse and respiration become slow. Muscular rigidity continues.
80°–78°F (26.7°–25.5°C)	Person loses consciousness. Reflexes cease to function, and heartbeat becomes erratic.
Less than 77°F (25°C)	Cardiac and respiratory systems fail completely. Death occurs unless cardiopulmonary resuscitation (CPR) is successful.

### Treating Hypothermia

- Get the person out of the cold, and remove wet clothing.
- If impairment is mild, give warm drinks if aspiration is not a risk. Provide dry clothing.
- Keep a semiconscious person awake. Initiate external warming using blankets, sleeping bags, or shelter.
- Apply hot water bottles or chemical heat packs to areas of high circulation, such as the neck, armpits, and groin.
- Avoid burns to the skin by insulating heated objects adequately.
- When no immediate signs of life are present, begin CPR (see Tab 2: CPR). Evacuate the person to advanced medical support.



**SAFETY TIP—Handle all victims of moderate to severe hypothermia gently, and immobilize them to reduce the risk for heart rhythm irregularities. Unnecessary movement may cause an already irritable heart to go into cardiac arrest.**

## Snow Blindness

**Snow blindness** is a sunburn of the cornea and conjunctiva of the eye. This painful condition is caused by exposure of unprotected eyes to bright sunlight reflected from ice or snow. It occurs in polar regions and at high altitudes. The intensity of ultraviolet rays increases by 5% with every 1000 ft (305 m) in elevation and can have serious consequences if the eyes are not protected by special sun-shielding goggles or glasses.

■ **Signs and symptoms:** Bloodshot and teary eyes, eye pain, sensitivity to light, eyelid swelling, and sensation of grittiness in the eyes. Permanent vision loss in very severe cases.

■ **Treatment:** Avoid rubbing the eyes, remove contact lenses, administer an oral pain medication such as aspirin (if more than 18 years old) or ibuprofen, use external cool compresses to ease burning and swelling, patch the affected eye(s) with soft dressings to prevent irritation from eyelid movement and light, and rest in a dark room if possible.

## Trench Foot

**Trench foot (immersion foot)** follows exposure to nonfreezing cold and wet conditions over several days and causes nerve and blood vessel damage to the legs and feet without ice crystal formation.

■ **Signs and symptoms:** Swelling, redness, and pain in the affected feet and legs during the first few hours to days, then pallor (whitish skin) with eventual numbness.

■ **Treatment:** Loosen constrictive clothing, boots, and straps. Don't rub affected areas. Slowly warm by immersing the feet in warm (not hot) water. Give warm drinks, and wrap the person in blankets. When the feet are warmed, keep them dry and avoid re-exposure to moisture. Seek immediate medical care.

## HEAT-RELATED PROBLEMS

Heat-related problems range from sunburn to life-threatening emergencies such as heatstroke. You are at greater risk for these problems when the environmental temperature exceeds 95°F (35°C) with humidity levels greater than 80%. Children and the elderly are also at increased risk, as are people who have underlying health problems, are dehydrated, or have a burn (including sunburn). Muscular exertion (hard labor or strenuous exercise) also greatly increases the risk.

During even moderate exercise in hot environments, sweat loss can exceed 2 quarts (2 liters) per hour. Drink 1 quart (1 liter) of water an hour to help offset the losses. You can also drink a rehydration drink or sports drink to maintain electrolyte balance. Humans can absorb only about 1 quart (1 liter) of fluid an hour, so frequent rest and rehydration breaks are critical.



**SAFETY TIP—**Certain substances may predispose you to heat-related problems. These include psychotropic drugs, alcohol, stimulants, and decongestants, among others. Check with your doctor before being exposed to a hot environment.

### Sunburn

- **Signs and symptoms:** Minor skin redness and irritation in mild and uncomplicated cases. Possibly severe pain after sufficient exposure. Initially skin turns red about 2 to 6 hours after exposure and feels irritated. The peak effects appear at 12 to 24 hours.
- **Treatment:** Medications such as aspirin (if more than 18 years old) and ibuprofen are useful to relieve discomfort, especially when started early. For mild sunburn, cool compresses may suffice. Aloe-based lotions help soothe and moisturize the skin. Obviously, stay out of the sun while you're sunburned. Seek medical care if you experience a fever, chills, dehydration, or blistering.

## Heat Syncope

- **Signs and symptoms:** Syncope (fainting) after prolonged standing in a hot environment.
- **Treatment:** Check airway, breathing, and respiration. Assess for any trauma caused by a fall. When the person is alert and awake, give cool fluids.

## Heat Cramps

- **Signs and symptoms:** Painful cramps usually occurring in heavily exercised muscles, with onset during or after the exercise.
- **Treatment:** Administer cool fluids, and allow the person to rest in a cool environment.

## Heat Exhaustion

Heat exhaustion occurs when fluid loss (sweating) exceeds fluid intake. It often happens during manual labor or exercise in hot, humid environments and is common in people who are not used to a hot, humid climate. Electrolyte losses are frequent. Heat-exhausted people are dehydrated—if they continue their activity, heatstroke may follow.

- **Signs and symptoms:** Normal or increased pulse, respiration, and blood pressure. Normal or slightly elevated body temperature. Dizziness, nausea and vomiting, headache, chills, and lightheadedness may occur.
- **Treatment:** Stop exercise, drink fluids, and replace electrolytes with a sports or rehydration drink that contains potassium, sodium, phosphorus, and chloride. Rest in a cool environment. Seek medical care.



**SAFETY TIP—Unacclimatized people working in heat for 8 hours a day can prevent salt deficit and electrolyte imbalance by adding a small amount of salt to their drinking water. The ideal concentration is a 0.1% salt solution, which can be prepared by dissolving 1/4 tsp of table salt in 1 quart (1 liter) of water. Salt should never be eaten by itself. It irritates the stomach, causes vomiting, and does not treat the dehydration.**

## Heatstroke

**Heatstroke is a life-threatening emergency.** It results when the body produces more heat than it can release with its normal cooling processes (sweat and respiration). Manual labor and exercise in a hot environment can bring on heatstroke very quickly even in a person who is not dehydrated. In addition to muscular exertion, risk factors include obesity, heart problems, and older age. Athletes training or competing in hot, especially hot and humid, environments are at significant risk.

- **Signs and symptoms:** Severe, life-threatening rise in body temperature to more than 105°F (40.5°C), with or without preceding heat exhaustion. Decreased or absent sweating, altered mental status (confusion, disorientation, bizarre behavior), seizures, elevated pulse and respiration, and decrease in blood pressure.
- **Treatment:** Provide rapid cooling. Place ice or cold packs on areas of high circulation: the neck, armpits, and groin. Immerse the person in cool water if possible (keeping the head out of water), or use evaporative cooling (wet the person with cool water and fan aggressively). Seek immediate medical care.



**SAFETY TIP—To avoid heatstroke, athletes should train and acclimatize to the heat (this may take several weeks), stay well hydrated, and curtail training when it's very hot.**

## Hot Weather and Pets

Hot, humid weather can be dangerous to pets, particularly dogs left in cars or chained outside. Pets can suffer brain damage or even death.

### ***Signs of Heat Illness in Pets***

Dogs cool themselves by panting. If panting doesn't reduce the body temperature sufficiently, the dog will develop heat exhaustion or heat-stroke. Signs of heat exhaustion include rapid breathing, heavy panting, and profuse salivation. As with a human, heat exhaustion can lead to

heatstroke. Signs of heatstroke include heavy panting, glazed eyes, fatigue, vomiting, staggering or unsteady gait, rapid pulse, and deep red or purple tongue and gums. **If your dog exhibits any of these signs, lower its body temperature immediately!** Get the dog in the shade, apply cool, wet towels, put the dog in a shower, or use a hose and spray with cool water. Never cool the dog enough to cause shivering. Give small amounts of cool water and call a veterinarian for immediate medical help.

### **Safety Precautions**

Use common sense, and remember these tips to keep your pet safe in hot weather:

- Always have plenty of fresh water available.
- Make sure your pet has access to shelter and shade.
- Dogs can get sunburned, especially those with light-colored noses or little hair on some parts of their bodies. Ask your veterinarian for advice on pet-safe sunscreens.
- Do not leave older pets, pets with health problems, or short-nosed dogs such as pugs outside in the heat.
- **Never** leave your dog unattended in a parked car with the windows up. Temperatures inside can reach more than 120° F (49°C) within minutes even when the outside temperature is just 70°F (21°C). Opening a window an inch or two or leaving a bowl of water will make little difference. Your dog will quickly overheat and could die.
- **Never** allow your dog to exercise excessively in hot weather. Walk the dog early in the morning or later in the evening.

### **LIGHTNING INJURIES**

All thunderstorms produce lightning, and all are dangerous. Although most lightning victims survive, they often report a variety of long-term, debilitating problems.



**Lightning bolts.**

Lightning delivers a massive, very hot electrical pulse over a fraction of a millisecond. Ninety percent of lightning strikes are from cloud to cloud; only about 10% of lightning strikes are from cloud to ground. Two factors can predispose you to a lightning strike: height and isolation. Lightning tends to strike tall objects, including trees, gazebos, television or cell towers, shelters, flagpoles, bleachers, and fences. A person who is the tallest object in an open field is at risk.

**MYTH  
BUSTER**

*"Lightning only occurs with thunderstorms."*

**False:** Lightning can occur without rain or visible clouds in the sky. Most people know enough to seek shelter after the storm clouds roll overhead. Few realize that one of the most dangerous times for a fatal strike is before the storm.

**SEVERE THUNDERSTORM WATCH:** Notice of when and where severe thunderstorms are likely to occur. Watch the sky, and stay tuned to a radio or television for information.

**SEVERE THUNDERSTORM WARNING:** Issued when severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property for anyone in the path of the storm.

### Prevention

- During the thunderstorm season, listen to weather reports. High winds, rain, and clouds may mean that a thunderstorm is imminent.
- Remove dead or rotting trees and branches that could fall and cause injury or damage.
- If you see a lightning bolt or hear a sharp, loud crack or long, low rumble from thunder (the sound of lightning), seek shelter. You can estimate the distance of the storm by seeing the flash of light in the distance and then listening for thunder. You see lightning the instant it flashes, whereas the sound waves of thunder travel a mile in about 5 seconds. **If the interval between lightning and thunder becomes less than 30 seconds, seek shelter immediately.** Storms travel quickly, and the next lightning strike could be dangerously close to you.
- Shelter in small, open structures is not safe. Try to get inside a large, enclosed building or an enclosed vehicle with the windows shut.
- Don't resume outdoor activities until 30 minutes after you hear the last thunder or see the last lightning.
- Before and during a thunderstorm, if you are caught outdoors, avoid high ground, metal objects, water, and open spaces such as fields. Stay at least 15 feet away from other people, and seek shelter in the middle of a grove of trees (but not under a solitary tree). **If you can't get to shelter, squat to make yourself as low as possible, but don't lie on the ground. Put your weight on the balls of your**

**feet, feet together, head lowered, eyes closed, and ears covered (see lightning position).** This position lowers your height and minimizes the area in contact with the surface of the ground.

- To prevent lightning injuries when indoors, avoid contact with water such as taking a shower or bath, because lightning can travel through the plumbing, and water conducts electricity. Also avoid talking on a landline corded telephone (lightning will travel through the phone line), working on a computer, or using headsets cabled to a sound system (lightening will travel through electrical sources). Stay away from windows and doors, and turn off and unplug electrical equipment before the thunderstorm arrives.
- Use your battery-operated radio for updates from local officials.



**Lightning position.**



**SAFETY TIP—Seek shelter when you hear thunder or see lightning. During potential storms, avoid exposed areas such as open fields, water, tall objects, and openings of caves or buildings.**

**MYTH  
BUSTER**

*"Wearing metal on your body attracts lightning."*

**False:** Height, a pointed shape, and isolation are the dominant factors controlling where a lightning bolt will strike. The presence of metal makes virtually no difference. While metal doesn't attract lightning, touching or being near long metal objects (fences, railings, bleachers, vehicles) is still unsafe when thunderstorms are nearby. If lightning does happen to hit it, the metal can conduct the electricity a long distance and still electrocute you.

## **Lightning Injuries**

Lightning is much less likely to cause internal burns than is generated electricity. The brief exposure often limits damage to the outer layer of skin. In most instances, the contact is too brief to burn the skin substantially. Lightning energy flows through the body for an incredibly brief period; most of it usually flashes around the body's surface. However, it can kill a person by instantly short-circuiting the heart or brain.

- **Signs and symptoms:** In mild injuries, possible ruptured eardrum or superficial burns in a fernlike pattern. In major injuries, cardiopulmonary arrest, chaotic heart rhythm, severe skin burns, fractures, and concussion. Look for entry and exit wounds.
- **Treatment:** Treat immediate life-threatening injuries, treat other injuries as needed, call for help, and evacuate the person to the nearest medical facility.

**MYTH  
BUSTER**

*"Lightning victims are electrified. If you touch them, you'll be electrocuted."* **False:** The human body doesn't store electricity. It's perfectly safe to touch a lightning victim to give first aid.

## WATER EMERGENCIES

### Prevent Injuries by Following These Water Safety Tips

- **Learn to swim.** Check out your local community center for swim classes.
- Adult supervision will minimize risks and injuries to children.
- Pool and hot tub safety is essential.
- Always wear a properly fitted and approved lifejacket, and use helmets when appropriate (for white-water rafting and kayaking).
- Never swim when intoxicated.
- Always swim with a buddy; never swim alone.
- **Obey pool rules:** Don't run on or near a pool deck; don't play on or near diving boards; don't jump on or near people in the water; never enter pool areas that are closed or locked; never fake an accident or drowning; don't engage in horseplay.

**MYTH  
BUSTER**

*"Flotation devices serve the same purpose as life-jackets."* **False:** Lifejackets are designed to hold a person on top of the water. Flotation devices (floats, surfboards, rafts) usually require you to hold on to, sit on, or lie on them and are not dependable. Weak swimmers can fall off in deeper water than they would swim in without the float.

**SAFETY TIP—Most cases of drowning are easily preventable.**

Preventive strategies include installing fencing around swimming pools to keep out children and pets, maintaining adult supervision, wearing lifejackets in boats, and above all, avoiding drugs and alcoholic beverages while swimming or boating.

### How to Rescue a Drowning Person

Should you attempt to rescue someone who is drowning? Here are some things to consider before you do:

- Never attempt a rescue unless you're trained in water safety.
- Training in water safety, water rescue, CPR, and first aid provides the skills needed to save lives and the knowledge to take some panic out of the situation.

**The first step in rescuing a drowning person is to ensure your own safety.** A conscious person may panic and cling to you, thus submerging you in the process. Avoid being the second victim. The safest form of rescue is known as **"reach, throw, row, and go"**:

- **Reach to grab a long object and extend it to let the drowning person reach for the other end.** A fishing rod, an oar, a branch, even a shirt or towel can help you pull someone to safety. If the person is close and you can't find anything to reach with, lie down, hold on to something solid with your arms, and reach with your leg.
- **Throw anything that floats to the drowning person.** Small plastic beverage coolers (soft or hard) and lifejackets are good floaters. People who perform rescues at sea say that many survivors are found clinging to their ice chests. If you are in a boat, it may be equipped with a flat cushion or round ring buoy; both are designed to be held on to, not worn. Tying a rope to the cushion or ring buoy before you have an emergency can save time and lives.

- **Row a boat, raft, log, or anything that can float safely to get the person back to shore.** Dragging someone into a boat over the stern (back) might require great strength. The person may be able to hold on to the boat as you either head for shore or stay put until more help arrives.
- **Go for help.** Time is critical but, unless you've been trained as a lifeguard, it's better to go for help than try to swim to someone's rescue. Dial 911 or your local emergency response number if you have a cell phone.

**MYTH  
BUSTER**

*"Good swimmers don't drown."* **False:** People drown for many reasons besides a lack of swimming skills. Contributing factors include a medical emergency, injury, drug or alcohol intoxication, overexertion, hypothermia, and cramps. Some gifted swimmers have lost their lives in this manner. Good swimming skills are never a replacement for proper water safety.

### First Aid for Victims of Drowning and Near-Drowning

**Drowning** is death caused by suffocation when a liquid interrupts the body's absorption of oxygen from the air. The primary causes of death are lack of oxygen and acidosis leading to cardiac arrest. **Near-drowning** is the survival of a drowning event involving unconsciousness or water inhalation. It can lead to serious secondary complications, including death, after the event.

- **Signs and symptoms:** Unconsciousness, no breathing, possibly no heartbeat; cold exposure and shock.
- **Treatment:** Remove the person from the water. If breathing is absent, begin CPR (see Tab 2: CPR) immediately if you are trained or being guided by an emergency dispatcher. Call for immediate

medical assistance, and evacuate to a medical facility. Use blankets, and keep the person warm.



**SAFETY TIP—**Victims have recovered fully after immersion in cold water for more than 30 minutes. Cooling slows the body's metabolic processes and allows the brain to survive the lack of oxygen for longer than normal.

## MYTH BUSTER

*"Victims always drown in deep water."* **False:** Shallow water in pools or along coastlines may seem harmless enough to let a child splash around in, but you may be surprised to learn that most drownings occur in less than 4 ft (1.22 m) of water. Small children can drown in as little as 1 inch (2.54 cm) of water and in just 30 seconds.

## SCUBA DIVING EMERGENCIES

Trained and certified scuba divers know how to avoid common problems that can come up during a dive. The two most serious causes of injury are decompression sickness and arterial gas embolus.

### Decompression Sickness

Decompression sickness (often called "the bends") is caused by the formation of nitrogen gas bubbles inside blood vessels and tissues. Excess nitrogen accumulates in the body when a diver breathes at a depth greater than 33 feet (10 m). Decompression sickness occurs when ascent is too rapid to allow the release of this excess nitrogen. Divers notice symptoms within minutes or hours after surfacing.

■ **Signs and symptoms:** Fatigue and musculoskeletal pain, particularly around joints such as the shoulders or elbows. Pain may be a dull

ache but may also be sharp or throbbing. More severe cases may lead to unconsciousness, low blood pressure, and a fast heart rate.

- **Treatment:** Transport the patient for recompression treatment in a hyperbaric (oxygen) chamber. If an aircraft is used, ideally the cabin should be pressurized to sea level. If the patient is flown out by helicopter (unpressurized), the pilot should try to stay below 1000 ft (330 m) above sea level. Keep the patient facing up, and have a medical team administer oxygen and other necessary interventions.
- Help with dive-related incidents is available 24 hours a day. Call the Divers Alert Network (in the United States) at 800-446-2671.

### **Arterial Gas Embolism**

The pressure of water on a submerged diver's body is far greater than atmospheric pressure. When a diver ascends to the surface too quickly, this pressure can decrease so rapidly that gas expands in the lungs and air cannot escape in adequate amounts. Alveoli (small air sacs) rupture in the lungs and release air bubbles that enter the bloodstream and are circulated to the heart. This is called an **arterial gas embolism** and usually develops immediately after a diver surfaces. The result can be fatal.

- **Signs and symptoms:** Sudden loss of consciousness on surfacing from a dive, chest pain related to lack of oxygen to the heart, confusion, convulsions, difficulty speaking, shortness of breath, blindness or visual impairment, dizziness, and headache.
- **Treatment:** Transport the person for recompression treatment in a hyperbaric (oxygen) chamber. If an aircraft is used, ideally the cabin should be pressurized to sea level. If the person is flown out by helicopter (unpressurized), the pilot should try to stay below 1000 ft (330 m) above sea level. Keep the person facing up, and have a medical team administer oxygen and other necessary interventions.
- Help with treatment of dive-related incidents is available 24 hours a day. Call the Divers Alert Network (in the United States) at 800-446-2671.

## Tab 6: Poisons, Bites, and Stings

Poisons are substances that can harm us if we come into contact with them. The most common sources of poisons are contaminated foods, certain household and industrial chemicals, the secretions of biting and stinging insects and other creatures, and the sap, berries, and other parts of poisonous plants. Bites from mammals such as humans, dogs, and cats are covered in Tab 4: Injuries and Wounds.

### POISONING

**Although poisonings are common in the workplace, most poisonings occur in the home.** Household chemicals, especially those designed to have a pleasant odor and color, are a common cause, as are industrial chemicals used in the garage, workshop, or garden. Over-the-counter and prescription medications can easily cause an accidental overdose if a child or pet gets hold of them, as can vitamins and other dietary supplements.

As shown in the box immediately following, poisonous substances can be ingested—taken into the body by mouth—or inhaled or injected. They can also be absorbed by skin contact. From any of these routes, poisoning can produce local or generalized (body-wide) effects ranging from minor to critical. Identifying specific poisons may be easy or impossible because poisons may be mixed or even unknown.

### POISON: ROUTES OF EXPOSURE AND ABSORPTION

#### Ingestion

- The most common exposure route is ingestion, and the most common substances are drugs, household products, plants, and contaminated food.

*Continued*

## POISON: ROUTES OF EXPOSURE AND ABSORPTION—cont'd

- Absorption generally occurs in the gastrointestinal tract. The mouth and upper airway may also be affected.
- Take the person to a hospital emergency department without delay.

### Inhalation

- Toxic fumes from gases such as smoke or carbon monoxide cause most cases of inhalation poisoning.
- The upper and lower airway may both be affected.
- Lack of oxygen may occur when air is displaced by gases, vapors, aerosols, or dusts.
- Move the person into fresh air, give supplemental oxygen if possible, and seek immediate medical care.

### Injection

- Injection causes immediate (intravenous) or rapid (intramuscular, subcutaneous) absorption.
- This route includes bites, stings, and intravenous drug overdose.
- Generalized symptoms or intense local tissue destruction will occur soon after poisoning.
- Immobilize the extremity, and provide basic life support (airway, breathing, circulation). Seek immediate medical care.

### Skin

- This is the route of slowest absorption; however, absorption will occur more quickly if the skin is broken.
- Contact with corrosives (e.g., acids and alkalis in plants and household or industrial cleaners) causes most skin absorption poisonings.
- Local effects include burns to the skin and blisters.
- Remove clothing, dust any dry material off the skin, and flush the skin with water. Seek immediate medical care.



**SAFETY TIP—**If you have a question about a poison or poisoning, you can call the National Poison Control Center (800-222-1222) from anywhere in the United States. The medical staff are experts and will tell you what to do. Try to have the container or label handy so you can describe it. You can also call if you have any questions about poisoning prevention. The center will take your call for any reason, 24 hours a day, 7 days a week.

### If poisoning has occurred, follow these steps:

- Identify the poison if you can.
- Call your local or national poison control center (see phone number under safety tip).
- Alternatively, go to a hospital emergency department immediately.

The signs, symptoms, and treatment of specific types of poisonings are discussed next.

### Food Poisoning

Food poisoning can occur when certain microorganisms contaminate food. Food can become contaminated during processing or from improper preparation and storage. Any type of food, whether of plant or animal origin, can become infected. Undercooked beef and pork, raw seafood and produce, and foods that have been left out at warm temperatures, as during a picnic, are common sources of food poisoning.

- **Signs and symptoms:** Weakness, nausea, vomiting, abdominal pain or cramping, and diarrhea. Typically, symptoms begin within 1 to 48 hours after the contaminated food has been consumed.
- **Treatment:** Vomiting and diarrhea are normal methods the body uses to rid itself of the harmful substance. If short periods of vomiting and diarrhea have lasted less than 24 hours, the person can usually stay hydrated by taking frequent sips of a clear liquid. Avoid caffeinated or sugary drinks. After the vomiting and diarrhea have stopped, the person should eat plain foods (e.g., rice, wheat, and potatoes) that the

stomach can easily tolerate. If vomiting and diarrhea last more than 24 hours or abdominal pain is severe, seek medical care.

## Chemical Poisoning

Chemical poisoning is often caused by the ingestion of household products, gardening chemicals, industrial chemicals, or plants. Children and pets will swallow just about anything, so make sure you keep the following common household poisons out of their reach:

- Antifreeze and windshield washer fluid
- Arts and crafts products such as glue and paint
- Bleach, drain cleaners, and toilet bowl cleaners
- Medications and vitamins and other supplements
- Mothballs, makeup, nail polish, and perfumes
- Plant food and bug and weed killers
- Some house plants (read about the plant before you buy it)
- Paint chips flaking off a wall, especially lead-based paint found in older homes



### **SAFETY TIP—Antifreeze can be fatal to humans and pets.**

Children and pets are drawn to it because of its sweet smell and taste. The most commonly used antifreeze compounds contain ethylene glycol, which is toxic. Poisoning of pets commonly occurs when pets lick antifreeze leaking from a vehicle's cooling system. If you change antifreeze in the driveway, collect all the waste coolant and dispose of it properly. Never leave a container of ethylene glycol coolant within reach of a child or pet. If you see a puddle of greenish liquid in your driveway, clean it up immediately. Flush the area with plenty of water and locate and fix the leak in your vehicle without delay. A quick clean-up technique is to spread cat litter on the spill, wipe it up with rags (bag them immediately), and rinse the area.

**When in doubt, assume the worst.** Try to identify the product, and contact your local or national poison control center. Look for empty medicine bottles or scattered pills; look for skin burns and burns around the person's mouth and stains and/or odors on the person's clothing or on the furniture or floor nearby.

■ **Signs and symptoms:** Burns on the skin or around the lips or mouth, severe sore throat, difficulty breathing, stomach cramps without fever, and unexplained nausea and vomiting. In a child, sudden behavioral changes such as sleepiness or anxiety, drooling, or odd breath odor.



**SAFETY TIP—Children experience greater toxicity from poisons because of the increased dose of toxin per pound (or kilogram) of weight.**

■ **Treatment:** If there are no symptoms but you suspect poisoning, call the poison control center. Try to identify the possible poison, the amount ingested, and the time of occurrence. If the person has symptoms, call for immediate medical care. While waiting for help, keep the person calm, and make sure the airway is clear. Collect any bottles or containers of the suspected poison.



**SAFETY TIP—If someone is poisoned, don't administer ipecac syrup or do anything to induce vomiting. The American Association of Poison Control Centers and the American Academy of Pediatrics have recommended that ipecac **not** be used or even be kept at home. According to these sources, there's no solid evidence of effectiveness, and it can do more harm than good.**

## Pet Safety: Foods Poisonous to Dogs and Cats

Avoid feeding your dog or cat any of the following:

- Alcoholic beverages
- Avocado
- Chocolate (all forms)
- Coffee (all forms)
- Fatty foods
- Garlic
- Macadamia nuts
- Moldy or spoiled foods
- Onions or onion powder
- Raisins and grapes
- Salt
- Products sweetened with xylitol (an artificial sweetener)
- Yeast dough

### MYTH BUSTER

*"I can give my dog or cat chocolate as a treat."*

**False:** Chocolate contains theobromine, a stimulant found in the cocoa bean that's harmful to both dogs and cats. Chocolate can cause vomiting and diarrhea, excessive thirst and urination, hyperactivity, abnormal heart rhythm, tremors, seizures, and even death in severe cases. If your pet has gotten into chocolate, note the type, estimate the amount eaten, and call your veterinarian for advice. If your veterinarian is not available, seek immediate care at an emergency veterinary clinic.



**SAFETY TIP—**If you have a question about a possible pet poison, call the **Animal Poison Control Center at 888-426-4435**. They are the best resource for any animal poison-related emergency, 24 hours a day, 365 days a year. If your pet needs immediate medical care, contact your veterinarian or an emergency veterinary clinic.

## BITES AND STINGS

Many animals can bite or sting you. Injuries from the bites of mammals such as dogs, cats, and humans are discussed on page 79. Here, we discuss the bites and stings of flying insects, chiggers, ticks, spiders and scorpions, marine animals such as jellyfish and stingrays, and finally snakes. Whereas most such bites and stings are painful, only a few types can cause sickness, allergic reactions, or death. For instance, all spider bites can deliver toxic substances, but very few can penetrate deeply enough through human skin to cause sickness or death.

This section cannot cover all scenarios involving every biting or stinging creature on the planet. It does give you suggestions for dealing with the bites and stings of the most common such animals.

### Flying Insects

If you are hiking, camping, or just sitting in your back yard, you may be exposed to bites and stings from flying insects. Although annoying, most bites and stings are preventable if you take the proper precautions (see the next Safety Tip).



**SAFETY TIP—**In bug-infested areas, wear protective clothing such as a long-sleeved shirt and trousers. Apply an insect repellent to your clothing as well as to exposed skin. A head net may be necessary to protect your face and neck.

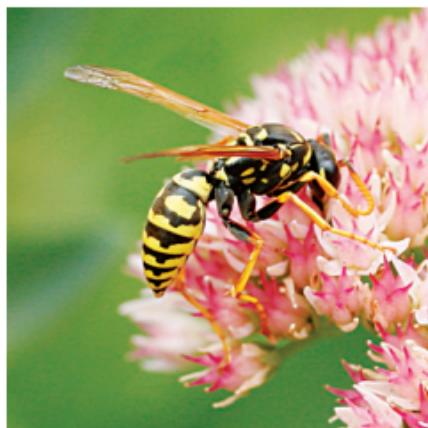
## Bees and Wasps

Even a single sting from one of these winged insects can cause a great deal of pain.

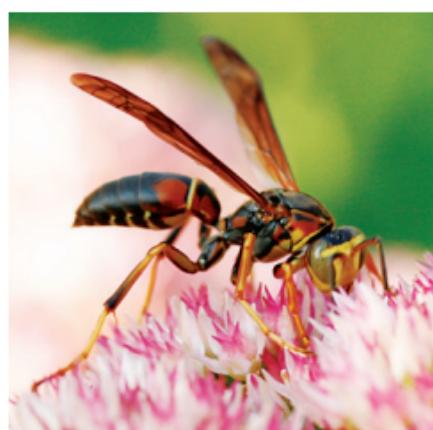
- Wasps, which include yellow jackets, paper wasps, and hornets, can deliver multiple stings and may attack as a group.
- The honeybee has a barbed stinger, attached to a venom sac, that remains in the victim's skin and prevents the bee from stinging more than once. After losing its stinger, the honeybee flies away to die.



Honeybee.



Yellow jacket wasp.



Paper wasp.



Sting from yellow jacket wasp.

## **Black Flies, Fire Ants, and Mosquitoes**

The bite of these flying insects causes pain and itching.

- **Black flies** are small, dark flies with a humped back and a painful bite. They breed around rapidly flowing streams rather than stagnant water. Black fly saliva is toxic. It can cause pain, itching, and even nervous and intestinal disorders.
- The **fire ant** both bites and stings. Its bite is used as a means to hold on so it can use its stinger. After latching on to your skin with its teeth, the fire ant delivers its painful sting. The ant swivels around the bite, stinging multiple times in a circular pattern. Although fire ants have two pairs of wings, they usually attack from the ground.
- **Mosquitoes** are found all over the world. Many are known to transmit diseases such as malaria, West Nile virus, encephalitis, and dengue fever. The mosquito penetrates the skin of a human or animal with a flexible snout that draws out the blood. The itching and local swelling around the bite characterize the allergic reaction to the mosquito's saliva.



**Mosquito drawing blood.**



**SAFETY TIP—**Mosquitoes mature in stagnant water, their usual breeding ground. Be sure to empty open containers filled with water and drain or fill in areas where water collects.



**SAFETY TIP—**Protect your dog and cat from heartworm disease. If there are mosquitoes in your area, your pet should be given preventive medication. Heartworm, a parasite, is transferred from one mammal (dog, cat, fox, wolf) to another by certain types of mosquito. If the mosquito bites an infected animal and then bites your pet, the worm's larvae will be deposited into your pet's bloodstream. As the larvae mature, they migrate to the animal's heart. Heartworm disease is fatal but preventable. Talk to your veterinarian, and keep your pet safe.

### *First Aid for Bites and Stings from Flying Insects*

- **Signs and symptoms:** Local pain, redness, swelling, and itching; in moderate allergic reactions, possible rash or hives. In severe allergic reactions, wheezing or trouble breathing, severe swelling around the bite or sting, or swelling around the lips, tongue, or face. If you are allergic, particularly to bee or wasp venom, a single sting can cause a serious reaction or even death. Some reactions are local and affect only the skin; others are systemic and affect the whole body.
- **Treatment:** If a stinger is embedded in your skin, scrape or pick it off with your fingernail. Avoid squeezing, which can release more venom into the skin. Some insects may not have stingers; if you can't see one, assume it's not there. A cold compress may reduce the swelling and ease the pain. For moderate reactions, a mild painkiller such as acetaminophen or ibuprofen can make you feel more comfortable.
- To prevent infection, wash the area with soap and water. Apply an antiseptic or an antibacterial ointment. Calamine lotion may

relieve the discomfort. Avoid scratching—this is a major cause of infections. For a systemic reaction, use an over-the-counter anti-histamine to control swelling, itching, and redness. If you have a sudden and severe allergic reaction, seek immediate medical attention. (See the discussion of anaphylaxis on page 57.) People prone to severe allergic reactions should carry epinephrine injections in case they get stung.



**SAFETY TIP—If you are at risk for a sudden and severe allergic reaction, your doctor may suggest that you carry an allergy kit.** These kits contain antihistamine pills (e.g., diphenhydramine [Benadryl]), alcohol wipes for cleansing the injection site, and an injection of epinephrine (e.g., EpiPen) that you can give yourself in case of an emergency. Seek immediate medical care even after the use of an allergy kit.

## Chiggers

Chiggers are the larval stage of the harvest mite. Mites are not insects, but rather belong to a diverse group of creatures called *arachnids* that includes ticks, spiders, and scorpions. Chiggers crawl onto your skin and chew up tiny parts of the inner skin so they can survive into their final adult stage as harvest mites. Contrary to popular belief, they don't remain in the skin after feeding.

- Chiggers tend to congregate on your ankles or wrists because your skin is thinner there, thus making it easier for this tiny animal to penetrate your skin for its meal.
- Chiggers secrete a substance that desensitizes the area, so you don't react to their presence immediately. In fact, you won't feel the effects for up to 48 hours after the chiggers feed on you.
- To determine where you were when you encountered chiggers, count back 24 to 48 hours from when you began exhibiting irritating signs of their "bite."

**MYTH  
BUSTER**

*"Applying fingernail polish will suffocate the chiggers."* **False:** Chiggers don't bore into or live inside your skin. By the time a severe itching problem sets in, the chiggers are nowhere in sight. Trying to smother skin damaged by chiggers may actually cause more problems.

**Ticks**

Ticks are small arachnids that bite into the skin and feed on blood. They can transmit Lyme disease, Rocky Mountain spotted fever, tick paralysis, and other serious diseases. Wear long sleeves and pants tucked into closed-toed shoes or boots during your travels in "tick country."



**Lone star tick.**



**Lone star tick (filled with blood).**

**Lyme Disease**

Lyme disease is a progressive and debilitating bacterial disease spread by the bite of deer ticks, which are very small. Ticks must be attached to the skin for at least 24 hours to transmit the bacteria to humans.

- **Stage 1: Days to weeks**—expanding red rash around the site; possible flu-like signs and symptoms such as fever, headache, fatigue, and joint pain.
- **Stage 2: Week to months**—Neurological problems (meningitis, Bell's palsy), cardiac abnormalities, infection, and rash.
- **Stage 3: Months to years**—circulatory, respiratory, and neurological problems; signs and symptoms of severe arthritis.

### ***Rocky Mountain Spotted Fever***

Rocky Mountain spotted fever is a severe bacterial disease spread by the bite of dog ticks and other types of ticks.

- **Stage 1:** Fever, headache, and sensitivity to light occur.
- **Stage 2:** This stage lasts 3 to 4 days and is characterized by high fever and rash.
- Deaths are rare but have been reported.

### ***Tick Paralysis***

Tick paralysis is a rare but potentially fatal disease caused when a paralyzing nerve toxin is released from the bite of a female tick.

- Leg weakness progresses to paralysis as long as the tick is still attached.
- Respiratory arrest is possible.
- Deaths are rare but have been reported.

### ***Tick Removal and First Aid***

- You can use your fingers to remove an unattached tick from your skin. Dispose of the tick immediately.
- Remove an embedded tick with tweezers. Pull the tick straight out gently but firmly. Avoid jerking or twisting the tick or the head may remain embedded.
- After removing the tick, wash the bite area with soap and water, and apply an antiseptic if you can.
- The same removal procedures will work if your dog or cat has brought in ticks from outdoors. You may have to search beneath heavy fur if the tick has attached itself to the animal. Even in

short-haired pets, ticks can be found in obscure areas, such as between the toes, or under the chin, tail, or ear flap. Be sure to look closely.



**SAFETY TIP—**Ticks can give dogs and cats the same diseases they give humans. If left undiagnosed, Lyme disease, Rocky Mountain spotted fever, or tick paralysis can be fatal. Be sure your pet is protected against the most common carrier, fleas, in addition to ticks. Check with your veterinarian for the best flea and tick repellent.

## Spiders

Many people fear spiders, but these fears are largely unfounded. Like scorpions, spiders are predators that help keep insect populations in check, and few species of spiders bite humans. The **black widow** and **brown recluse** spiders are exceptions: their bites can cause uncomfortable and even serious reactions.



**Black widow spider.**



**Brown recluse spider.**

### ***Black Widow Spiders***

The adult black widow spider is medium sized, about 1/2 inch (1.3 cm) long. The female black widow is normally shiny black, with a red hour-glass marking on the underside of the abdomen. Only the female's bite is toxic; the male is brown and is not poisonous to humans. Black widow spiders are active at night. They prefer dark corners or crevices, woodpiles, hollow stumps, sheds, outhouses, and garages. Indoors, they prefer cluttered areas in basements and crawl spaces.

- **Signs and symptoms:** A mild pinprick followed by severe muscle cramping and pain progressing to the chest, back, abdomen, arms, and legs. Difficulty breathing in severe cases. Although rare, fatalities do occur, particularly in children less than 3 years old or adults more than 55 years old.
- **Treatment:** Wash the bite area with soap and water. Apply ice or cold packs to relieve pain. Seek immediate medical care. Antivenin, a product that lessens the effect of the venom, should be administered only by a doctor. Most people recover within 36 to 72 hours.

### ***Brown Recluse Spiders***

The brown recluse spider is about  $\frac{1}{2}$  to 1 inch (1.3 to 2.5 cm) long. Its characteristic dark violin-shaped marking is on the back of the body (where the legs are attached), with the base of the violin at the spider's head and the neck of the violin pointing to the rear. These spiders seek out dark, warm, dry environments, such as attics, closets, porches, barns, basements, woodpiles, and old tires.

- **Signs and symptoms:** Usually a painless bite. Possible localized swelling and inflammation occur within 1 to 2 hours. After about 6 to 12 hours, a bull's-eye lesion with blistering or redness resembling a cigarette burn appears. If the area enlarges, the skin and tissue around it can die. If left untreated, the bite may cause widespread infection and, rarely, death.
- **Treatment:** Wash the bite area with soap and water. Apply ice or cold packs to relieve pain. Seek immediate medical care.

## Scorpions

Scorpions are predatory arachnids, like spiders, but they have a true stinger located at the end of their tail. This stinger is used primarily to paralyze insect prey, but when threatened by a human, the scorpion will defend itself. A scorpion can sting multiple times. Most species cause significant local pain and swelling with little to no widespread effects. Scorpion stings are most dangerous to young children and elderly people. Pets are also at risk. Scorpion stings are not a major health concern for the United States except for stings of the bark scorpion in the Southwest. However, a more poisonous variety that lives in certain tropical countries can deliver a fatal sting.



**Scorpion.**

- **Signs and symptoms:** Immediate pain, burning, and swelling and redness at the sting site. The venom affects the nervous system and causes muscle twitching, which can progress to convulsions (seizures).
- **Treatment:** Wash the sting area with soap and water. Ice or cold packs can be applied to relieve pain. Seek medical care without delay.

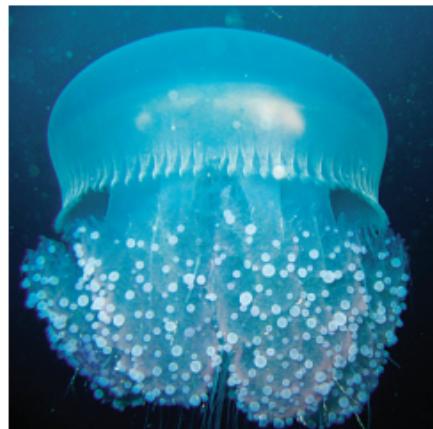
## Marine Animals

Marine animals can inflict pain with their teeth, stingers, or even prickly body parts. Most such encounters occur in salt water and begin when the animal tries to defend itself. It's best to swim near a beach with a lifeguard and observe posted signs, which may alert you to danger from hazardous animals. **Do not touch unfamiliar marine life. Even dead animals and severed tentacles may contain venom.**

### *Types of Stinging Marine Animals*

Three marine animals commonly involved in stinging incidents are jellyfish, sea anemones, and stingrays:

- **Jellyfish** have a nearly transparent body with long, fingerlike structures called tentacles. Stinging cells inside the tentacles can hurt you if you come in contact with them. Some stings can cause serious harm.
- **Sea anemones** have small, soft bodies that resemble flowers. They use their tentacles to catch prey. Their sting, like that of many bees, causes local pain, tenderness, and swelling.
- **Stingrays** have a long, whiplike tail with sharp spines that contain venom. A large stingray may cause serious injury or even death if the barb penetrates internal organs.



Jellyfish.



Sea anemone.



**Stingray.**

### ***First Aid for Marine Animal Bites and Stings***

- **Signs and symptoms:** Pain, burning, swelling, redness, and bleeding around the bite or sting. Muscle cramps, diarrhea, difficulty breathing, nausea or vomiting, and abdominal pain. Variable generalized signs and symptoms.
- **Treatment:** Wear gloves if possible, and wipe off stingers or tentacles with a towel. Be careful to avoid contact. Wash the area with salt water. In some cases, soaking the wound in very warm (not hot) water for 30 to 90 minutes is recommended to help inactivate the toxin. The area can also be soaked in alcohol or vinegar. If the sting or bite has caused bleeding, dress the wound. An over-the-counter antihistamine helps with localized swelling, tenderness, or itching. Hydrocortisone cream reduces swelling. Give acetaminophen, aspirin (if more than 18 years old), or ibuprofen for pain. Seek immediate medical care if the person has difficulty breathing, uncontrolled bleeding, or other generalized symptoms.



**SAFETY TIP—**Don't rinse the injury with fresh water. Fresh water will activate any stinging cells that haven't already ruptured and will cause more painful stings. Rubbing the area will have the same effect.

## Snakes

**Poisonous snakes inject a toxic venom when they strike their victim.**

Most poisonous snakes belong to a group known as pit vipers. These snakes have two large fangs, located in the upper front portion of the mouth. The two fangs are hollow and work like a hypodermic needle to inject the venom. The coral snake is also poisonous, but it is not a pit viper. It has small teeth instead of fangs and has to chew to inflict its poison. It's important to identify the snake, if at all possible, because the type of venom makes a difference in the treatment given by the emergency medical team.



**SAFETY TIP—**Pit vipers have a triangular head, pupils that resemble vertical slits, and a telltale pit on each side of the head between the eye and the mouth. These pits, heat-sensing organs, make it possible for the snake to strike a warm-blooded victim, even one it can't see.

## Common Pit Vipers

In the United States, common pit vipers include the rattlesnake, copperhead, and water moccasin (also called the cottonmouth).



**Timber rattlesnake.**



**Copperhead.**



**Water moccasin (cottonmouth).**

### *First Aid for a Bite from a Pit Viper*

- **Signs and symptoms:** One to two punctures made by the hollow fangs of the snake. Severe pain within 5 to 10 minutes, accompanied by swelling and discoloration around the bite area, progressing up the bitten extremity. If treatment is delayed, possible kidney and liver damage may result from toxins.
- **Treatment:** Remove constricting clothing or jewelry, clean the bite with soap and water, immobilize the bite area, and keep it lower than the heart. Bandage the wound, and get the person to a hospital or clinic as soon as possible. The chances for recovery are good if the person receives care within 2 hours. Severe bites can be treated with antivenin, antibiotics, and antihistamines to reduce swelling, but time and identification of the snake are of the utmost importance.

### *Coral Snake*

A coral snake is small and ringed with red, yellow, and black. It has a black head and red bands touching yellow bands. **The classic rhyme is "Red touching yellow, kill a fellow. Nose is black, head is yellow."** The nonpoisonous scarlet snake and scarlet kingsnake have a similar pattern

but they have red noses and no red bands touching yellow bands. Unlike pit vipers, coral snakes lack fangs, and because their mouths are small and their teeth are short, most coral snakes bite by chewing on toes and fingers. Their bite is usually painless, with little or no swelling or discoloration. However, it is highly poisonous. Symptoms may be delayed for several hours, but when they do occur, they progress rapidly.



Coral snake.

### ***First Aid for a Bite from a Coral Snake***

- **Signs and symptoms:** Nausea, drowsiness, vomiting, marked salivation, and difficulty breathing. Delayed signs and symptoms may include numbness at the bite area, headache, and eventual muscular paralysis.
- **Treatment:** Remove constricting clothing or jewelry, clean the area and dress the wound, mark swelling with a pen to determine the rate and amount, and get the person to a hospital or clinic as soon as possible.

## **POISONOUS PLANTS**

Plant poisonings can occur by ingestion or skin contact.

## Ingestion of Poisonous Plants

Frequently, curious children and pets ingest plants that weren't meant to be eaten. The poisonous quality of a plant depends on several factors:

- **The type and amount of poison ingested.** For example, oleander is one of the most toxic plants known. Ingestion of a single leaf can be fatal to a young child.
- **The part of the plant.** For example, rhubarb stalks are edible but the leaves are poisonous. In contrast, all parts of jimson weed (also called datura, or angel's trumpet) are highly toxic.

Most plant ingestions involve only a small amount and produce only nausea and vomiting. Clean the mouth, and contact the poison control center for plant protocols. If in doubt, seek immediate medical care.

## Contact Poisoning by Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac have a toxic oily sap called *urushiol* in their roots, stems, leaves, and fruit. The sap is released when the plant is bruised. It may be deposited on the skin by direct contact with the plant or by contact with contaminants, including shoes, clothing, tools, or animals. Urushiol is still present after the plant has died. Severe poisoning also has occurred from sap-coated soot in the smoke of burning plants. Inhaling smoke laced with urushiol can cause severe allergic reactions.

### ***Poison Ivy***

The leaves of poison ivy consist of three pointed leaflets. The edges can be smooth or toothed and vary in length from 2 to 4 inches (5 to 10 cm). Poison ivy can grow as a ground cover, shrub, or climbing vine. The leaves are reddish in spring and turn green during the summer.

### ***Poison Oak***

Poison oak grows as a shrub or a climbing vine. Its leaves are shaped like oak leaves. As with poison ivy, poison oak leaves are divided into three leaflets. The underside of the leaves, a lighter green than the surface, is covered in hairy filaments.

## Poison Sumac

Poison sumac grows as a dense shrub or small tree. Its leaves grow in pairs, anywhere from 7 to 13. Unlike poison ivy leaves, poison sumac leaves never have a toothed outline. Small white or gray berries hang in clusters from the stalk.



Poison oak.



Poison ivy.



Poison sumac.

**First Aid for Contact Poisoning from a Poisonous Plant**

- **Signs and symptoms:** Severe itching followed by red inflammation and blistering; and oozing sores in serious cases. Once the sap has been cleaned from all contact points, the contamination stops spreading.
- **Treatment:** Immediately wash exposed skin and clothing thoroughly with plenty of soap and water. If your pet has been exposed, bathe your pet thoroughly. Symptoms usually develop within 24 to 48 hours after contact with the oil. If poisoning develops, treat the blisters and inflammation with dressings of calamine lotion, Epsom salts, or bicarbonate of soda. Medical attention is required for severe rashes, especially those covering large areas, involving the eyes, nose, and mouth, or accompanied by fever. A prescription medication such as prednisone may help to contain the rash.

**MYTH  
BUSTER**

*"Breaking the blisters releases urushiol that can spread."* **False:** The rash spreads from the poisonous sap, not by contamination from sores. Urushiol is not present in the blister fluid.

## Tab 7: Natural Disasters

Natural disasters can take many forms:

- Flood
- Hurricane
- Tornado
- House fire
- Wildfire
- Earthquake
- Tsunami
- Volcanic eruption
- Landslide or mudslide
- Avalanche
- Winter storm and extreme cold

### BE PREPARED FOR A NATURAL DISASTER

A natural disaster can strike quickly and without warning. Although you can't foresee everything, a little advance planning can give you the edge you need to survive. To be prepared, take three steps:

- Develop a disaster action plan.
- Assemble survival supplies.
- Learn in advance how to help others in need.

At the close of this section, we'll also identify special steps you should take to safeguard livestock and pets.



**SAFETY TIP—**Don't wait until an actual disaster occurs to develop an action plan. Planning at this late stage is planning to fail. The end result could be catastrophic—your survival is at stake.

## Develop a Disaster Action Plan

What would you do if utilities such as water, gas, and electricity were cut off? Or if you had only minutes to flee your home from approaching wild-fires? Knowing the answer in advance is your best protection. Your disaster action plan will be unique to your family or group. The age, health, abilities, and special requirements of group members, your location, community resources, and even pets will all figure into your strategy. **Here are the steps to take in developing your natural disaster action plan:**

- Discuss with your family/group the types of disaster(s) most likely to occur in your area, what the consequences may be, and what you would do in each case. For example, should you prepare for a long-term power outage, or to flee your home because of rising flood waters?
- Decide the conditions for activating your plan. For example, will you activate it when a tornado has been spotted in your area, or a smoke alarm has gone off in your home or workplace?
- Determine where members should go and what they should do when action needs to be taken.
- Always have a backup plan. For example, select alternative sites in advance in case the main site is no longer viable or accessible.
- Plan how to take care of any pets and livestock. (See the tips at the end of this section.)
- Identify a place where your family/group can reunite after the disaster. It's a good idea to meet at a central point where most of your preparedness supplies are stored. (See the next section.)
- Identify the locations of your nearest fire and police stations and your local medical facility. Enter their contact numbers in your cell phone directory and/or post a list beside your home phone.
- Identify the people you will need to contact outside the area, and find their phone numbers. Enter these in your cell phone directory and/or post a list beside your home phone.

- Know where your gas, electric, and water main shutoffs are. Know how to turn off each utility. If in doubt, ask your utility company. Keep necessary tools near these areas.
- Store all valuables and critical documents in waterproof containers. Keep them in one accessible place so you can gather them quickly if you need to flee your home.
- Make sure all members know how to access local radio or television stations for emergency broadcast information.
- Make sure your vehicle is fueled with more than half a tank of gas at all times.
- Maintain your plan. Make sure all family/group members are up to date on the current plans.

### STEPS TO SAFETY

1. **Find out what kinds of natural disaster are most likely to happen in your area.**
2. **Learn your community's warning signals—know what they sound like and what you should do when you hear them.**
3. **Find out about animal care after a disaster.**
4. **If necessary, know how to provide ongoing care to elderly or disabled family members or neighbors needing assistance in a disaster.**
5. **Learn the disaster plans at your workplace, your children's school or daycare center, and other places where your family/group spends time.**

### Assemble Survival Supplies

If you've assembled your survival supplies in advance, you'll be able to act at a moment's notice with the confidence that you can get through the disaster. Make sure your first aid, survival, and disaster supply kits have everything you need to survive for at least 72 hours. (See Tab 1, Basic Safety for detailed instructions.) You'll also need the

following emergency items to keep you and your family/group safe during a natural disaster:

- Flashlight and portable radio with batteries (long-life alkaline batteries; store them in a cool dry place)
- Enough clean water for each person for at least 3 days (Allow 1 gallon [4 liters] per person per day, half to drink and half to use for cooking and sanitation. The average person needs 2 quarts [2 liters] of water daily just for drinking. Reminder: 4 quarts equal 1 gallon, 1 quart equals 32 ounces, and 1 liter equals 1000 mL.)
- Emergency food for at least 3 days (allow three meals per person per day)
- Required medications
- Blankets, warm clothes, gloves, and sturdy shoes
- Mosquito netting if you are in a damp, warm environment
- Pipe or crescent wrenches to turn off gas and water supplies



**SAFETY TIP—Stock emergency supplies for your pets. Each pet should have a carrier and enough fresh food and water, medications, and other essentials to ride out the disaster with you.**

### Be Prepared to Help Others in Need

In special need during a disaster are the injured, trapped, disabled, children, and frail elderly. Follow the steps outlined here:

#### If someone is injured:

- Check the scene to ensure you can give assistance without endangering yourself.
- Give first aid if anyone needs it. See Tab 2: CPR, Tab 3: Medical Emergencies, Tab 4: Injuries and Wounds, Tab 5: Environmental Emergencies, and Tab 6: Poisons, Bites, and Stings.
- Do not move seriously injured persons unless they are in immediate danger of further injury.

- Cover injured persons with blankets to keep them warm.
- Ask bystanders for help, and phone 911.
- Seriously injured or burned persons should be treated and transported by medical professionals immediately.

### If someone is trapped:

- Check the scene to ensure you can give assistance without endangering yourself.
- If it's safe to do so, try to free the person by removing debris and transporting the person to safety.

### Others in need:

- Include in your disaster plan actions to assist your neighbors in need such as frail elders, people with disabilities, and families with infants and/or young children.
- Don't forget about helping guide and assistance dogs for people with special needs (e.g., the visually or hearing impaired). A dog may become disoriented and need safety during a disaster.

## Preparing Your Pets and Livestock for Natural Disasters

**Remember pets and livestock.** If you are like millions of animal owners, your pet is an important member of your household. You'll increase the likelihood that your animals will survive a disaster by taking the following simple steps:

- Assemble an animal emergency supply kit (see Tab 1: Basic Safety). Include a pet first aid book.
- Have needed medications, your pet's medical history, and your veterinarian's contact numbers.
- Store at least 3 days' worth of pet food and water in airtight containers.
- Include identification. Small animals need a collar with ID tag, a microchip (see safety tip immediately following), or a tattoo. Livestock need a microchip, tattoo, ear tag, or halter tag.

- Prepare a pet carrier, harness, or leash.
- Make sure your pets' vaccinations are current. Animal shelters may require proof of immunization.
- Have current photographs of all your animals (see photos of Darby and Dude).
- Include litter, litter boxes, paper towels, and trash bags in emergency supplies.
- Don't forget familiar items such as toys, treats, and bedding. These can help reduce stress.
- Locate and prearrange an evacuation site outside your immediate area that will accept animals. Research pet-friendly hotels, veterinary hospitals, boarding stables, kennels, and animal shelters. Develop a buddy care system.



**Current photo: Darby.**



**Current photo: Dude.**



**SAFETY TIP—**Microchip your animal (dog, cat, horse, or any other). A microchip implant, no larger than a grain of rice, is placed under the skin, usually on the animal's back. Each chip has a unique number that shows up on an electronic scanner. After you register this number with a central data bank, it will trace you when your pet is scanned at an animal shelter or veterinary office. Ask your veterinarian about getting a chip implanted; it can save the life of a pet that's gotten lost and slipped out of its collar, halter, or harness.

Bear in mind that you may not be home with your animals when disaster strikes. Take the following steps to prepare in advance for such a situation:

- Preplace stickers on your front and back house doors, barn doors, and pasture entrances to notify rescue personnel that animals are on your property.
- List the number, species, and location of your animals and their favorite hiding spots.
- Post your contact information and the location of your evacuation supplies.
- Designate an off-site person, such as a willing neighbor, to tend to your animals. This person should be familiar with your animals and have access to your home, kennel, or barn.

## FLOOD

**Floods** are one of the most common hazards in many countries.

- Flood effects can be local, affecting a neighborhood or community, or widespread, affecting entire river basins.
- Not all floods are alike. Some can take days to develop. However, flash floods can occur quickly, sometimes in just a few minutes.
- Flooding can also occur when a dam breaks or a levee is breached, producing effects similar to a flash flood.



**Extensive flooding.**

**FLOOD WATCH:** This indicates the possibility of flooding in your area.

**FLOOD WARNING:** Ongoing or expected flooding. If advised to evacuate, do so immediately.

**FLASH FLOOD WATCH:** Possibility of flooding within hours or minutes. Be prepared to move to higher ground.

**FLASH FLOOD WARNING:** Occurrence of a flash flood. Seek higher ground immediately.

### Plan Ahead

- Know your area's flood risk. If unsure, call your local planning and zoning department.
- Know whether or not your house was built in a floodplain, and if so, whether appropriate preventive measures were incorporated (i.e., elevated pilings and a reinforced foundation).
- Elevate the furnace, water heater, and electrical panel if your home is susceptible to flooding.

- Install "check valves" in sewer traps to prevent floodwater from backing up into the drains of your house.
- Construct barriers (levees, beams, floodwalls) to stop floodwater from entering the building.
- Seal walls in basements with waterproofing compounds to avoid seepage.
- If it has been raining hard for many hours or steadily for many days, be alert for a flood warning.
- Listen to your local radio or television station for flood information.

### During a Flood

- Listen to the radio or television for information.
- Be aware that flash flooding can occur. If a flash flood warning has been issued, move immediately to higher ground.
- Be aware of streams, drainage channels, canyons, and other areas known to flood suddenly. Flash floods can occur in these areas with or without rain clouds or heavy rain.

### Preparing to Evacuate

- Secure your house. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
- Turn off utilities at the main switches or valves if instructed to do so.
- Disconnect electrical appliances. Do not touch electrical equipment if you're wet or standing in water.
- Once outside, don't walk through moving water. Six inches (15 cm) of moving water can make you fall. If you have no choice, walk where the water is still. Use a stick to check the firmness of the ground in front of you.

### When Driving in Flood Conditions

- Six inches (15 cm) of water will reach the bottom of most passenger cars and cause loss of control and possible stalling.
- One foot (30.5 cm) of water will float many vehicles.
- Two feet (61 cm) of rushing water can carry away most vehicles, including sport utility vehicles and pick-up trucks.

- Never drive into flooded areas.
- Heed barricades. Don't drive around them.
- If your vehicle stalls in rapidly rising waters, abandon it immediately and climb to higher ground.
- If floodwaters rise around your vehicle, abandon it and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.



**SAFETY TIP—Don't expect flooding to occur only when it's raining. A broken dam or levee can also cause unexpected flooding.**

### After a Flood

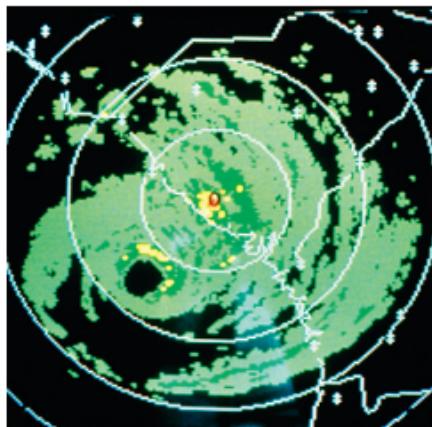
- Help injured or trapped persons if you can do so without endangering yourself.
- Listen for news reports to learn whether the community's water supply is safe to drink.
- Avoid contact with floodwaters; they may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or fallen power lines.
- Be careful in areas where floodwaters have receded. Roads may have weakened and could collapse under the weight of a car.
- Stay away from fallen power lines, and report them to the power company.
- Return home only when authorities indicate it's safe.
- Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
- Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are serious health hazards.
- Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and toxic chemicals.



**SAFETY TIP—**Floodwaters can pose a variety of health risks. Avoid direct contact, and clean and disinfect everything that got wet. Discard food and water supplies that could have come into contact with floodwaters.

## HURRICANE

A **hurricane** is an intense tropical storm system. Powered by heat from the sea, it is steered erratically by the easterly trade winds and the temperate westerly winds, as well as by its own energy. As it moves ashore, a hurricane brings with it a storm surge of ocean water along the coastline, high winds, tornadoes, torrential rains, and flooding. It can cause damage several hundred miles (or kilometers) inland. Winds can exceed 155 miles (249 km) per hour.



Hurricane: radar image.



Hurricane damage.

**HURRICANE:** This is an intense tropical weather system of strong thunderstorms and maximum sustained winds of 74 mph (64 knots or 119 km/hr) or higher.

**HURRICANE/TROPICAL STORM WATCH:** This watch indicates the possibility of hurricane or tropical storm conditions in the specified area, usually within 36 hours. Tune in to a radio or television for information.

**HURRICANE/TROPICAL STORM WARNING:** This warning indicates the likelihood of winds 74 mph (64 knots or 119 km/hr) or higher, or dangerously high water and rough seas, in 24 hours or less.

**STORM SURGE:** A dome of water pushed onshore by hurricane and tropical storm winds, storm surges can reach 25 ft (8 m) in height and 50–1000 miles (80–1609 km) in width.

**STORM TIDE:** This is a combination of storm surge and the normal tide. A 15-ft (5-m) storm surge combined with a 2-ft (0.6-m) normal high tide would create a 17-ft (5.5-m) storm tide.

**TROPICAL DEPRESSION:** This is an organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 knots or 61 km/hr) or less. Sustained winds are defined as 1-minute average wind measured at about 33 ft (10 m) above the surface.

**TROPICAL STORM:** This is an organized system of strong thunderstorms and maximum sustained winds of 39–73 mph (34–63 knots or 62–118 km/hr).

## Hurricane Categories

Hurricanes are classified in five categories according to wind speed, central pressure, and damage potential. Category 3 and higher hurricanes are considered major, although category 1 and 2 storms are still extremely dangerous.

## SAFFIR-SIMPSON HURRICANE SCALE

Scale Number (Category)	Sustained Winds	Damage	Storm Surge
1	74–95 mph (119–153 km/hr)	Minimal: Unanchored mobile homes, vegetation	4–5 ft (1.2–1.5 m)
2	96–110 mph (154–177 km/hr)	Moderate: All mobile homes, roofs, small crafts, flooding	6–8 ft (1.8–2.4 m)
3	111–130 mph (178–209 km/hr)	Extensive: Small buildings; low-lying roads cut off	9–12 ft (2.7–3.6 m)
4	131–155 mph (210–249 km/hr)	Extreme: Roofs destroyed, trees down, roads cut off, mobile homes destroyed, beach homes flooded	13–18 ft (3.9–5.4 m)
5	More than 155 mph (249 km/hr)	Catastrophic: Most buildings and vegetation destroyed, major roads cut off, homes flooded	Greater than 18 ft (5.4 m)

### Plan Ahead

- Be ready to drive up to 50 miles (80 km) inland.
- Make plans to secure your property.
- Know how to turn off gas, electricity, and water.

- Permanent storm shutters offer the best protection for windows. You can also board up windows with 1/2-inch (1.3-cm) plywood, cut to fit and ready to install. Be sure to mark which board fits which window. Tape doesn't prevent windows from breaking.
- Secure outdoor objects or bring them indoors.
- Determine how and where to secure your boat.
- Be sure trees and shrubs around your house are well trimmed.
- Clear loose and clogged rain gutters and downspouts.

**MYTH  
BUSTER**

*"Most people are killed by hurricane winds and the damage they cause."* **False:** Nine out of 10 hurricane deaths are from inland flooding. Your biggest threat is water, including the surge after-effects. With the ground saturated, water won't drain off as quickly.

### During a Hurricane

- Listen to a battery-operated radio or television for progress reports.
- Stay inside and away from all windows and glass doors.
- Close all interior doors; secure and brace outside doors.
- Keep curtains and blinds closed. Don't be fooled if there's a lull; it could be the eye of the storm, and winds will pick up again.
- Take refuge in a small interior room, closet, or hallway on the lowest level, or in the basement.
- Lie on the floor under a table or other sturdy object.

### When to Evacuate

- If local authorities direct you to do so. Be sure to follow their instructions.
- If you live in a mobile home or temporary structure. Such shelters are particularly hazardous during hurricanes no matter how well they're fastened to the ground.

- If you live in a high-rise building. Hurricane winds are stronger at higher elevations.
- If you live on the coast, on a floodplain, near a river, or on an inland waterway. Such areas are vulnerable to flooding.
- If you feel you are in danger. Trust your instincts.

### After a Hurricane

- Help injured or trapped persons if you can do so without endangering yourself.
- Be informed: Listen to radio or television for official information.
- Return home only after officials advise that it's safe.
- Avoid fallen power lines.
- Check for potential risks such as gas leaks (shut off the main gas valve if you suspect a leak or smell natural gas) and damaged electrical wiring (shut off power at the control box if your house wiring is damaged).
- Check for sewage and water line damage.

### TORNADO

A **tornado** is spawned from violent thunderstorms. It can cause fatalities and devastate an area in seconds.

- A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground.
- Its whirling winds can reach 300 mph (483 km/hr).
- Damage paths can be more than 1 mile (1.6 km) wide and 50 miles (80 km) long.
- Before a tornado hits, the wind may die down and the air may become very still.



Funnel cloud.



Tornado damage.

**TORNADO WATCH:** The weather conditions in your area are favorable for a tornado. Remain alert for approaching storms. Watch the sky and stay tuned to your local radio or television for information.

**TORNADO WARNING:** This indicates a sighting or other indication of a tornado on weather radar. Follow your tornado plan and seek shelter immediately!

### Plan Ahead

- Learn the warning signals (siren sounds) in your area.
- Conduct safety drills at home with your family/group.
- Make sure all members of your family/group know the procedures to follow if they are at work or school when a tornado hits.



**SAFETY TIP—**Be alert to changing weather conditions. Listen to local radio or television newscasts for the latest information.

Look for approaching storms; dark, often greenish sky; large hail; a large, dark, low-lying cloud (particularly if rotating); or a loud roar like that of a freight train. If you see approaching storms, be prepared to take shelter immediately.

**MYTH  
BUSTER**

*"A car can outrun a tornado."* **False:** A tornado's speed and direction change suddenly and quickly. Seek shelter in a building or on a low area of ground.

### During a Tornado

If a tornado warning has been issued in your area, seek shelter immediately.

#### If you are indoors:

- Whether in your own home or a school, workplace, hospital, shopping center, or high-rise building, the safest place is underground (a storm cellar or basement) or on the lowest building level. Go there and stay there until the tornado warning has ended.
- If you can't get to these, go to the center of the smallest interior room (closet, interior hallway) on the lowest level.
- Stay away from corners, windows, exterior doors, and outside walls. Put as many walls as possible between you and the outside.
- Get under a sturdy table and use your arms to protect your head and neck. Do not open windows.

#### If you are in a vehicle, trailer, or mobile home:

- At the first sign of severe weather, get out immediately. Seek shelter elsewhere, such as at a community center or designated

storm shelter, or go to the lowest floor of a sturdy nearby building. Mobile homes, even if fastened down, offer little protection from tornadoes.

- Never try to outrun a tornado in a car or truck.

#### If you are outside with no shelter:

- Lie flat on the ground or in a ditch or depression with your hands over your head and neck. Do not get under an overpass or bridge; you're safer in a low, flat location.
- Watch out for flying debris; this causes most fatalities and injuries during a tornado.
- Be aware of the potential for flooding.

#### After a Tornado

- Stay in your shelter until it's safe to leave.
- Help injured or trapped persons if you can do so without endangering yourself.
- Check for risks such as fire hazard or gas leaks. Shut off the main gas valve if you suspect a gas leak or smell natural gas. Shut off power at the control box if there is any damage to your house wiring.
- Watch out for fallen power lines and stay out of damaged areas.

#### HOUSE FIRE

**Fire** is the combustion of flammable materials producing heat, light, and often smoke. House fires can be highly destructive and even lethal.

#### Plan Ahead

- Review escape routes with your family/group. Practice escaping from each room. Draw a floor plan with at least two ways of escaping every room.
- Learn to STOP, DROP to the ground, and ROLL if clothes catch on fire (see page 175).

- Install smoke alarms on every level of your house. Attach them to the ceiling or 4 to 12 inches (10 to 30 cm) below it on the wall. Place alarms at the top of open stairways, or at the bottom of enclosed stairs and near (but not in) the kitchen. Test and clean smoke alarms once a month, and replace batteries at least once a year. Replace the alarm itself every 10 years.
- Install a fire extinguisher. Place the ABC type (see the box immediately following) in your home or office.
- Replace electrical wiring if it's frayed or cracked (call an electrician if you aren't sure). Wiring should not run under rugs or over nails.
- Don't overload outlets or extensions. Outlets should have cover plates and no exposed wiring.
- Have an escape ladder available. These are easily purchased and will help you escape if you're above the ground floor and cannot get out through a door.
- Make sure windows are not nailed or painted shut. Security gratings and burglar bars should have a fire safety feature that lets them be easily opened from the inside.

## ABC FIRE EXTINGUISHERS

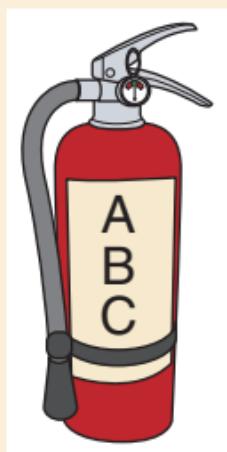
The most typical hand-held fire extinguisher is an ABC or "dry chemical" type and is suitable for class A, B, and C fires. The extinguishing agent is a powder. The extinguisher is light and very effective for its size and weight.

**Class A:** Fires in ordinary combustible materials such as wood, cloth, paper, rubber, and plastic

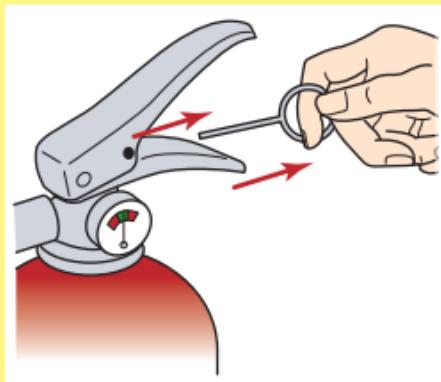
**Class B:** Fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases

**Class C:** Fires that involve energized electrical equipment

**Caution:** Do not use water or water-type extinguishers on electrical fires. Water conducts electricity.



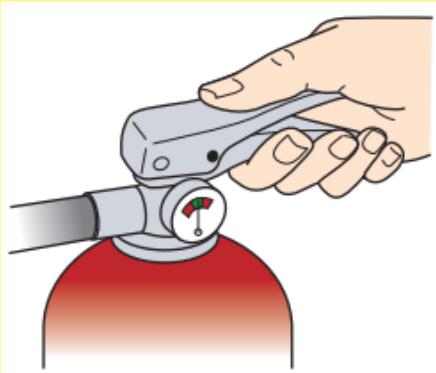
**SAFETY TIP—When using an ABC fire extinguisher, know the PASS system.**



**Step 1. P**ull the pin.

**Step 2. A**im the nozzle.

*Continued*



**Step 3.** Squeeze the handle.



**Step 4.** Sweep the fire at its base.



**SAFETY TIP**—If you discover a fire in a public building (e.g., school, workplace, hospital, child care center), remember **RACE**:

**R:** Rescue anyone in danger.  
**A:** Activate the fire alarm.  
**C:** Contain the fire.  
**E:** Extinguish the fire.

## During a Fire

### Escape the fire if possible:

- If on the ground floor, leave through a door or open a window and climb through.
- Do not use elevators to escape from an upper floor; use stairs.
- Stay low to the ground; smoke and heat rise. The air is clearer and cooler near the floor.
- Close doors behind you as you escape to delay the spread of the fire.

- Cover your mouth with a cloth to avoid inhaling smoke and gases.

**If you are in an upper room with a closed door:**

- If smoke is pouring in around the bottom of the door or it feels hot, keep the door closed.
- If there is no smoke at the bottom or top of the door and it does not feel hot, open it slowly. If you see smoke or fire in the hall, close the door.
- Open a window for fresh air while awaiting rescue.

**If your clothes catch fire:**

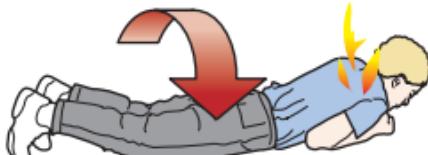
- Stop, drop, and roll** until the fire is extinguished. Running only makes the fire burn faster.



**Step 1. Stop.**



**Step 2. Drop.**

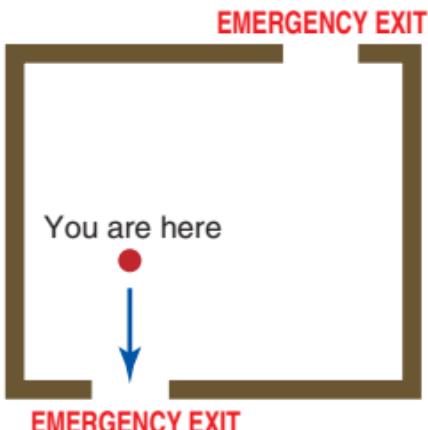


**Step 3. Roll.**

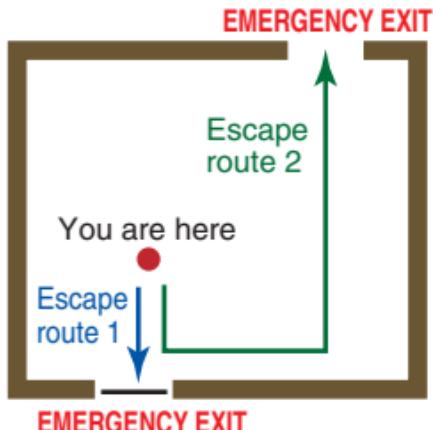


**Step 4. Fire extinguished.**

To escape from a high-rise building:



**1. Use the closest exit.**



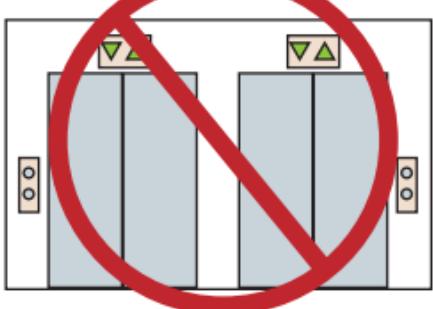
**2. Use another route if your first route is blocked.**



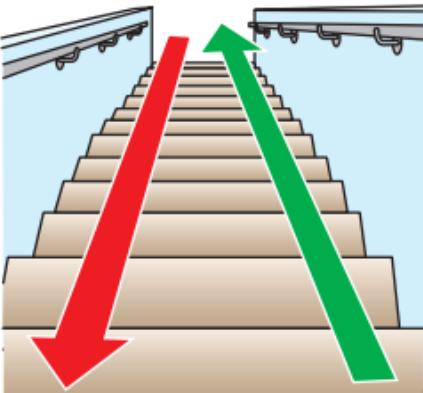
**3. As you go, if things start to fall, take cover under a table or desk.**



**4. As you exit, face away from windows and glass.**



**5. Do not use elevators.**



**6. Keep to the right while going down stairwells. Emergency workers will walk up the left (their right).**

## MYTH BUSTER

*"The smoke from fire isn't the real danger."*

**False:** Smoke kills more people than burns do. In a matter of minutes, fire robs the air of oxygen and fills it with carbon monoxide and other deadly gases.

## MYTH BUSTER

*"You can leave home while food is in the oven."*

**False:** Most house fires start in the kitchen. Turn your oven and burners off if you must leave the kitchen while cooking. Keep your oven and stovetop clean—grease and spilled food can start a fire.

## Fire Hazards and Fire Safety Tips

### Handle flammable items with care:

- Never use gasoline, benzine, or any other flammable liquid indoors.
- Store flammable liquids in approved containers in well-ventilated storage areas.
- Never smoke near flammable liquids.
- Discard all rags or materials that have been soaked in flammable liquids. Leave them outdoors in a metal container.
- Insulate chimneys and place spark arresters on top. The chimney should be at least 3 ft (91.5 cm) higher than the roof. Remove branches hanging above and around the chimney.

### Take appropriate precautions with alternative heating sources:

- Be careful when using space heaters and other alternative heating sources.
- Place space heaters at least 3 ft (91.5 cm) away from flammable materials. Make sure the floor and nearby walls are properly insulated.
- Use only the type of fuel designated for your unit, and follow the manufacturer's instructions.
- Have heating units inspected and cleaned annually by a certified specialist.
- Keep a screen in front of your fireplace.
- Keep matches and lighters up high, away from children, and in a locked cabinet if possible.
- Store ashes in a metal container outside and away from your house.
- Keep open flames away from walls, furniture, drapery, and flammable items.

### If you smoke:

- Never smoke in bed.
- Never smoke if you are feeling drowsy or are taking medications with a sedative effect.

- Use deep, sturdy ashtrays.
- Douse cigarette and cigar butts with water before disposal.

### Avoid electrical fires:

- Have the wiring in your home checked by an electrician.
- Inspect extension cords for frayed or exposed wires or loose plugs.
- Make sure outlets have cover plates and no exposed wiring.
- Make sure wiring doesn't run under rugs, over nails, or across high-traffic areas.
- Don't overload extension cords or outlets.
- Make sure insulation doesn't touch bare electrical wiring.

### Other fire safety tips:

- Sleep with your door closed.
- Install ABC fire extinguishers in your home, and teach family members how to use them.
- Consider installing an automatic fire sprinkler system.
- Ask your local fire department to inspect your house for fire safety and prevention.

### After a Fire

- Help injured or trapped persons if you can do so without endangering yourself.
- If you detect heat or smoke when entering a damaged building, leave immediately.
- If you are a tenant, contact the landlord.
- If you have a safe or strongbox, don't try to open it. It can hold intense heat for several hours. If the safe door or box lid is opened before the safe or box has cooled, the contents could burst into flames.
- If you must leave your home because a building inspector says the building is unsafe, ask someone you trust to watch the property during your absence.

## WILDFIRE

**Wildfire** is a real threat for people living near wilderness areas or using recreational facilities there. Dry conditions greatly increase the potential for wildfires. These occur regularly at various times of the year and in different parts of the world.



**Extensive wildfire.**

## Plan Ahead

### Find out your fire risk:

- Learn the history of wildfire in your area.
- Be aware of recent weather—a long period without rain increases the risk of wildfire.
- Consider having a professional inspect your property and give you recommendations for reducing your risk.
- Determine your community's ability to respond to wildfire. Are roads leading to your property clearly marked? Are they wide enough to allow firefighting equipment to get through? Is your house number visible from the roadside?

- Always be ready to evacuate—it may be the only way to protect your family/group in a wildfire. Know where to go and what to bring with you. Plan several escape routes in case the road you usually use is blocked by the fire.

### Learn and teach safe fire practices:

- Build fires away from nearby trees, bushes, awnings, or tents.
- Always have a way to extinguish the fire quickly and completely.
- Install smoke detectors on every level of your home and near sleeping areas.
- Never leave a fire, even a cigarette, burning unattended.
- Avoid open burning completely; this is especially important during dry season.

### Create a 30-ft (9-m) safety zone around your house:

- All vegetation is fuel for a wildfire. The greater the distance between it and your home, the better you are protected. Keep the volume of vegetation in this zone to a minimum.
- If you live on a hill, extend the zone on the downhill side—fire spreads rapidly uphill. The steeper the slope is, the more open space you'll need for protection.
- Consider installing a swimming pool and/or patios as part of your safety zone. Stone walls can act as heat shields and deflect flames.
- Clear all combustibles within your safety zone.
- Install electrical lines underground, if possible.
- Ask the power company to clear branches from power lines.
- Avoid using bark and wood chip mulch.
- Store combustible or flammable materials in approved safety containers, and keep them away from the house.
- Keep the gas grill and propane tank at least 15 ft (5 m) from any structure. Clear an area 15 ft (5 m) around the grill.

**Create a second zone at least 100 ft (30 m) around your house:**

- This zone should begin about 30 ft (9 m) from the house and extend to at least 100 ft (30 m). In this zone, reduce or replace as much of the most flammable vegetation as possible.
- Stack firewood 100 ft (30 m) away and uphill from any structure.

**During a Wildfire****Escape the fire if possible:**

- Immediately evacuate all members of your family/group, and don't forget your pets.
- Roll up vehicle windows and close air vents. Drive slowly with headlights on. Watch for other vehicles and pedestrians. Do not drive through heavy smoke.

**If the approaching fire forces you to stop:**

- Park away from the heaviest trees and brush. Turn the headlights on so rescuers can see you through the smoke. Turn the ignition off.
- Instruct all vehicle occupants to get on the floor and cover themselves with a blanket or coat.
- Stay in the vehicle until the main fire passes. Air currents may rock the car. Some smoke and sparks may enter. The temperature inside the car will increase. Metal gas tanks and containers can explode but rarely do so.

**If you are trapped at home:**

- Stay calm. As the fire front approaches, go inside the house.
- Once inside, close windows and outside doors. Stay in the center of the house away from outer walls.

**If you are caught in the open:**

- The best temporary shelter is in a sparse fuel area; that is, an area clear of brush. On a steep mountain, the side of the mountain away from the fire is safer.

- If a road is nearby, lie facedown along it or in the ditch on the uphill side. Cover yourself with anything that will shield you from the fire's heat.
- If hiking in the backcountry, seek a depression with sparse fuel. Clear fuel away from the area while the fire is approaching and then lie face down in the depression and cover yourself. Stay down until after the fire passes.

### After a Wildfire

- Check the roof of your home immediately. Put out any roof fires, sparks, or embers. Check the attic for hidden sparks.
- Water in your pool or hot tub will come in handy now. For several hours after the fire, maintain a fire watch. Recheck for smoke and sparks throughout the house.

### EARTHQUAKE

The earth's crust is divided into several major plates, some 50 miles (80 km) thick, which move slowly and continuously over the earth's interior. Most **earthquakes** occur at a point of contact along a fault line between two geological plates. When the slowly accumulating pressure reaches a peak, the two plates suddenly grind over, under, or past each other and cause the ground at the earth's surface to slip abruptly. The resulting waves of vibration within the earth also create complex waves of motion for many miles (many kilometers) at the surface.

**Earthquakes strike suddenly, violently, and without warning.** If an earthquake occurs in a populated area, it may cause many deaths and injuries and extensive property damage. Identifying potential hazards and planning in advance can reduce the dangers of serious injury or loss of life.



**Earthquake damage.**

**EARTHQUAKE:** This is a sudden slipping or movement of a portion of the earth's crust, accompanied and followed by a series of vibrations.

**AFTERSHOCK:** This is an earthquake of similar or lesser intensity that follows the main earthquake.

**FAULT:** This is the fracture across which displacement has occurred during an earthquake.

**EPICENTER:** The point on the surface directly above the point on the fault where the earthquake rupture began. Once fault slippage begins, it expands along the fault during the quake and can extend hundreds of miles before stopping.

**SEISMIC WAVES:** Vibrations that travel outward from the earthquake fault at speeds of several miles (several kilometers) per second. Although fault slippage directly under a structure can cause considerable damage, seismic wave vibrations cause most earthquake destruction.

**MAGNITUDE:** The amount of energy released during an earthquake, computed from the amplitude of the seismic waves. A magnitude of 7.0 on the Richter Scale indicates an extremely strong quake. Each whole number on the scale represents about a 30-fold energy increase from the previous whole number. Therefore, an earthquake measuring 6.0 is about 30 times more powerful than one measuring 5.0.

### Plan Ahead

- Repair deep plaster cracks in ceilings and foundations.
- Locate children's play areas away from hazards such as brick walls.
- Anchor overhead lighting fixtures to the ceiling. Anchor bookcases to the wall. Securely attach heavy pictures and mirrors to the wall.
- In earthquake-prone areas, avoid placing heavy objects on open shelves, and install locking devices on kitchen cabinets.
- Store household chemicals so containers can't easily tip over or spill.
- Anchor mobile homes securely to the ground.
- Follow local seismic building standards; these help to reduce impact.



**SAFETY TIP—Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.**

### During an Earthquake

#### If you are indoors:

- Drop down to the floor. Take cover under a sturdy desk, table, or other piece of furniture. Hold on to it and be prepared to move with it.

- Stay clear of glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures or furniture.
- Don't rush outside. You may be injured by falling debris.
- Don't use elevators.

**If you are outdoors:**

- Get into the open and stay there.
- Move away from buildings, streetlights, and utility wires.

**If you are driving:**

- Stop only if it's safe to do so.
- Stay inside the vehicle.
- Don't stop on or under a bridge or overpass or in a tunnel.
- Don't stop under trees, electrical power lines, light posts, or signs.

**If trapped under debris:**

- Don't light a match.
- Don't move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort; you could inhale dangerous amounts of dust.



**SAFETY TIP—**Some earthquakes are actually foreshocks. Don't take it for granted that an earthquake is over; a larger one could still occur.

**MYTH  
BUSTER**

*"The safest place to be in an earthquake is under a doorway."* **False:** In modern structures, the doorway is no stronger than the rest of the building. Actually, you're more likely to be hurt by the door swinging wildly. In a public building, you could be in danger from people trying to hurry outside. If you're inside, get under a table or desk and hang on to it.

### After an Earthquake

- Expect aftershocks. Listen to a battery-operated radio or television for the latest emergency information.
- Use the telephone—including cell phones—only for emergency calls.
- Open cabinets cautiously. Beware of objects that could fall off shelves.
- Stay away from damaged areas.
- Help injured or trapped persons if you can do so without endangering yourself.
- Clean up spilled medicines, bleach, gasoline, or other flammable liquids immediately.
- Inspect the entire length of chimneys for damage. Unnoticed damage could lead to a fire.
- Inspect utilities. Check for gas leaks. Look for electrical system damage. Check for sewage and water line damage.
- If you live in a coastal area, be aware of possible tsunamis. See the next section.

### TSUNAMI

A **tsunami** (pronounced soo-ná-mee), also called a “seismic sea wave” (or, mistakenly, “tidal wave”), is a series of enormous waves created by an underwater disturbance such as an earthquake. These waves can

also be generated by coastal or underwater landslides, volcanic eruptions, or meteor impacts in the water. Tsunamis threaten coastal populations of the Pacific and other oceans and seas.

A tsunami can move hundreds of miles (or kilometers) per hour in the open ocean and smash into land with waves as high as 100 ft (30 m) or more. Areas are at greater risk if they are less than 25 ft (8 m) above sea level and within a mile of the shoreline. Drowning is the most common cause of death associated with a tsunami. Hazards include flooding, contaminated drinking water, and fires from gas lines or ruptured tanks.

**TSUNAMI ADVISORY:** This indicates the recent occurrence of an earthquake, which could generate a tsunami.

**TSUNAMI WATCH:** This indicates the possibility that a tsunami has been generated but is at least 2 hours' travel time to the area under watch.

**TSUNAMI WARNING:** This indicates the possibility that a tsunami has been generated. People in the warned area are strongly advised to evacuate.

## Plan Ahead

- Find out whether your home is in a danger area. Know the height of your street above sea level and its distance from the coast. Evacuation orders may be based on these numbers.
- Be familiar with the warning signs. Because tsunamis can be caused by an underwater disturbance or an earthquake, people living along the coast should consider an earthquake or a significant ground rumbling as a warning signal. A noticeably rapid rise or fall in coastal waters is also a sign that a tsunami is approaching.

- Make evacuation plans. Pick a safely elevated inland location. If an earthquake or other disaster has occurred, roads in and out of the vicinity may be blocked, so plan more than one evacuation route.

### **During a Tsunami**

- If an earthquake occurs and you are in a coastal area, turn on your radio for a possible tsunami warning.
- If you hear an official tsunami warning or detect signs of a tsunami, evacuate at once. Climb to higher ground.
- Stay away from the beach. Never go down to the beach to watch a tsunami come in. If you can see the wave, you're too close to escape it.
- A tsunami is a series of waves. Don't assume that the danger is over because one wave has come and gone. The next wave may be larger than the first one. Stay out of the area.



**SAFETY TIP—In any disaster, save yourself, not your possessions.**

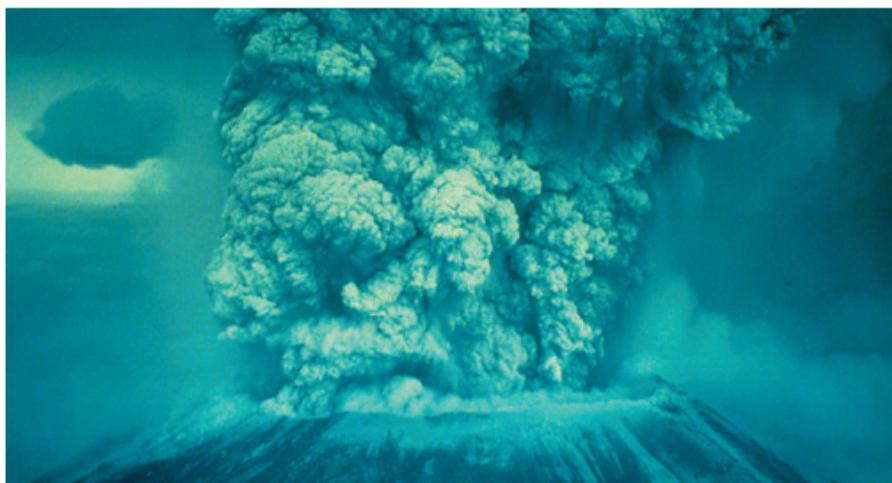
### **After a Tsunami**

- Help injured or trapped persons if you can do so without endangering yourself.
- Stay away from flooded and damaged areas until officials say it's safe to return.
- Open windows and doors to help dry the building.
- Shovel mud while it's still moist to give walls and floors an opportunity to dry.
- Check food supplies, and test drinking water.

### **VOLCANIC ERUPTION**

A **volcano** is a mountain that opens downward to a reservoir of molten rock below the surface of the earth. Unlike most mountains, which are pushed up from below, volcanoes build up from an accumulation of

their own eruptive products. When pressure from gases within the molten rock becomes too great, an eruption occurs. Eruptions can be quiet or explosive. There may be lava flows, flattened landscapes, poisonous gases, and flying rock and ash. Because of their intense heat, lava flows are great fire hazards. They destroy everything in their path, but most move slowly enough to let people get out of the way.



**Volcanic eruption.**

### Plan Ahead

- Add a pair of goggles and a disposable breathing mask for each person to your disaster supply kit.
- Stay away from active volcano sites.
- If you live near a known volcano, active or dormant, be ready to evacuate at a moment's notice.

### During a Volcanic Eruption

- Follow the evacuation order issued by authorities. Evacuate immediately from the volcano area to avoid flying debris, hot gases, and flowing lava.
- Wear a long-sleeved shirt and long pants.

- Use goggles and wear eyeglasses instead of contact lenses.
- Use a dust mask or hold a damp cloth over your face to help with breathing.
- If your home is outside the evacuation area, unless the roof is in danger of collapsing, stay indoors until the ash has settled.
- Close doors, windows, and all ventilation systems (chimney vents, furnaces, air conditioners, fans, and other vents) in the house.

### After a Volcanic Eruption

- Help injured or trapped persons if you can do so without endangering yourself.

### LANDSLIDE AND MUDSLIDE

In a **landslide** or **mudslide**, masses of rock, earth, or debris move down a slope. These slides may be small or large, slow or rapid. They are activated by storms, earthquakes, volcanic eruptions, fires, alternate freezing and thawing, and steepening of slopes by erosion or human modification. **Debris flows** and **mud flows** are rivers of rock, earth, and other debris saturated with water. They can travel several miles (or kilometers) from their source and grow in size as they pick up trees, boulders, cars, and other materials.



Landslide and mudslide damage.

## Plan Ahead

- Don't build near steep slopes, close to cliff edges, near drainage ways, or in natural erosion valleys.
- Get a ground assessment of your property.
- Plant ground cover on slopes, and build retaining walls.
- In mudflow areas, build channels or deflection walls to direct the flow around buildings.

## During a Landslide or Mudslide

- Listen to a portable, battery-powered radio or television for warnings of intense rainfall. Short bursts of rain may be particularly dangerous, especially after longer periods of heavy rainfall and damp weather.
- If your area is susceptible to landslides and debris flows, evacuate if it's safe to do so. If you remain at home, move to a second story if possible.
- Listen for any unusual sounds that could indicate moving debris, such as trees cracking or boulders knocking together. Debris can flow quickly and sometimes without warning.
- If you are near a stream or channel, watch for any sudden increase or decrease in water flow and for a change from clear to muddy water. Such changes may indicate landslide activity upstream, so be prepared to move quickly.
- Be especially alert when driving. Watch the road for collapsed pavement, mud, fallen rocks, and other indications of possible debris flows.

## After a Landslide or Mudslide

- Listen to local radio or television stations for the latest emergency information.
- Stay away from the slide area. There may be danger of additional slides.
- Watch for flooding, which may occur after a slide. Floods sometimes follow the slide because both have been started by the same event.

- Help injured or trapped persons if you can do so without endangering yourself.
- Look for broken utility lines and damaged roadways and railways, and report them to appropriate authorities.
- Check the building foundation, chimney, and surrounding land for damage.
- Replant damaged ground as soon as possible. Erosion caused by loss of ground cover can lead to flash flooding and additional slides.
- Ask a geotechnical expert to evaluate landslide hazards or design corrective techniques to reduce risk.

## AVALANCHE

An **avalanche** is a huge mass of ice and snow that breaks away from the side of a mountain and surges downward at great speed. Travel through avalanche terrain always involves risks. Be aware of avalanche hazards and select a safe route to avoid injury. Never ski or venture into dangerous conditions.

### Safety Equipment for Backcountry Travel

- **Snow shovel:** Your shovel should be made of aluminum or high-impact plastic, collapse to fit into a pack, and be strong enough to dig in avalanche debris. You can also use it to dig snow caves for overnight shelter.
- **Probe pole or ski pole:** Probes help to pinpoint the location of avalanche victims. Organized rescue teams use 10- to 12-ft (3- to 3.6-m) poles. You can buy shorter poles that fit together to make a full-length one. Some ski poles come with removable grips and baskets that can be screwed together to make an avalanche probe.
- **Avalanche rescue transceiver (rescue beacon):** The transceiver emits a signal that tells the rescuer's unit where a buried person is located. It's essential to confirm that all members of the party are on the same frequency and have their transceivers set to "Transmit" before setting out.

MYTH  
BUSTER

*"Noise triggers avalanches."* **False:** Most noise does not exert enough force. To start an avalanche, a sound would have to be tremendously loud, like that of an explosive at close range. In almost all avalanche fatalities, the avalanche is triggered by the weight of one or more persons walking over the snow.

### Avalanche Survival

- The moment snow begins to move, try to escape by moving quickly to the side of the avalanche. Don't try to outrun it by moving downhill—it will certainly overtake you.
- Shouting alerts companions that you need help. To prevent snow inhalation, close your mouth after you yell for help.
- If knocked off your feet, try to remain on the surface of the snow by staying facedown and "swimming" with the avalanche.
- As the avalanche slows down, use all possible strength to get your head, an arm, or a hand above the surface. Use your hand to create a breathing space around your face.
- If you are caught under the snow it is easy to become disoriented as to which direction is up (toward the surface) or down. An easy safety tip to remember is to spit. Due to general principles of physics you will see or feel your saliva (spit) run toward the direction of the ground. This will orientate you to the direction of the surface. Dig in the opposite direction that your spit falls, toward the surface.

### Avalanche Rescue

- If the person is not alone, have a companion remain in a stable position and mark the last known location with a piece of equipment or clothing, or anything that can be seen from a distance. If enough people are available, send someone to notify the local ski patrol or emergency squad.

- Visually check for any equipment or body parts sticking out of the snow.
- **With a rescue transceiver:** Switch your transceiver to "Receive," and use a methodical approach to narrow the search and pinpoint the signal. A skilled rescuer can find a buried person within a few minutes.
- **Once you locate the signal:** Use your probe to identify the victim. When probing the snow, look for changes in consistency: people and backpacks feel "soft," whereas rocks and trees feel "hard."
- **Once you locate the victim:** Use your shovel to dig the person out as quickly as possible. The average person cannot survive much beyond 15 minutes under the snow.
- **Without a rescue transceiver:** Search the fall line below the location where the person was last seen. Use your probe to search in likely spots, then use your shovel to dig the person out.



**SAFETY TIP—If you own a rescue transceiver, practice using it before traveling in avalanche-prone terrain. Avalanche courses often include transceiver training. If you're planning on winter backcountry travel, take the course.**

### Treatment of Avalanche Injury

- Manage the person's airway, breathing, and circulation.
- Stabilize any fractures or bleeding.
- Treat for shock, and provide warmth in anticipation of hypothermia.
- Evacuate to a medical center immediately.

### WINTER STORM AND EXTREME COLD

Heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be hit with a major **winter storm** or **extreme cold**. Winter storms can result in flooding, storm surge, closed highways, blocked roads, fallen power lines, and hypothermia.

**WIND CHILL:** This calculation gauges how cold it feels outside when the effects of temperature and wind speed are combined.

**WINTER STORM WATCH:** This indicates the possibility of severe winter weather in your area.

**WINTER STORM WARNING:** This indicates the occurrence or prediction of a winter storm in your area.

**BLIZZARD WARNING:** This is a prediction that large amounts of falling or blowing snow will occur in several hours. In a blizzard, visibility is reduced to less than 1/4 mile (0.4 km), and sustained winds reach at least 35 mph (56 km/hr).

**FREEZING RAIN:** Rain that freezes when it hits the ground.

Freezing rain creates a coating of ice on roads, walkways, trees, and power lines.

**SLEET:** Rain that turns to ice pellets before reaching the ground.

Sleet also causes moisture on roads to freeze and become slippery.

**FROST/FREEZE WARNING:** This is a prediction that temperatures will fall below freezing.

## Plan Ahead

- Be familiar with winter storm warning messages.
- Stock enough heating fuel.
- Service snow removal equipment.
- Keep snow shovels and other snow removal equipment in working order.
- Purchase rock salt to melt ice on walkways and sand to improve traction.
- If you have a fireplace, keep a good supply of wood.
- Winterize your house, barn, shed, or any other structure that can shelter your family, neighbors, livestock, or equipment.

- Keep fire extinguishers on hand. Extreme cold increases the risk of house fires: more people turn to alternate heating sources without taking the necessary safety precautions.
- Prepare your vehicle in advance. Check fuel and antifreeze levels, the battery and ignition systems, the brakes, and the heater and defroster. Stock each car with a winter emergency kit that includes the following: a shovel; a windshield scraper; blankets, extra hats, socks, and mittens; a first aid kit; a tow chain or rope; road salt and sand; booster cables; emergency flares; and a fluorescent distress flag.

### **During a Winter Storm or Extreme Cold**

#### **If you are indoors:**

- Stay indoors and dress warmly.
- Listen to radio or television to get the latest information.

#### **If you are outdoors:**

- Wear loose-fitting, layered, and lightweight clothing. The outer garments should be tightly woven and water repellent.
- Wear mittens, which are warmer than gloves. Wear a hat.
- Cover your mouth with a scarf to protect your lungs.
- Avoid overexertion when shoveling snow. Overexertion can bring on a heart attack, a major cause of death in winter.
- Watch for any signs of frostbite or hypothermia.
- If you suspect frostbite or hypothermia, begin slow warming (see Tab 5: Environmental Emergencies), and seek immediate medical assistance.

#### **If you are in your vehicle:**

- Drive only if it's absolutely necessary.
- Don't travel alone, and make sure others know where you're going.
- Stay on main roads; avoid back road shortcuts.

## If a blizzard traps you in the car:

- Pull off the highway. Turn on hazard lights, and hang a distress flag from the radio antenna or window.
- Remain in your vehicle, where rescuers are most likely to find you. Don't set out on foot unless you can see a nearby building where you know you can take shelter.
- Run the engine and heater about 10 minutes each hour to keep warm. When the engine is running, open a downwind window slightly for ventilation, and periodically clear snow from the exhaust pipe. This will protect you from possible carbon monoxide poisoning.
- Exercise to maintain body heat, but avoid overexertion. In extreme cold, use road maps, seat covers, and floor mats for insulation. Huddle with passengers, and use your coat for a blanket.
- Take turns sleeping. One person should be awake at all times to look for rescue crews.
- Drink fluids to avoid dehydration.
- Be careful not to waste battery power. Balance electrical energy needs with your supply—use the lights, heat, and radio sparingly.
- Turn on the inside light at night so work crews or rescuers can see you.
- If stranded in a remote area, use your feet to stamp "**HELP**" or "**SOS**" in an open area. Outline the letters with rocks or tree limbs. Rescue personnel may be surveying the area by airplane.

## Tab 8: Outdoor Survival Skills

Whether you're spending a weekend in the wilderness, taking a long car trip, or even hiking for an afternoon on your favorite trail, you may suddenly find yourself in danger, especially if you become lost, stranded, or injured. This tab will teach you the six basic survival skills you need to get home safely: fire, shelter, signaling, water, food, and first aid. Also included here are discussions of navigational systems, search and rescue, and encounters with wild animals. Let's begin by reviewing the safety measures you should take before setting out.

### PLAN AHEAD

A quick rescue actually begins before you get lost, stranded, or injured. The first step is the precautions you take before you leave home, camp, or your vehicle.

- **Dress for the weather and expect the unexpected.** Pack a lightweight rain suit. It may even come in handy on a dry day as a windbreaker.
- **Don't forget a hat.** In cold weather, you can lose as much as 75% of your body heat through your uncovered head. On a hot day, a hat protects you against the sun's rays.
- **Dress in layers.** You can remove clothing as the temperature warms up and put on a jacket or hat as you slow your pace or the temperature drops.
- **Study maps and know the territory.** Pack your map in a waterproof plastic bag.
- Pack a compass or global positioning system (GPS) in your gear. Know how to use the equipment.
- Listen to the local weather report before every outing.
- **File a trip plan with a responsible person.**
- Pack a survival knife, a first aid kit, and a survival kit.
- Include supplies for any pets you may have with you. Pets will need fresh food and drinking water.

- You may be required to keep your dog on a leash in many recreational areas.
- Carry a cell phone or two-way radio with freshly charged batteries.
- Remember that children are more susceptible to environmental factors such as cold, heat, and the sun's rays.
- Small children tend to explore their environments with hands and feet. Make sure they are safe from potential hazards.

### SAMPLE TRIP PLAN

**Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Emergency Contact and Phone Number:** \_\_\_\_\_

**Description and location of destination:** \_\_\_\_\_

**Reason for trip:** \_\_\_\_\_

**Mode of transportation:** \_\_\_\_\_

**Departure time and date:** \_\_\_\_\_

**Return time and date:** \_\_\_\_\_

**Name of others with you (include any pets):** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**SAFETY TIP—**If you're departing from a vehicle, be sure to park the vehicle where it can be easily found. Leave your trip plan in a plastic bag under the windshield wiper, regardless of how short the trip is. This will give authorities a starting point for the search if you don't return on schedule.

### BASIC SURVIVAL SKILLS

One of the most important survival skills is also one of the simplest: **DO NOT PANIC**. If you find yourself lost or stranded, stop what you're

doing and find a place to sit. Breathe slowly and deeply to help you stay calm and think more clearly. Plan to stay put until help arrives, and begin to focus on the six basic survival skills (fire, shelter, signaling, water, food, first aid).



**SAFETY TIP—**Most people are found within 72 hours after they are reported missing. However, even within this time frame, a basic knowledge of survival skills is essential. Otherwise, an emergency can end in tragedy.

## FIRE

**Knowing how to build a fire is the best survival skill you can have.** Fire provides warmth, light, and comfort. It can purify water, cook food, signal rescuers, dry clothing, drive away pests, and keep predators at a distance. Even if you don't have adequate clothing, a good fire can help you survive the coldest of environments. When venturing into the outdoors, you should always bring at least two, and preferably three, ways of making a fire. Carry one on your person and the other with your gear.

### How to Start a Fire

Several types of fire-making gear can maximize your ability to build and maintain a fire should the need arise:

- **Waterproof matches:** Keep these in a weather-tight plastic match safe. Matches have a short shelf life, so replace them about every 6 months.
- **Butane lighter**
- **Prepackaged fire starters**
- **Survival knife and flint**
- **Survival knife and magnesium fire starter**

A **magnesium fire starter** consists of a small block of lightweight magnesium with a full-length flint attached to one side. To start a fire,

scrape some of the soft magnesium into a small pile of tinder. Then strike your survival knife (the back of a locked knife blade) along the flint to create a shower of sparks; these will ignite the pile into a white-hot flame of 5400°F (2982°C). The advantage of a magnesium fire starter is the high temperature of the flame, which burns so hot that it can ignite damp wood.



Scrape magnesium on the tinder.



Ignite the fire.



#### **SAFETY TIP—Know how to start a fire even in wet conditions.**

**Building a fire in a survival situation is more difficult than most people think. Master the skill of fire making before you actually need it.**

### **Steps to Building a Fire**

A roaring fire requires five things:

- 1. Oxygen source:** Burning is nothing more than rapid oxidation.
- 2. Heat source:** Examples include matches, lighter, flint, a prepackaged fire starter, and a magnesium fire starter.
- 3. Tinder to catch the flame and start the fire:** An abandoned bird's nest, bark from a birch or cedar tree, thistledown, or dry grass can be used.

- 4. Small sticks and twigs:** These catch the fire from the tinder.
- 5. Dry, dead fuel wood:** In wet weather, look on the lower limbs of evergreen trees, or split wet logs down to their dry interiors. Collect the amount of firewood you think you'll need for the night. Then collect the same amount again: experience has shown most people underestimate by half the amount of firewood they need.



**SAFETY TIP—**When starting a fire, avoid adding large pieces of wood too quickly. Don't pile on so much wood that the flame gets too little oxygen to burn. Make sure you have enough tinder and wood gathered in advance before starting the fire.



Star fire.



Pyramid, or log-cabin, fire.

Once you have a roaring fire, conserve fuel by making a **star fire**. Using large logs if you can, place only their ends in the fire, and arrange the ends of the logs to meet so they form a star (see figure for star fire). Push the logs inward as more fuel is needed. You can also build a **pyramid fire, or log-cabin fire**, which will burn downward and require less attention at night.

An emergency space blanket placed against the back wall of a shelter makes a good reflector. To keep warm, sit between the fire and the reflecting wall.

## SHELTER

Anything that reduces or increases your overall body temperature can be your enemy. Shelter protects your body from the elements: heat, cold, rain, snow, sun, and wind. Shelter also protects you from swarms of insects and other creatures that can irritate or harm you.



**SAFETY TIP—Practice building a survival shelter. Experiment with different materials and survival scenarios. Should the need arise, you'll be glad you did.**

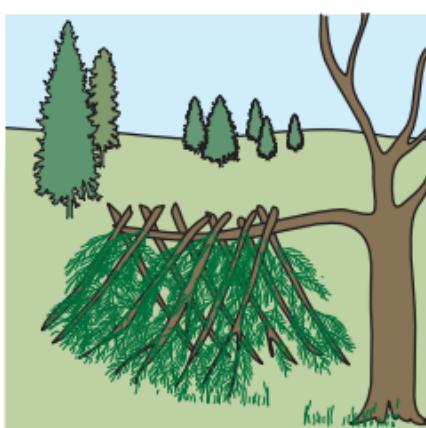
### Basic Shelter Guidelines

- Clothing is your body's most fundamental shelter. Choose your clothing wisely, and consider the environment you're planning to enter. Dressing in layers will maximize your ability to adapt to changing conditions. Layers trap air and are warmer than one thick garment. Try to keep the layer closest to your body dry.
- Don't expend energy by making a shelter if nature provides one. Look for a cave, rocky crevice, large tree with low-hanging limbs, or a clump of bushes.
- Build a lean-to shelter. Gather fallen tree limbs. Lean them against a rock, top edge of an overhang, or fallen tree. Cover the leaning limbs with leaves, pine needles, or small tree branches and grass.
- Pack a lightweight tube tent for easy transportation and assembly. Insulate it with an emergency space blanket or tarpaulin to prevent dampness and hypothermia, or with dry leaves, dry grasses, or pine needles. You can also wrap yourself in a blanket or tarpaulin in a sitting or squatting position to concentrate your body's core heat.

- If you are sheltering with a friend or your dog, stay in close contact to keep each other warm.
- If you are stranded with a vehicle, plane, boat, snowmobile, or canoe, try to use the craft as a shelter.
- Adequate sleep is important to help you make sound decisions. The need for rest becomes more critical as time passes and rescue is delayed. Rest contributes to mental and physical health, and adequate shelter contributes to sound rest.
- When sleeping with your clothes on, keep everything loose, including boots. The better circulation you have, the more warmly you will sleep. Loose clothing also permits moisture to evaporate.



**Tube tent.**



**Lean-to shelter.**



**SAFETY TIP—**The secret to shelter construction is simple. Use whatever is available to protect yourself from the elements.

Construct a shelter that uses the least amount of energy to build and, if possible, set it up where it can be seen.

## SIGNALING

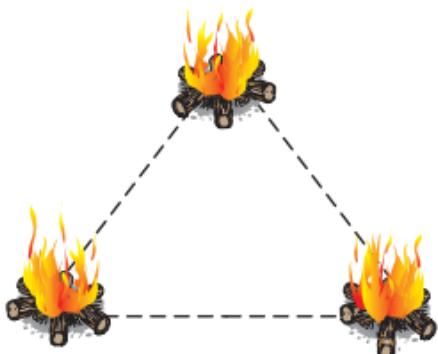
Signaling is the use of any means available to alert all potential rescuers that you are in need of help. Fire and smoke, flashing light, brightly

colored markers or clothing, flags, reflective mirrors, and whistles can all help a rescuer spot you. Your ingenuity in devising a signal could very well save your life. Most search and rescue parties use aircraft as a primary method of sighting.

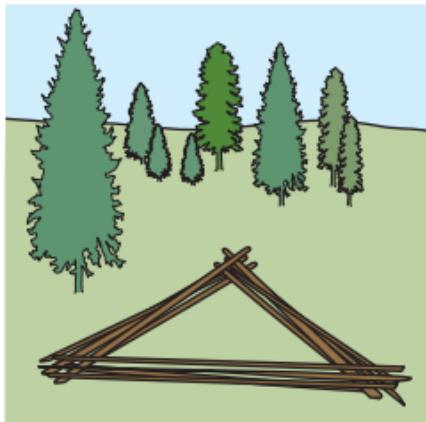


**SAFETY TIP—Three of anything is considered a universal signal for help: three gunshots, three blows on a whistle, three sticks in the shape of a triangle.**

- **Three fires in a triangle are a recognized distress signal.** At night a bright fire in an open area can be seen for miles from the air and a fair distance from the ground, especially in mountains.
- Lay out a ground-to-air signal in an open field. **For example, a triangle means distress and is the universal signal for help.** It can be formed from rocks, logs, or colored clothing—whatever will show up against the background. Its lines should be 3 ft (1 m) wide and 18 ft (5.5 m) long to be seen by search aircraft. Dark tree limbs on snow or light-colored rocks on dark soil are proven examples of a ground-to-air signal.

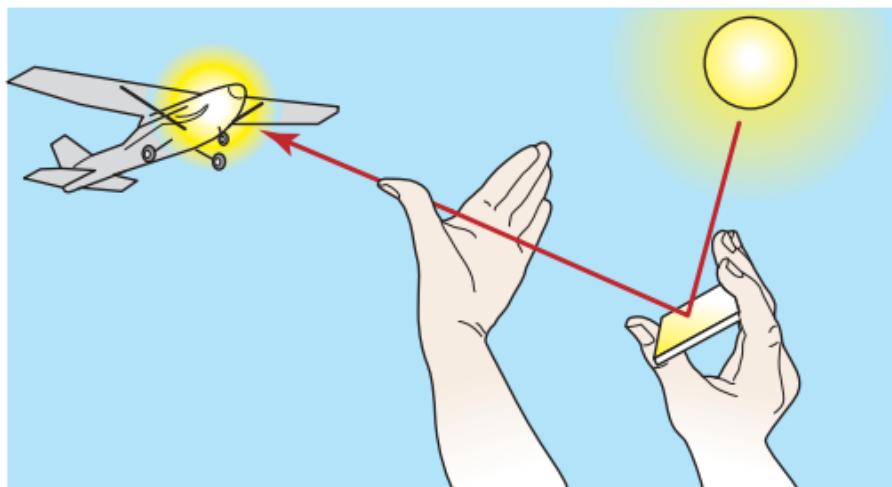


**Three fires in triangular form.**



**Universal signal for help.**

- **Make a smoky fire** by piling wet leaves or green vegetation over the fire during the day. Smoke is an excellent signal to use during the day.
- **Use an emergency strobe light** to signal at night.
- **Blow on a whistle.** A loud whistle requires little energy, can be heard much further than the human voice, and is easily heard by tracking dogs.
- **Use a signal mirror when you can see a plane or people in the distance.** A commercially made emergency signal mirror is small and easy to carry. If you forgot to pack one in your survival kit, you can improvise and use the rear-view mirror of your vehicle, a shiny CD or DVD, a pocket/purse mirror, or even metal from cans or aluminum foil. Using the hand method, stretch out your hand and center the object you want to signal, such as an airplane, between the "V" made by your thumb and fingers. Position the mirror with your other hand so that the sunlight is directed off your mirror going through the "V." When you aim it correctly, the brilliant flash of light can't be ignored. It can attract the attention of rangers in a forest tower or searchers miles away in the air, on a mountainside, or in a desert.



**Signal mirror: hand method using pocket mirror.**



**SAFETY TIP—**Carry two methods of signaling besides a cell phone or two-way radio. Electronic devices don't always function even in ideal conditions. In rugged rural and mountainous areas, reception may be spotty or nonexistent. Other threats to outdoor electronic devices include damage and dead batteries.

## WATER

When you're lost or stranded, clean, drinkable water is often the most important consideration in your survival. People have survived without food for weeks or even months, but you can live only up to 3 days without water. Depending on your health, going without water for even 1 day could mean desperate trouble. Remember the following:

- Always carry a canteen or other vessel filled with water.
- When planning your trip, always assume that you'll need extra water.
- Carry some plastic zip-lock bags to collect and store water.
- Include in your survival kit a metal pot or aluminum foil, which you can mold into a vessel, for boiling water.
- Never wait until you are out of water to collect it.



**SAFETY TIP—**Because safe drinking water has become scarce even in the most remote wilderness areas, it's a good idea to treat all water before drinking.

## How Much Water Do You Need?

Water is by far the most important nutrient for the human body. Approximately 75% of the body consists of water, and the intake and output of liquids are necessary to keep our vital organs functioning normally. If you're having trouble finding potable water in a survival situation, you'll soon start wondering how long you can survive without it.

## 209

- To maintain a high level of health in ideal environments, a minimum of 2 quarts (2 liters) of clean water per day per person is the generally accepted guideline.
- In general, your water consumption needs will increase with the temperature, in cold or very dry environments, or if you are physically active. In such situations, you may need more than a gallon (4 liters) of water per day to stay healthy.
- You need to replace water lost through perspiration and respiration, so if you are engaged in hiking or another vigorous activity and are sweating and breathing hard, you need to drink more water to stay healthy.
- You need water to process your food. Foods that are salty or high in protein increase your need for water.



### **SAFETY TIP—Very cold environments can be as dry as the**

**desert. This is because cold air cannot hold much moisture. Cold, dry air not only dehydrates your body with every breath you take, but also robs your body of moisture via exposed skin. This is one reason your lips may be prone to chapping in cold weather. Because you won't sweat nearly as much in cold, dry air as you would in hot, dry air, you can become severely dehydrated without even realizing the danger you're in.**



### **SAFETY TIP—Wind can also affect the amount of water you**

**need to take in. A dry wind on exposed flesh can virtually suck the water right out of your skin.**

## **What Water Is Safe to Drink?**

In a survival situation, the water from a pond, lake, river, or stream may be the only water available. Never drink untreated water from such a source because it may contain harmful microorganisms such as bacteria,

viruses, and parasites like *Giardia*. Ingesting these microorganisms can make you very sick. Symptoms from drinking contaminated water may include nausea, diarrhea, fatigue, and stomach cramps and can begin within 2 to 7 days from the time of ingestion. People with significantly weakened immune systems are likely to have more severe and persistent symptoms than are healthy individuals.

The best way to ensure safe drinking water is to carry enough with you. However, in a survival situation lasting several days, when your bottled water runs out, you can collect, filter, and treat water from natural sources to make it safe to drink.

### **Step 1: Collect the Water**

It's easiest to collect water from ponds, lakes, rivers, or streams. However, in a survival situation, if you are not near such sources, you can collect water by the following means:

- **Snow:** Snow is 17 parts air and 1 part water. If you melt snow by heating, put in a little at a time and compress it, or the pot will burn.
- **Ice:** If available, melt ice rather than snow. You get more water for the volume with less heat and time.
- **Rain:** If it rains, you can funnel runoff into your plastic zip bag. Use a rain suit or emergency space blanket to catch rain by digging a hole in the ground and lining it with the suit or blanket. Before using this method, make sure you'll stay dry in your shelter.
- **Dew:** Dew can be collected off plant leaves, vehicles, tube tents, and other surfaces with a cloth and squeezed into a container. Some dew will collect on the underside of a piece of plastic spread on the ground during the night.



**SAFETY TIP—Do not try to eat snow or ice. Not only does it lower your body temperature, but it causes the mucous membranes of your mouth to become swollen and raw. The inflammation may become painful enough to prevent eating or drinking until it subsides. Dogs eat snow and get away with it; humans cannot.**

## Step 2: Filter the Water

If the water you collect isn't clear, the first step is to get the sediment out. You can filter water through a clean handkerchief or similar fabric. Let the filtered water stand until any remaining sediment has settled to the bottom. Then pour the water into the container in which you plan to treat it.

## Step 3: Treat the Water

Different methods are available to make water safer to drink. These include boiling, chemical treatment, filtration, and ultraviolet (UV) light-emitting systems.

### **Boiling**

Boiling water thoroughly will kill all disease-causing microorganisms. Boiling does not remove chemicals, however. A full boil for at least 1 minute is recommended. If the water is heavily polluted, boil it for 10 minutes. Boiling leaves water with a flat taste, so after the water cools, aerate it by pouring it back and forth several times between two clean containers. This will give it back its natural taste. If you don't have a metal pot, you can make a container for boiling water from the aluminum foil in your survival kit.



**SAFETY TIP—**Water boils at 212°F (100°C). Temperatures above 160°F (70°C) kill all harmful microorganisms within 30 minutes; above 185°F (85°C), within a few minutes. In the time it takes water to reach the boiling point, all microbes will be killed. At high altitudes, it takes longer for water to boil, but once the water reaches a rolling boil and then cools, you can safely drink it.

### **Chemical Treatment**

If boiling is not practical, chemical treatment will kill most harmful microbes. For effective chemical disinfection, the water must be filtered first. Commercial tablets, chlorine, and iodine are most commonly used to treat water. These chemicals are quite effective in protecting

against *Giardia*, but they may be less effective against certain other microorganisms:

- **Purification tablets.** Drug and supply stores carry halazone and other commercial water treatment tablets you can keep in your survival kit. These tablets do an excellent job. Be sure to follow the directions on the bottle. It's important to use the correct dose and waiting period to make sure the water is safe to drink.
- **Chlorine.** Chlorine is another excellent water treatment. To each quart (or liter) of questionable water, add 2 drops of chlorine (5% strength). If the water is cloudy or dirty, add 4 drops. Next, shake the water vigorously and let it sit for 30 minutes. A slight chlorine odor and taste will let you know the water has been properly treated. If not, repeat the dose, and let the water stand for an additional 15 minutes. If you don't know the strength of the chlorine, add 10 drops per quart (or liter) of filtered and settled water. Double the amount of chlorine for cloudy or dirty water.
- **Iodine.** Add 5 drops of 2% iodine tincture to 1 quart (or liter) of clear water and 10 drops to cloudy water. Let the water stand for 30 minutes before drinking it. With iodine tablets, follow the manufacturer's directions. The addition of vitamin C to iodine-purified water can neutralize some of the associated bad taste. Note: Pregnant women should not use iodine drops to purify water because it could affect the fetus. Prolonged use of iodine can cause thyroid problems, so you should not use it to disinfect water over long periods of time.



**SAFETY TIP—The effectiveness of chemical disinfectants such as water purification tablets, chlorine, or iodine depends on the concentration of the chemical, how contaminated the water is, the water temperature, the amount of suspended particles, and the duration of the treatment.**

## Filtration

The best water filters for individual use are often designed for hikers, kayakers, and other outdoor enthusiasts. Small, lightweight, and easy to operate, they filter out *Giardia* and other harmful microorganisms and fit into a survival kit easily. Because filters work by physically trapping infectious agents, the smaller creatures may slip through the pores of the filtering mechanism. Viruses are a special problem because they're exceedingly small: many portable water filters are unable to trap them.

## **Ultraviolet (UV) Light-Emitting Devices**

These handheld, portable devices can effectively purify water against parasites, bacteria, and viruses. They use ultraviolet light to purify water so there is no chemical taste, odor, or risky side-effects. They work rapidly, requiring about 1 minute to purify 1 quart or liter of water. They are small, lightweight, and convenient for trips where weight and space are important considerations. Universal, portable, ultraviolet water purifying products made by SteriPEN ([www.steripen.com](http://www.steripen.com)) are the perfect tools to ensure your family has safe drinking water anywhere.



**SteriPEN, a type of UV device.**



**SteriPEN purifies river water.**



Outdoor use of SteriPEN.



**SAFETY TIP—**Anytime you treat water in a canteen, jug, or other type of container, be sure to rinse the cap, spout, screw threads, and lid with some of the treated water. You shouldn't overlook any surface that may come in contact with either your mouth or the drinking water.

**MYTH  
BUSTER**

*"I need to disinfect water only for drinking."*

**False:** It's important to use disinfected water for anything that will enter your body. Don't wash your food or your cooking and eating utensils with contaminated water. Don't brush your teeth with it either—you will certainly introduce disease-causing organisms into your body. Avoid getting untreated water on any wounds or areas of open skin.

## FOOD

Although food is not as immediately critical as water, missing even just a few meals can cause

- Irritability
- Low morale
- Lethargy (physical weakness)
- Confusion, disorientation, and poor judgment
- Weakened immune system
- Inability to maintain body temperature that can lead to hypothermia, heat exhaustion, or even heatstroke

These symptoms can shorten your odds of survival as weakness, sickness, accidents, and mistakes take their toll. When you are well fed, you are better able to take on the challenges that may arise in your situation.

### What to Include in Your Survival Food Supply

Several considerations go into creating your survival food supply:

- **Storability:** Food may be stored for long periods and must still be edible when you need it.
- **Nutrition:** Food must supply enough vitamins, minerals, fats, carbohydrates, and protein to sustain life.
- **Expense:** Buying freeze-dried meals can get expensive and exceed what you and your family can afford.
- **Food rotation:** Food items must be rotated in your survival kit to keep them from going out of date.
- **Edibility:** You're far better off if your survival food kit contains foods you eat normally. During a survival situation, it's a bad idea to stress your body further by consuming foods you aren't used to or don't like.
- **Ease of preparation:** In an emergency, you may need to prepare your food outdoors over an open fire. Some of the following are among the best survival foods for your kits:

- White or brown rice
- Protein or energy bars
- Dry cereal
- Trail mix (nuts, dried fruit, seeds)
- Dried beans—get the multiple-bean mix if possible
- Powdered milk
- All-purpose flour
- Canned fish—tuna, salmon, or other fish
- Canned vegetables including spinach, pumpkin, and carrots
- Olive oil or vegetable shortening
- Honey or sugar
- Iodized salt
- Multivitamins
- Spices according to your taste

Beans and brown rice together form a complete protein. That makes them as good as meat, yet they are much easier to store for long periods without spoilage. Canned fish and powdered milk are also good protein sources.

### **How to Store Your Food Supply Safely**

Store food safely, especially if bears are in the area. Bears are always looking for something to eat. In bear country, follow these tips:

- Cook away from your tent.
- Store all food away from your campsite. Hang it from tree branches out of the bears' reach if possible.
- If no trees are available, store your food in airtight, locked, or specially designed bear-proof containers (in some locations, these "barrels" may be required by the National Park Service for backcountry travel).
- Remember, pets and their food may also attract bears.



**SAFETY TIP—**People can live for weeks without eating. Avoid the temptation to eat wild foods such as insects, plants, and especially mushrooms unless you are well trained in identification of wild foods.

## FIRST AID AND SURVIVAL KIT

First aid and survival kits are discussed on pages 8–13. Re-analyze your needs before every trip, create a medical checklist, and carry a small personal first aid kit with you at all times. Most survival situations require only bandaging for small cuts, care for bruises, and personal medication needs. Include added protection against biting insects such as mosquitoes, ticks, and chiggers. Make sure you know what you have with you and how to use it. Also, include a portable survival kit with the necessary equipment, water, and food to help you survive in an emergency.

## NAVIGATIONAL SYSTEMS

- **Map:** Maps are essential for hiking, biking, and driving routes. Topographical maps come in handy in unfamiliar terrain.
- **Compass:** A compass will help orient you to the direction and route you are traveling. It does take some knowledge to use one, so plan ahead and make sure you understand how it works.
- **Global positioning system (GPS):** A GPS gives you the exact longitude and latitude of your position. It's also battery dependent and can be dropped or broken, so you should take a compass along as well.

## SEARCH AND RESCUE

Modern search and rescue efforts begin as soon as you are reported missing to local authorities. Survival situations vary: you may be stranded during a day hike or extended outing, have your vehicle run off the side of a road, be caught in an avalanche, or be surrounded by floodwaters, to mention only a few. Most search teams estimate how

long the missing person can survive under present conditions and then search three times that long, if necessary. Search efforts go far beyond reasonable expectations, so don't give up hope.

**Your preparation will determine how fast the search begins. Good preparation gets you rescued more quickly.** Take the proper precautions in filing a trip plan with a responsible person (see page 200). Make sure you have the proper equipment and clothing for your planned trip. See pages 8–13 to make sure you have proper first aid and survival kits.

Rescuers need detailed information on the missing person. Name and address, physical description, clothing, boot or shoe type (important to trackers), age, equipment, medical conditions including medications, experience in the outdoors, physical condition, and personality traits—all this information helps experienced searchers locate someone who is lost or stranded.

## ENCOUNTERS WITH WILD ANIMALS

Whether you hike, mountain bike, float down rivers, or ride horses, you must take precautions to make the journey safer for you, your companions, and wildlife. Before your outing, get to know about the wildlife you could encounter. **Remember, all wildlife can be dangerous. Do not approach or feed wild animals, especially bears.** Look for warning signs in parks that indicate sightings of a certain animal, such as a bear or mountain lion.

Many people mistakenly believe that wild animals make specific gestures and warning signals that give people time to retreat to safety. Wild animals are individualistic and unpredictable. Animals that ignore you, look calm, or appear friendly may charge or strike out suddenly and without warning. Human injury often occurs when any animal responds to a perceived threat with instinctive “fight-or-flight” behavior. People are injured simply because they’re too close and get in the animal’s way. A car horn, barking dog, or excited child can trigger an animal into fight-or-flight behavior.

**Bears*****Follow Park Guidelines***

- Don't camp along bear trails. Signs such as tracks, droppings, or a prey carcass are reliable indicators that a bear is in the vicinity.
- Use proper food storage to keep human or pet food unavailable to bears. Don't store food in vehicles or tents. Use park-provided, bear-proof storage lockers, or hang food from high tree branches.
- Handle food wastes properly. Never leave litter around your campsite, and don't bury garbage or food or pour it into the ground at a campsite.
- Avoid sloppy camping. A sloppy campsite attracts bears to your own and other people's camps. After you're gone, the bear may return to look for food in other campsites.

***Personal Safety***

- Never hike alone in bear country. This quiet activity makes it easy to surprise bears.
- Hike a trail with a group. Make sure your group is making noise and is watchful. Bears hear you coming and get out of your way. A bear is more likely to make contact with one person than with a group.
- Do not approach a bear if you see one. Be calm and move slowly away from the bear. Do not run away as this often triggers the bear's instinct to chase. Tell a park official where and when you saw the bear.
- Never approach a cub. A sow (mother bear) will overcome all fear of you to protect her cub. You may not see her, but chances are she isn't far away.

**Mountain Lions*****Follow Park Guidelines***

- Be aware of park warnings. Signs may be posted stating that you're entering a mountain lion habitat.
- Stay on trails, stay aware of your surroundings, and make noise.
- Keep children close to you at all times, and keep pets on a leash.
- Hike only during daylight hours.

## Personal Safety

- Never hike alone in a mountain lion habitat. This quiet activity makes it easy to surprise a mountain lion.
- Hike a trail with a group. Make sure your group is making noise and is watchful. Mountain lions hear you coming and get out of your way. A mountain lion is more likely to make contact with one person than with a group.
- If you encounter a mountain lion: Face the lion, back away slowly, do not run or crouch, and try to appear larger (stand tall with your hands above your head). Talk calmly but firmly to the animal. Keep children close to you and pick them up without bending. Try not to look the animal in the eye; this gesture is seen as a challenge.
- If the mountain lion becomes aggressive: Yell and throw anything you can without having to crouch. Fight back if attacked and stay on your feet.

## Other Animals

It's possible to encounter just about any type of animal native to the region where you are hiking or camping. Most animals are not aggressive and will retreat quickly. For information about encounters with snakes and scorpions, see Tab 6: Poisons, Bites, and Stings. The following boxes describe some common myths and misperceptions about animal encounters.

**MYTH  
BUSTER**

*"If you see a raccoon during the day, it must be rabid."* **False:** Raccoons are opportunistic and will appear whenever food is around. Although they are normally nocturnal, it's not uncommon to see them during the day when pet food is outside. However, if the animal is circling or staggering, or otherwise acting disoriented or sick, contact a local animal control officer.

**MYTH  
BUSTER**

*"If you get close to a skunk you'll get sprayed."* **False:** It's actually pretty unusual for a person to get sprayed by a skunk. These animals only spray to defend themselves, as when a dog runs up and grabs them. Unless threatened, they will stamp their front feet as a warning to get you to back off.

**MYTH  
BUSTER**

*"Bats get tangled up in your hair if they fly near you."* **False:** The last place a bat wants to be is in your hair. Bats navigate using a complex sonar-like system called echolocation, which allows them to "see" their world with precision. The misconception about bats flying into hair is based on their swooping flight patterns when they are trapped in a confined space such as a house. The reason they swoop is not to fly into your hair, but to stay airborne.

**MYTH  
BUSTER**

*"Opossums are vicious and rabid."* **False:** Opossums are highly resistant to rabies, most likely because of their low body temperature. Opossums are also relatively benign creatures that defend themselves by hissing, teeth-baring, and drooling. These are not signs of rabies, but rather a bluff to scare off potential predators. When their act doesn't work, they play dead.

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