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**SAFETY
MANUAL**

COURTESY OF

LIBERTY ROBOTICS

FIRST TEAM

1764

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Emergency

Tips / First Aid

Emergency Action Principles

These are the steps that you should always follow during a MEDICAL emergency.

1. Make sure the area is safe to approach the victim. Failure to do this can lead to you becoming injured.
2. Activate the Emergency Medical System. Call 9-1-1.
3. Perform the Primary Survey.
 - a. Open the airway.
 - b. Check for breathing.
 - c. Start CPR (and check for severe bleeding).
4. Perform a Secondary Survey: check for non-life threatening conditions.
5. Rest and reassure the victim.
6. Monitor and treat for shock.

Before entering a situation you must make sure that there are not dangers that can harm you, other bystanders, or the victim. Some things to check for include:

- Fires or potential fires
- Fumes or smoke
- Falling objects
- Broken glass on the floor where you'll be leaning
- Electric wires/sources

Anaphylaxis

What is anaphylaxis?

Anaphylaxis is a life-threatening type of allergic reaction.

Symptoms and signs of anaphylaxis include:

Symptoms

- Skin reactions including hives, itching, and flushed or pale skin
- Swelling of the face, eyes, lips or throat
- Constriction of the airways, leading to wheezing and trouble breathing
- A weak and rapid pulse
- Nausea, vomiting or diarrhea
- Dizziness, fainting or unconsciousness

Triggers

- Medications (especially penicillin)
- Foods such as peanuts, tree nuts, fish and shellfish
- Insect stings from bees, yellow jackets, wasps, hornets and fire ants

If you've had any kind of severe allergic reaction in the past, ask your doctor if you should be prescribed an epinephrine autoinjector to carry with you.

If you're with someone having an allergic reaction with signs of anaphylaxis:

1. Immediately call 9-1-1 or your local medical emergency number.
2. Ask the person if he or she is carrying an epinephrine autoinjector to treat an allergic attack (for example, EpiPen, Twinject).
3. If the person says he or she needs to use an autoinjector, ask whether you should help inject the medication. This is usually done by pressing the autoinjector against the person's thigh.
4. Have the person lie still on his or her back.
5. Loosen tight clothing and cover the person with a blanket. Don't give the person anything to drink.
6. If there's vomiting or bleeding from the mouth, turn the person on his or her side to prevent choking.
7. If there are no signs of breathing, coughing or movement, begin CPR. Perform uninterrupted chest presses of about two a second until paramedics arrive.
8. Get emergency treatment even if symptoms start to improve. After anaphylaxis, it's possible for symptoms to recur. Monitoring in a hospital setting for several hours is usually necessary.

If you're with someone having signs of anaphylaxis, don't wait to see whether their symptoms get better. Seek emergency treatment right away. In severe cases, untreated anaphylaxis can lead to death within half an hour. An antihistamine pill, such as diphenhydramine (Benadryl, etc.), isn't sufficient to treat anaphylaxis. These medications can help relieve allergy symptoms, but work too slowly in a severe reaction to help.

Burns

To distinguish a minor burn from a serious burn, the first step is to determine the extent of damage to body tissues. The three burn classifications of first-degree burn, second-degree burn and third-degree burn will help you determine emergency care:

First-degree burn

The least serious burns are those in which only the outer layer of skin is burned, but not all the way through. The skin is usually red, with swelling, and pain sometimes is present. Treat a first-degree burn as a minor burn unless it involves substantial portions of the hands, feet, face, groin or buttocks, or a major joint, which requires emergency medical attention.

Second-degree burn

When the first layer of skin has been burned through and the second layer of skin (dermis) also is burned, the injury is called a second-degree burn. Blisters develop and the skin takes on an intensely reddened, splotchy appearance. Second-degree burns produce severe pain and swelling.

If the second-degree burn is no larger than 3 inches (7.6 centimeters) in diameter, treat it as a minor burn. If the burned area is larger or if the burn is on the hands, feet, face, groin or buttocks, or over a major joint, treat it as a major burn and get medical help immediately.

Third-degree burn

The most serious burns involve all layers of the skin and cause permanent tissue damage. Fat, muscle and even bone may be affected. Areas may be charred black or appear dry and white. Difficulty inhaling and exhaling, carbon monoxide poisoning, or other toxic effects may occur if smoke inhalation accompanies the burn.

For minor burns, including first-degree burns and second-degree burns limited to an area no larger than 3 inches (7.6 centimeters) in diameter, take the following action:

- **Cool the burn.** Hold the burned area under cool (not cold) running water for 10 or 15 minutes or until the pain subsides. If this is impractical, immerse the burn in cool water or cool it with cold compresses. Cooling the burn reduces swelling by conducting heat away from the skin. Don't put ice on the burn.
- **Cover the burn with a sterile gauze bandage.** Don't use fluffy cotton, or other material that may get lint in the wound. Wrap the gauze loosely to avoid putting pressure on burned skin. Bandaging keeps air off the burn, reduces pain and protects blistered skin.
- **Take an over-the-counter pain reliever.** These include aspirin, ibuprofen (Advil, Motrin, others), naproxen (Aleve) or acetaminophen (Tylenol, others). Use caution when giving aspirin to children or teenagers. Though aspirin is approved for use in children older than age 2, children and teenagers recovering from chickenpox or flu-like symptoms should never take aspirin. Talk to your doctor if you have concerns.

Minor burns usually heal without further treatment. They may heal with pigment changes, meaning the healed area may be a different color from the surrounding skin. Watch for signs of infection, such as increased pain, redness, fever, swelling or oozing. If infection develops, seek medical help. Avoid re-injuring or tanning if the burns are less than a year old — doing so may cause more extensive pigmentation changes. Use sunscreen on the area for at least a year.

Caution

- **Don't use ice.** Putting ice directly on a burn can cause a burn victim's body to become too cold and cause further damage to the wound.
- **Don't apply butter or ointments to the burn.** This could cause infection.
- **Don't break blisters.** Broken blisters are more vulnerable to infection.

For major burns (Third Degree Burns), call 911 or emergency medical help. Until an emergency unit arrives, follow these steps:

1. **Don't remove burned clothing.** However, do make sure the victim is no longer in contact with smoldering materials or exposed to smoke or heat.
2. **Don't immerse large severe burns in cold water.** Doing so could cause a drop in body temperature (hypothermia) and deterioration of blood pressure and circulation (shock).
3. **Check for signs of circulation (breathing, coughing or movement).** If there is no breathing or other sign of circulation, begin CPR.
4. **Elevate the burned body part or parts.** Raise above heart level, when possible.
5. **Cover the area of the burn.** Use a cool, moist, sterile bandage; clean, moist cloth; or moist towels.

Get a tetanus shot. Burns are susceptible to tetanus. Doctors recommend you get a tetanus shot every 10 years. If your last shot was more than five years ago, your doctor may recommend a tetanus shot booster.

Cardiopulmonary Resuscitation (CPR)

Cardiopulmonary resuscitation (CPR) is a lifesaving technique useful in many emergencies, including heart attack or near drowning, in which someone's breathing or heartbeat has stopped. In 2010, the American Heart Association updated its guidelines to recommend that everyone — untrained bystanders and medical personnel alike — begin CPR with chest compressions.

It's far better to do something than to do nothing at all if you're fearful that your knowledge or abilities aren't 100 percent complete. Remember, the difference between you doing something and doing nothing could be someone's life.

Here's advice from the American Heart Association:

- **Untrained.** If you're not trained in CPR, then provide hands-only CPR. That means uninterrupted chest compressions of about 100 a minute until paramedics arrive (described in more detail below). You don't need to try rescue breathing.
- **Trained, and ready to go.** If you're well trained and confident in your ability, begin with chest compressions instead of first checking the airway and doing rescue breathing. Start CPR with 30 chest compressions before checking the airway and giving rescue breaths.
- **Trained, but rusty.** If you've previously received CPR training but you're not confident in your abilities, then just do chest compressions at a rate of about 100 a minute. (Details described below.)

The above advice applies to adults, children and infants needing CPR, but not newborns.

CPR can keep oxygenated blood flowing to the brain and other vital organs until more definitive medical treatment can restore a normal heart rhythm.

When the heart stops, the absence of oxygenated blood can cause irreparable brain damage in only a few minutes. A person may die within eight to 10 minutes.

To learn CPR properly, take an accredited first-aid training course, including CPR and how to use an automatic external defibrillator (AED).

Before you begin

Before starting CPR, check:

- Is the person conscious or unconscious?
- If the person appears unconscious, tap or shake his or her shoulder and ask loudly, "Are you OK?"
- If the person doesn't respond and two people are available, one should call 911 or the local emergency number and one should begin CPR. If you are alone and have immediate access to a telephone, call 911 before beginning CPR — unless you think the person has become unresponsive because of suffocation (such as from drowning). In this special case, begin CPR for one minute and then call 911 or the local emergency number.
- If an AED is immediately available, deliver one shock if instructed by the device, then begin CPR.

Remember to spell C-A-B

In 2010, the American Heart Association changed its long-held acronym of ABC to CAB — circulation, airway, breathing — to help people remember the order to perform the steps of CPR. This change emphasizes the importance of chest compressions to help keep blood flowing through the heart and to the brain.

Circulation: Restore blood circulation with chest compressions

1. Put the person on his or her back on a firm surface.
2. Kneel next to the person's neck and shoulders.
3. Place the heel of one hand over the center of the person's chest, between the nipples. Place your other hand on top of the first hand. Keep your elbows straight and position your shoulders directly above your hands.
4. Use your upper body weight (not just your arms) as you push straight down on (compress) the chest at least 2 inches (approximately 5 centimeters). Push hard at a rate of about 100 compressions a minute.
5. If you haven't been trained in CPR, continue chest compressions until there are signs of movement or until emergency medical personnel take over. If you have been trained in CPR, go on to checking the airway and rescue breathing.

Airway: Clear the airway

1. If you're trained in CPR and you've performed 30 chest compressions, open the person's airway using the head-tilt, chin-lift maneuver. Put your palm on the person's forehead and gently tilt the head back. Then with the other hand, gently lift the chin forward to open the airway.
2. Check for normal breathing, taking no more than five or 10 seconds. Look for chest motion, listen for normal breath sounds, and feel for the person's breath on your cheek and ear. Gaspings is not considered to be normal breathing. If the person isn't breathing normally and you are trained in CPR, begin mouth-to-mouth breathing. If you believe the person is unconscious from a heart attack and you haven't been trained in emergency procedures, skip mouth-to-mouth rescue breathing and continue chest compressions.

Breathing: Breathe for the person

Rescue breathing can be mouth-to-mouth breathing or mouth-to-nose breathing if the mouth is seriously injured or can't be opened.

1. With the airway open (using the head-tilt, chin-lift maneuver), pinch the nostrils shut for mouth-to-mouth breathing and cover the person's mouth with yours, making a seal.
2. Prepare to give two rescue breaths. Give the first rescue breath — lasting one second — and watch to see if the chest rises. If it does rise, give the second breath. If the chest doesn't rise, repeat the head-tilt, chin-lift maneuver and then give the second breath. Thirty chest compressions followed by two rescue breaths is considered one cycle.
3. Resume chest compressions to restore circulation.
4. If the person has not begun moving after five cycles (about two minutes) and an automatic external defibrillator (AED) is available, apply it and follow the prompts. Administer one shock, then resume CPR — starting with chest compressions — for two more minutes before administering a second shock. If you're not trained to use an AED, a 911 operator may be able to guide you in its use. Use pediatric pads, if available, for children ages 1 through 8. Do not use an AED for babies younger than age 1. If an AED isn't available, go to step 5 below.
5. Continue CPR until there are signs of movement or emergency medical personnel take over.

To perform CPR on a child

The procedure for giving CPR to a child age 1 through 8 is essentially the same as that for an adult. The differences are as follows:

- If you're alone, perform five cycles of compressions and breaths on the child — this should take about two minutes — before calling 911 or your local emergency number or using an AED.
- Use only one hand to perform heart compressions.
- Breathe more gently.
- Use the same compression-breath rate as is used for adults: 30 compressions followed by two breaths. This is one cycle. Following the two breaths, immediately begin the next cycle of compressions and breaths.
- After five cycles (about two minutes) of CPR, if there is no response and an AED is available, apply it and follow the prompts. Use pediatric pads if available. If pediatric pads aren't available, use adult pads.

Continue until the child moves or help arrives.

To perform CPR on a baby

Most cardiac arrests in babies occur from lack of oxygen, such as from drowning or choking. If you know the baby has an airway obstruction, perform first aid for choking. If you don't know why the baby isn't breathing, perform CPR.

To begin, examine the situation. Stroke the baby and watch for a response, such as movement, but don't shake the baby.

If there's no response, follow the CAB procedures below and time the call for help as follows:

- If you're the only rescuer and CPR is needed, do CPR for two minutes — about five cycles — before calling 911 or your local emergency number.
- If another person is available, have that person call for help immediately while you attend to the baby.

Circulation: Restore blood circulation

1. Place the baby on his or her back on a firm, flat surface, such as a table. The floor or ground also will do.
2. Imagine a horizontal line drawn between the baby's nipples. Place two fingers of one hand just below this line, in the center of the chest.
3. Gently compress the chest about 1.5 inches (about 4 cm).
4. Count aloud as you pump in a fairly rapid rhythm. You should pump at a rate of 100 compressions a minute.

Airway: Clear the airway

1. After 30 compressions, gently tip the head back by lifting the chin with one hand and pushing down on the forehead with the other hand.
2. In no more than 10 seconds, put your ear near the baby's mouth and check for breathing: Look for chest motion, listen for breath sounds, and feel for breath on your cheek and ear.

Breathing: Breathe for the infant

1. Cover the baby's mouth and nose with your mouth.
2. Prepare to give two rescue breaths. Use the strength of your cheeks to deliver gentle puffs of air (instead of deep breaths from your lungs) to slowly breathe into the baby's mouth one time, taking one second for the breath. Watch to see if the baby's chest rises. If it does, give a second rescue breath. If the chest does not rise, repeat the head-tilt, chin-lift maneuver and then give the second breath.
3. If the baby's chest still doesn't rise, examine the mouth to make sure no foreign material is inside. If the object is seen, sweep it out with your finger. If the airway seems blocked, perform first aid for a choking baby.
4. Give two breaths after every 30 chest compressions.
5. Perform CPR for about two minutes before calling for help unless someone else can make the call while you attend to the baby.

Continue CPR until you see signs of life or until medical personnel arrive.

Chemical Burns

If a chemical burns the skin, follow these steps:

1. **Remove the cause of the burn** by first brushing any remaining dry chemical and then rinsing the chemical off the skin surface with cool, gently running water for 20 minutes or more.
2. **Remove clothing or jewelry** that has been contaminated by the chemical.
3. **Wrap the burned area loosely** with a dry, sterile dressing or a clean cloth.
4. **Rewash the burned area** for several more minutes if the person experiences increased burning after the initial washing.
5. **Take an over-the-counter pain reliever.** These include aspirin, ibuprofen (Advil, Motrin, others), naproxen (Aleve) or acetaminophen (Tylenol, others). Use caution when giving aspirin to children or teenagers. Though aspirin is approved for use in children older than age 2, children and teenagers recovering from chickenpox or flu-like symptoms should never take aspirin. Talk to your doctor if you have concerns.

Get a tetanus shot. All burns are susceptible to tetanus. Doctors recommend you get a tetanus shot every 10 years. If your last shot was more than five years ago, your doctor may recommend a tetanus shot booster.

Minor chemical burns usually heal without further treatment.

Seek emergency medical assistance if:

- The person shows signs of shock, such as fainting, pale complexion or breathing in a notably shallow manner.
- The chemical burn penetrated through the first layer of skin, and the resulting second-degree burn covers an area more than 3 inches (7.6 centimeters) in diameter.
- The chemical burn occurred on the eye, hands, feet, face, groin or buttocks, or over a major joint.
- The person has pain that cannot be controlled with over-the-counter pain relievers.

If you're unsure whether a substance is toxic, call the poison control center at 800-222-1222. If you seek emergency assistance, take the chemical container or a complete description of the substance with you for identification.

Chemical Splash in Eye

If a chemical splashes into your eye, take these steps immediately:

Flush your eye with water. Use clean, lukewarm tap water for at least 20 minutes, and use whichever of these approaches is quickest:

- Get into the shower and aim a gentle stream of lukewarm water on your forehead over your affected eye. Or direct the stream on the bridge of your nose if both eyes are affected. Hold your affected eye or eyes open.
- Put your head down and turn it to the side. Then hold your affected eye open under a gently running faucet.
- Young children may do best if they lie down in the bathtub or lean back over a sink while you pour a gentle stream of water on the forehead over the affected eye or on the bridge of the nose for both eyes.

Wash your hands with soap and water. Thoroughly rinse your hands to be sure no chemical or soap is left on them. Your first goal is to get the chemical off the surface of your eye, but then you must remove the chemical from your hands.

Remove contact lenses. If they don't come out during the flush, then take them out.

Caution:

- Don't rub the eye — this may cause further damage.
- Don't put anything except water or contact lens saline rinse in the eye, and don't use eye-drops unless emergency personnel tell you to do so.

Seek emergency medical assistance

After following the above steps, seek emergency care or, if necessary, call 911 or your local emergency number. Take the chemical container or the name of the chemical with you to the emergency department. If readily available, wear sunglasses because your eyes will be sensitive to light.

Corneal Abrasion

The most common types of eye injury involve the cornea — the clear, protective "window" at the front of your eye. Contact with dust, dirt, sand, wood shavings, metal particles or even an edge of a piece of paper can scratch or cut the cornea. Usually the scratch is superficial, and this is called a corneal abrasion. Some corneal abrasions become infected and result in a corneal ulcer, which is a serious problem. Corneal abrasions caused by plant matter (such as a pine needle) can cause a delayed inflammation inside the eye (iritis).

Corneal abrasions can be painful. If your cornea is scratched, you might feel like you have sand in your eye. Tears, blurred vision, increased sensitivity or redness around the eye can suggest a corneal abrasion. You may get a headache.

In case of corneal abrasion, seek prompt medical attention. Other immediate steps you can take for a corneal abrasion are to:

- **Rinse your eye with clean water (use a saline solution, if available).** You can use an eyecup or small, clean drinking glass positioned with its rim resting on the bone at the base of your eye socket. If your work site has an eye-rinse station, use it. Rinsing the eye may wash out a foreign object.
- **Blink several times.** This movement may remove small particles of dust or sand.
- **Pull the upper eyelid over the lower eyelid.** The lashes of your lower eyelid can brush a foreign object from the undersurface of your upper eyelid.
- Take caution to avoid certain actions that may aggravate the injury:
- **Don't try to remove an object** that's embedded in your eyeball. Also avoid trying to remove a large object that makes closing the eye difficult.
- **Don't rub your eye after an injury.** Touching or pressing on your eye can worsen a corneal abrasion.
- **Don't touch your eyeball** with cotton swabs, tweezers or other instruments. This can aggravate a corneal abrasion.

Cuts and Scrapes

Minor cuts and scrapes usually don't require a trip to the emergency room. Yet proper care is essential to avoid infection or other complications. These guidelines can help you care for simple wounds:

1. **Stop the bleeding.** Minor cuts and scrapes usually stop bleeding on their own. If they don't, apply gentle pressure with a clean cloth or bandage. Hold the pressure continuously for 20 to 30 minutes and if possible elevate the wound. Don't keep checking to see if the bleeding has stopped because this may damage or dislodge the clot that's forming and cause bleeding to resume. If blood spurts or continues flowing after continuous pressure, seek medical assistance.
2. **Clean the wound.** Rinse out the wound with clear water. Soap can irritate the wound, so try to keep it out of the actual wound. If dirt or debris remains in the wound after washing, use tweezers cleaned with alcohol to remove the particles. If debris still remains, see your doctor. Thorough cleaning reduces the risk of infection and tetanus. To clean the area around the wound, use soap and a washcloth. There's no need to use hydrogen peroxide, iodine or an iodine-containing cleanser.
3. **Apply an antibiotic.** After you clean the wound, apply a thin layer of an antibiotic cream or ointment such as Neosporin or Polysporin to help keep the surface moist. The products don't make the wound heal faster, but they can discourage infection and help your body's natural healing process. Certain ingredients in some ointments can cause a mild rash in some people. If a rash appears, stop using the ointment.
4. **Cover the wound.** Bandages can help keep the wound clean and keep harmful bacteria out. After the wound has healed enough to make infection unlikely, exposure to the air will speed wound healing.
5. **Change the dressing.** Change the dressing at least daily or whenever it becomes wet or dirty. If you're allergic to the adhesive used in most bandages, switch to adhesive-free dressings or sterile gauze held in place with paper tape, gauze roll or a loosely applied elastic bandage. These supplies generally are available at pharmacies.
6. **Get stitches for deep wounds.** A wound that is more than 1/4-inch (6 millimeters) deep, gaping, jagged edged and has fat, or muscle protruding usually requires stitches. Adhesive strips or butterfly tape may hold a minor cut together, but if you can't easily close the wound, see your doctor as soon as possible. Proper closure within a few hours reduces the risk of infection.
7. **Watch for signs of infection.** See your doctor if the wound isn't healing or you notice any redness, increasing pain, drainage, warmth or swelling.
8. **Get a tetanus shot.** Doctors recommend you get a tetanus shot every 10 years. If your wound is deep or dirty and your last shot was more than five years ago, your doctor may recommend a tetanus shot booster. Get the booster as soon as possible after the injury.

Dislocation

A dislocation is an injury in which the ends of your bones are forced from their normal positions. The cause is usually trauma, such as a blow or fall, but dislocation can be caused by an underlying disease, such as rheumatoid arthritis.

Dislocations are common injuries in contact sports, such as football and hockey, and in sports that may involve falls, such as downhill skiing and volleyball. Dislocations may occur in major joints, such as your shoulder, hip, knee, elbow or ankle or in smaller joints, such as your finger, thumb or toe.

The injury will temporarily deform and immobilize your joint and may result in sudden and severe pain and swelling. A dislocation requires prompt medical attention to return your bones to their proper positions.

If you believe you have dislocated a joint:

1. **Don't delay medical care.** Get medical help immediately.
2. **Don't move the joint.** Until you receive help, splint the affected joint into its fixed position. Don't try to move a dislocated joint or force it back into place. This can damage the joint and its surrounding muscles, ligaments, nerves or blood vessels.

Put ice on the injured joint. This can help reduce swelling by controlling internal bleeding and the buildup of fluids in and around the injured joint.

Electrical Burns

An electrical burn may appear minor or not show on the skin at all, but the damage can extend deep into the tissues beneath your skin. If a strong electrical current passes through your body, internal damage, such as a heart rhythm disturbance or cardiac arrest, can occur. Sometimes the jolt associated with the electrical burn can cause you to be thrown or to fall, resulting in fractures or other associated injuries.

Call 911 or your local emergency number for assistance if the person who has been burned is in pain, is confused, or is experiencing changes in his or her breathing, heartbeat or consciousness.

While helping someone with an electrical burn and waiting for medical help, follow these steps:

1. **Look first. Don't touch.** The person may still be in contact with the electrical source. Touching the person may pass the current through you.
2. **Turn off the source of electricity if possible.** If not, move the source away from both you and the injured person using a dry, non-conducting object made of cardboard, plastic or wood.
3. **Check for signs of circulation (breathing, coughing or movement).** If absent, begin cardiopulmonary resuscitation (CPR) immediately.
4. **Prevent shock.** Lay the person down with the head slightly lower than the trunk, if possible, and the legs elevated.
5. **Cover the affected areas.** If the person is breathing, cover any burned areas with a sterile gauze bandage, if available, or a clean cloth. Don't use a blanket or towel, because loose fibers can stick to the burns.

Electrical Shock

The danger from an electrical shock depends on the type of current, how high the voltage is, how the current traveled through the body, the person's overall health and how quickly the person is treated.

Call 911 or your local emergency number immediately if any of these signs or symptoms occurs:

- Cardiac arrest
- Heart rhythm problems (arrhythmias)
- Respiratory failure
- Muscle pain and contractions
- Burns
- Seizures
- Numbness and tingling
- Unconsciousness

While waiting for medical help, follow these steps:

1. **Look first. Don't touch.** The person may still be in contact with the electrical source. Touching the person may pass the current through you.
2. **Turn off the source of electricity, if possible.** If not, move the source away from you and the person, using a non-conducting object made of cardboard, plastic or wood.
3. **Check for signs of circulation (breathing, coughing or movement).** If absent, begin cardiopulmonary resuscitation (CPR) immediately.
4. **Prevent shock.** Lay the person down and, if possible, position the head slightly lower than the trunk, with the legs elevated.

After coming into contact with electricity, the person should see a doctor to check for internal injuries, even if he or she has no obvious signs or symptoms.

Caution:

- **Don't touch the person with your bare hands** if he or she is still in contact with the electrical current.
- **Don't get near high-voltage wires** until the power is turned off. Stay at least 20 feet away — farther if wires are jumping and sparking.
- **Don't move a person** with an electrical injury unless the person is in immediate danger.

Fractures

A fracture is a broken bone. It requires medical attention. If the broken bone is the result of major trauma or injury, call 911 or your local emergency number. Also call for emergency help if:

- The person is unresponsive, isn't breathing or isn't moving. Begin cardiopulmonary resuscitation (CPR) if there's no respiration or heartbeat.
- There is heavy bleeding.
- Even gentle pressure or movement causes pain.
- The limb or joint appears deformed.
- The bone has pierced the skin.
- The extremity of the injured arm or leg, such as a toe or finger, is numb or bluish at the tip.
- You suspect a bone is broken in the neck, head or back.
- You suspect a bone is broken in the hip, pelvis or upper leg (for example, the leg and foot turn outward abnormally).

Don't move the person except if necessary to avoid further injury. Take these actions immediately while waiting for medical help:

- **Stop any bleeding.** Apply pressure to the wound with a sterile bandage, a clean cloth or a clean piece of clothing.
- **Immobilize the injured area.** Don't try to realign the bone or push a bone that's sticking out back in. If you've been trained in how to splint and professional help isn't readily available, apply a splint to the area above and below the fracture sites. Padding the splints can help reduce discomfort.
- **Apply ice packs to limit swelling and help relieve pain until emergency personnel arrive.** Don't apply ice directly to the skin — wrap the ice in a towel, piece of cloth or some other material.

Treat for shock. If the person feels faint or is breathing in short, rapid breaths lay the person down with the head slightly lower than the trunk and, if possible, elevate the legs.

Nose Bleeds

To take care of a nosebleed:

- **Sit upright and lean forward.** By remaining upright, you reduce blood pressure in the veins of your nose. This discourages further bleeding. Sitting forward will help you avoid swallowing blood, which can irritate your stomach.
- **Pinch your nose.** Use your thumb and index finger to pinch your nostrils shut. Breathe through your mouth. Continue to pinch for five to 10 minutes. This maneuver sends pressure to the bleeding point on the nasal septum and often stops the flow of blood.
- **To prevent re-bleeding after bleeding has stopped,** don't pick or blow your nose and don't bend down until several hours after the bleeding episode. Keep your head higher than the level of your heart.
- **If re-bleeding occurs,** blow out forcefully to clear your nose of blood clots and spray both sides of your nose with a decongestant nasal spray containing oxymetazoline (Afrin, others). Pinch your nose in the technique described above and call your doctor.

Seek medical care immediately if:

- The bleeding lasts for more than 20 minutes
- The nosebleed follows an accident, a fall or an injury to your head, including a punch in the face that may have broken your nose

For frequent nosebleeds

If you experience frequent nosebleeds, make an appointment with your doctor. You may need a blood vessel cauterized. Cautery is a technique in which the blood vessel is burned with electric current, silver nitrate or a laser. Sometimes your doctor may pack your nose with special gauze or an inflatable latex balloon to put pressure on the blood vessel and stop the bleeding.

Also call your doctor if you are experiencing nasal bleeding and are taking blood thinners, such as aspirin or warfarin (Coumadin). Your doctor may advise adjusting your medication intake.

Using supplemental oxygen administered with a nasal tube (cannula) may increase your risk of nosebleeds. Apply a water-based lubricant to your nostrils and increase the humidity in your home to help relieve nasal bleeding.

Puncture Wounds

A puncture wound doesn't usually cause excessive bleeding. Often the wound seems to close almost instantly. But these features don't mean treatment isn't necessary.

A puncture wound — such as from stepping on a nail — can be dangerous because of the risk of infection. The object that caused the wound may carry spores of tetanus or other bacteria, especially if the object has been exposed to the soil. Puncture wounds resulting from human or animal bites, including those of domestic dogs and cats, may be especially prone to infection. Puncture wounds on the foot also are more vulnerable to infection.

If the bite was deep enough to draw blood and the bleeding persists, seek medical attention. Otherwise, follow these steps:

1. **Stop the bleeding.** Minor cuts and scrapes usually stop bleeding on their own. If they don't, apply gentle pressure with a clean cloth or bandage. If bleeding persists — if the blood spurts or continues to flow after several minutes of pressure — seek emergency assistance.
2. **Clean the wound.** Rinse the wound well with clear water. Use tweezers cleaned with alcohol to remove small, superficial particles. If debris still remains in the wound, see your doctor. Thorough wound cleaning reduces the risk of tetanus. To clean the area around the wound, use soap and a clean cloth.
3. **Apply an antibiotic.** After you clean the wound, apply a thin layer of an antibiotic cream or ointment such as Neosporin or Polysporin to help keep the surface moist. These products don't make the wound heal faster, but they can discourage infection and allow your body to close the wound more efficiently. Certain ingredients in some ointments can cause a mild rash in some people. If a rash appears, stop using the ointment.
4. **Cover the wound.** Exposure to air speeds healing, but bandages can help keep the wound clean and keep harmful bacteria out.
5. **Change the dressing.** Do so at least daily or whenever it becomes wet or dirty. If you're allergic to the adhesive used in most bandages, switch to adhesive-free dressings or sterile gauze and hypoallergenic paper tape, which don't cause allergic reactions. These supplies are generally available at pharmacies.
6. **Watch for signs of infection.** See your doctor if the wound doesn't heal or if you notice any redness, drainage, warmth or swelling.

If the puncture is deep, is in your foot, is contaminated or is the result of an animal or human bite, see your doctor. He or she will evaluate the wound, clean it and, if necessary, close it. If you haven't had a tetanus shot within five years, your doctor may recommend a booster within 48 hours of the injury.

Severe Bleeding

If possible, before you try to stop severe bleeding, wash your hands to avoid infection and put on synthetic gloves. Don't reposition displaced organs. If the wound is abdominal and organs have been displaced, don't try to push them back into place — cover the wound with a dressing.

For other cases of severe bleeding, follow these steps:

1. **Have the injured person lie down and cover the person to prevent loss of body heat.** If possible, position the person's head slightly lower than the trunk or elevate the legs. This position reduces the risk of fainting by increasing blood flow to the brain. If possible, elevate the site of bleeding.
2. **While wearing gloves, remove any obvious dirt or debris from the wound.** Don't remove any large or more deeply embedded objects. Don't probe the wound or attempt to clean it at this point. Your principal concern is to stop the bleeding.
3. **Apply pressure directly on the wound until the bleeding stops.** Use a sterile bandage or clean cloth and hold continuous pressure for at least 20 minutes without looking to see if the bleeding has stopped. Maintain pressure by binding the wound tightly with a bandage (or a piece of clean cloth) and adhesive tape. Use your hands if nothing else is available. If possible, wear rubber or latex gloves or use a clean plastic bag for protection.
4. **Don't remove the gauze or bandage.** If the bleeding continues and seeps through the gauze or other material you are holding on the wound, don't remove it. Instead, add more absorbent material on top of it.
5. **Squeeze a main artery if necessary.** If the bleeding doesn't stop with direct pressure, apply pressure to the artery delivering blood to the area of the wound. Pressure points of the arm are on the inside of the arm just above the elbow and just below the armpit. Pressure points of the leg are just behind the knee and in the groin. Squeeze the main artery in these areas against the bone. Keep your fingers flat. With your other hand, continue to exert pressure on the wound itself.
6. **Immobilize the injured body part once the bleeding has stopped.** Leave the bandages in place and get the injured person to the emergency room as soon as possible.

If you suspect internal bleeding, call 911 or your local emergency number. Signs of internal bleeding may include:

- Bleeding from body cavities, such as the ears, nose, rectum or vagina
- Vomiting or coughing up blood
- Bruising on neck, chest, abdomen or side (between ribs and hip)
- Wounds that have penetrated the skull, chest or abdomen
- Abdominal tenderness, possibly accompanied by rigidity or spasm of abdominal muscles
- Fractures
- Shock, indicated by weakness, anxiety, thirst or skin that's cool to the touch

Spinal Injury

If you suspect a back or neck (spinal) injury, do not move the affected person. Permanent paralysis and other serious complications can result. Assume a person has a spinal injury if:

- There's evidence of a head injury with an ongoing change in the person's level of consciousness.
- The person complains of severe pain in his or her neck or back.
- The person won't move his or her neck.
- An injury has exerted substantial force on the back or head.
- The person complains of weakness, numbness or paralysis or lacks control of his or her limbs, bladder or bowels.
- The neck or back is twisted or positioned oddly.

If you suspect someone has a spinal injury:

- Call 911 or emergency medical help.
- Keep the person still. Place heavy towels on both sides of the neck or hold the head and neck to prevent movement. The goal of first aid for a spinal injury is to keep the person in much the same position as he or she was found.
- Provide as much first aid as possible without moving the person's head or neck. If the person shows no signs of circulation (breathing, coughing or movement), begin CPR, but do not tilt the head back to open the airway. Use your fingers to gently grasp the jaw and lift it forward. If the person has no pulse, begin chest compressions.
- If the person is wearing a helmet, don't remove it.

If you absolutely must roll the person because he or she is vomiting, choking on blood or in danger of further injury, you need at least one other person. With one of you at the head and another along the side of the injured person, work together to keep the person's head, neck and back aligned while rolling the person onto one side.

Sprain

Of all sprains, ankle and knee sprains occur most often. Sprained ligaments swell rapidly and are painful. Generally, the greater the pain, the more severe the injury is. For most minor sprains, you probably can treat the injury yourself.

Follow the instructions for P.R.I.C.E.

1. **Protect** the injured limb from further injury by not using the joint. You can do this using anything from splints to crutches.
2. **Rest** the injured limb. But don't avoid all activity. Even with an ankle sprain, you can usually still exercise other muscles to minimize deconditioning. For example, you can use an exercise bicycle with arm exercise handles, working both your arms and the uninjured leg while resting the injured ankle on another part of the bike. That way you still get three-limb exercise to keep up your cardiovascular conditioning.
3. **Ice** the area. Use a cold pack, a slush bath or a compression sleeve filled with cold water to help limit swelling after an injury. Try to ice the area as soon as possible after the injury and continue to ice it for 10 to 15 minutes four times a day for 48 hours. If you use ice, be careful not to use it too long, as this could cause tissue damage.
4. **Compress** the area with an elastic wrap or bandage. Compressive wraps or sleeves made from elastic or neoprene are best.
5. **Elevate** the injured limb above your heart whenever possible to help prevent or limit swelling.

After two days, gently begin using the injured area. You should feel a gradual, progressive improvement. Over-the-counter pain relievers, such as ibuprofen (Advil, Motrin, others) and acetaminophen (Tylenol, others), may be helpful to manage pain during the healing process. See your doctor if your sprain isn't improving after two or three days.

Get emergency medical assistance if:

- You're unable to bear weight on the injured leg, the joint feels unstable or you can't use the joint. This may mean the ligament was completely torn. On the way to the doctor, apply a cold pack.
- You have a fever higher than 100 F (37.8 C), and the area is red and hot. You may have an infection. You have a severe sprain. Inadequate or delayed treatment may cause long-term joint instability or chronic pain.

Pit Safety

Proper Pit Procedures

- Have a strong, structurally sound pit.
- Use caution when assembling and dismantling the pit in order to avoid accidents.
- Keep the amounts of people occupying the pit low in order to minimize the chances of an accident occurring.
- Always keep a clean pit.
- When using power tools in the pit, always use the proper procedures.
- Keep all safety equipment ready and available in case of an accident. (see below)
- When using ladders, always make sure that a spotter is present.
- Store heavy objects on the lowest shelves or the floor, if possible.
- Make sure that all walkways are clear.
- When working within the pit, be cautious of any pinch points on the shelves or the robot.
- Keep all food and drinks out of the pit.
- To avoid hazards, keep all tools disengaged while they are not in use.
- Eliminate fire hazards by removing them from the pit (ideal), or keeping potential fire hazard tools clearly marked and monitored at all times.
- Always use caution when moving about the pit.

Pit Safety Equipment

- First Aid Kit
- Fire Extinguisher/Fire Blanket
- Baking Soda
- Extra Safety Glasses
- Eye Wash
- Gloves
- Knee Pads
- Ear Plugs

Portable drills

Safety Rules:

Corded Drills

1. Always disconnect the power from the drill before changing the bits or tightening the chuck.
2. Always remove the chuck key after installing the drill bit.
3. Clamp down small pieces of stock. Do not hold the stock by hand.
4. Grip the drill with both hands to maintain control.
5. Keep the cord clear of the bit drilling area.
6. Keep fingers and loose clothing away from the drill bit.

Cordless Drills

1. Clamp down small pieces of stock. Do not hold the stock by hand.
2. Grip the drill with both hands to maintain control.
3. Keep the cord clear of the bit drilling area.
4. Keep fingers and loose clothing away from the drill bit.

Terms and parts to know

1. Pistol grip handle
2. On off switch
3. Power lock
4. Chuck
5. Chuck keyhole
6. Forward reverse switch
7. Battery/ power cord.

Set Up Your Own Safety Manual

A safety Manual should Include:

- First Aid
- Shop Safety
- Rules for Tools
- Examples of Proper Procedures
- List of Safety Equipment
- Material safety Data Sheets
- Emergency Plan for Shop Area
- Procedures for Common Injuries

Emergency Contact Sheet

Name	Telephone Number
Local Emergency	911
Poison Control	1-800-222-1222

We thank...

- Mentors
- Coaches
- Safety Captains
- Students
- Safe-Practicing Teams
- Judges
- Medical Advisors

First Aid Recommendations:

Mayo Clinic Staff Writers, Mayo Clinic,

<http://www.mayoclinic.com/health/FirstAidIndex/FirstAidIndex>