

Head and Spinal Injuries

12

Head Injuries

Any head injury is potentially serious. If not properly treated, injuries that seem minor could become life threatening. Head injuries include scalp wounds, skull fractures, and brain injuries. Spinal injuries (that is, neck and back injuries) can also be present in people with a head injury.

▶ Scalp Wounds

Scalp wounds bleed profusely because the scalp has many blood vessels. A bleeding scalp wound does not affect the blood supply to the brain. The brain obtains its blood supply from arteries in the neck, not the scalp. A concussion, skull fracture, impaled object, brain injury, or spinal injury may accompany a severe scalp wound.

Chapter at a glance

- ▶ **Head Injuries**
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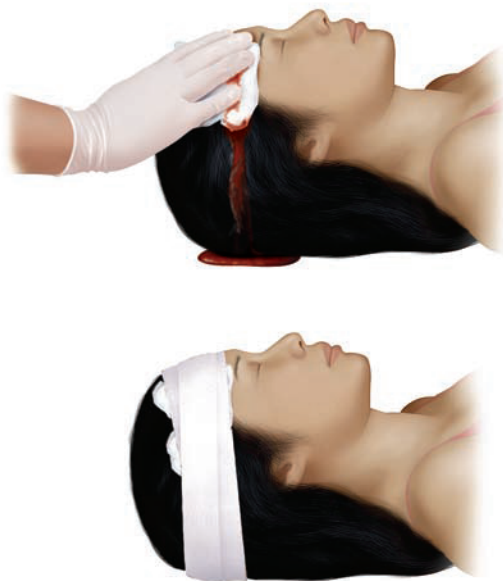
What to Look For

Scalp wound

What to Do

1. Control bleeding by pressing on the wound **Figure 12-1**. Replace any skin flap to its original position and apply pressure. Another option is applying an ice pack or instant cold pack to control bleeding.
2. If you suspect a skull fracture, **DO NOT** apply excessive pressure; doing so may push bone pieces into the brain. Press on the edges of the wound to help control bleeding **Figure 12-2**.
3. Apply a dry, sterile or clean dressing.
4. Keep the head and shoulders raised if no spinal injury is suspected.
5. If bleeding continues, **DO NOT** remove the first blood-soaked dressing; instead, add another dressing over it.
6. Call 9-1-1 if the following occur:
 - The wound is extensive.
 - There is significant facial damage.
 - Signs of concussion occur (eg, nausea and vomiting, headache, drowsiness).

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**Figure 12-1**

Apply direct pressure with a dry, sterile dressing to control the bleeding.

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**Figure 12-2**

Apply pressure around the edges of the wound to control bleeding from a suspected skull fracture.

► Skull Fracture

A **skull fracture** is a break or a crack in the cranium (bony case surrounding the brain). Skull fractures may be open (with an accompanying scalp laceration) or closed (without an accompanying scalp laceration).

What to Look For

- Pain
- Skull deformity
- Bleeding from an ear or the nose
- Leakage of **cerebrospinal fluid (CSF)** (clear or pink-tinged, watery fluid from an ear or the nose)
- Discoloration around the eyes **Figure 12-3** or behind the ears, known as **Battle sign** **Figure 12-4**, that appears several hours after the injury
- Unequal-sized pupils of the eye
- Heavy scalp bleeding (skull and/or brain tissue may be exposed)
- Penetrating or impaled object

What to Do

1. Apply a sterile or clean dressing over the wound and hold it in place with gentle pressure. Harder pressure can be applied on the edges of the wound to avoid pressing bone pieces into the brain.
2. Control bleeding by pressing on the edges of the wound and gently on the center of it. A doughnut-shaped pad is useful in applying pressure around the edges of a suspected skull fracture **Figure 12-5**.
3. Call 9-1-1.



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Figure 12-3

Discoloration around the eyes.



Courtesy of Rhonda Hunt.

Figure 12-4

Battle sign.



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A

Figure 12-5



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B



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C

Make a doughnut for skull fracture-related bleeding and to surround an eye for protection when a short object is embedded in an eye. **A.** Using a cravat bandage or strip of cloth, wrap about half the length into a circle large enough to surround the injured area. **B.** Pass the tail through the hole repeatedly to form a circle. **C.** The completed dressing should have a hole large enough to surround the injury.

CAUTION

DO NOT stop the flow of blood or CSF from an ear or nose. Blocking the flow could increase pressure within the skull.

DO NOT remove an impaled object from the head. Stabilize it in place with bulky dressings.

DO NOT clean an open skull fracture; infection of the brain could result.

DO NOT press on the fractured area.

► Traumatic Brain Injuries

It is not injury to the head, per se, that causes most short- and long-term conditions, but injuries to the brain itself. Most head injuries are a result of motor vehicle crashes, sports injuries, and falls. Many of these injuries are minor—shallow lacerations or localized bruising and swelling. However, according to the Centers for Disease Control and Prevention (CDC), over 50,000 people die each year in the United States from head trauma, and twice that many have brain injuries that leave them with permanent damage.

The brain is a delicate organ. When the head is struck with sufficient force, the brain bounces against the inside of the skull. Brain injuries can be serious and difficult first aid emergencies to handle. The person is often confused or unresponsive, making assessment difficult. Many brain injuries are life threatening. Mishandling a person with a brain injury could result in permanent damage or death.

The brain, like other body tissues, will swell from bleeding when it is injured. Unlike other tissues, however, the brain is confined in the skull, where there is little room for swelling. Any swelling of brain tissue or accumulation of blood inside the skull compresses the brain and increases the pressure inside the skull, which interferes with brain functioning. Furthermore, because the skull is hard, the brain and its surface blood vessels may be damaged if they strike the inside of the skull, which can occur when the head is struck directly or is rapidly accelerated or decelerated (such as in a vehicle crash). The phenomenon of a person “seeing stars” when struck on the back of the head results because the occipital lobe of the brain (the part that controls vision) strikes the back of the skull.

The nerve cells of the brain and the spinal cord, unlike most other cells in the body, are unable to regenerate. When those cells die, they are lost forever and cannot be replaced. Injuries to the brain can be caused

by a penetrating foreign object, by bony fragments from a skull fracture, or by the brain striking the inside of the skull after a person’s head has hit a stationary object (such as the ground)—a deceleration injury—or has been hit by something like a baseball bat or a teammate’s knee—an acceleration injury. Sometimes there will be two points of injury: one at the point of impact and one where the brain rebounds off the skull on the opposite side.

All brain injuries are unique. The brain can sustain several types of injuries depending on the type and amount of force that impacts the head. The type of injury may affect just one functional area of the brain, various areas, or even the entire brain.

The following sections on traumatic brain injury are adapted from the Centers for Disease Control and Prevention.

Concussion

A **concussion** is considered a mild traumatic brain injury (MTBI) and occurs when a blow to the head alters the function of the brain **Table 12-1**.

Recovery from a concussion can last anywhere from several minutes to days, weeks, months, or even longer. Children, adolescents, and older adults tend to take longer to recover than do adults. A person with a concussion who has experienced previous concussions may need increased recovery time as well. Although most people with a concussion make a full recovery, it is possible for people to experience postconcussion syndrome, in which concussion symptoms last longer than 3 months.

FYI**Suspect a Concussion (MTBI)**

- High-speed activities (motor vehicle crashes, bicycle riding, skateboarding)
- Sports and recreation activities
- Falls (including those among older adults), especially from a significant distance (eg, off a ladder, from a tree)
- Suspected child maltreatment (eg, shaking, hitting, throwing)
- Exposure to blasts (including military personnel returning from war zones)
- Injuries to the external parts of the head and/or scalp (eg, lacerations) and orthopedic injuries (eg, fractures, dislocations)

Source: Centers for Disease Control and Prevention, US Department of Health and Human Services. Heads Up: Facts for Physicians About Mild Traumatic Brain Injury (MTBI). http://www.brainlineilitary.org/concussion_course/course_content/pdfs/mtbi.pdf.

Table 12-1 Symptoms of Concussion or MTBI

Thinking/ Remembering	Physical	Emotional/ Mood	Sleep Disturbance
<ul style="list-style-type: none"> • Difficulty thinking clearly • Feeling slowed down • Difficulty concentrating • Difficulty remembering new information 	<ul style="list-style-type: none"> • Headache • Nausea or vomiting (early on) • Balance problems • Dizziness • Fuzzy or blurry vision • Feeling tired, having no energy • Sensitivity to noise or light 	<ul style="list-style-type: none"> • Irritability • Sadness • More emotional • Nervousness or anxiety 	<ul style="list-style-type: none"> • Sleeping more than usual • Sleeping less than usual • Trouble falling asleep

Source: Data from Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Other Traumatic Brain Injuries

Other types of traumatic brain injuries include the following:

- **Contusion.** A direct blow to the head can cause a bruise to the brain.
- **Coup-contrecoup.** In this injury, a blow to the head is strong enough to cause a contusion at the site of impact, as well as move the brain, causing it to hit the opposite side of the skull. This second hit causes a second contusion.
- **Diffuse axonal.** Shaking or strong rotation of the head causes this tearing injury. One example of diffuse axonal injury is shaken baby syndrome.
- **Penetration.** In this injury, an object such as a bullet, knife, or other sharp object enters the

brain. The wound is then contaminated by hair, skin, bone, and pieces of the penetrating object. These contaminants may not be retrievable.

Q&A

How does blunt head trauma cause death?

Blunt trauma can cause bleeding into or around the brain, or can lead to swelling of the brain (called edema). The skull is a rigid capsule that protects the brain. Bleeding in or around the brain causes a rapid rise of pressure within the rigid skull. The only escape route for this excess pressure is through the foramen magnum, an opening at the base of the skull through which the brain stem and spinal cord exit. The pushing of brain material through this opening compresses the brain stem, resulting in the cessation of breathing, followed by death.

What to Look For

- The following signs or symptoms may worsen over minutes or hours:
 - Behavior or personality changes
 - Blank stare/dazed look
 - Changes to balance, coordination, and reaction time
 - Delayed or slowed spoken or physical responses
 - Disorientation, memory loss (confused about date/location)

What to Do

1. If unresponsive, check for breathing. If breathing stops, call 9-1-1 and give cardiopulmonary resuscitation (CPR).
2. If a neck injury is suspected, or if the person is unresponsive:
 - **DO NOT** move the head, neck, or spine.
 - Call 9-1-1.

(Continues)

What to Look For

- Loss of responsiveness (occurs in fewer than 10% of concussions)
- Slurred/unclear speech
- Difficulty controlling emotions
- Vomiting
- Headache
- Fuzzy or blurry vision
- Nausea
- Dizziness
- Sensitivity to noise or light
- Difficulty remembering new information

What to Do

3. If the person is wearing a helmet, such as a motorcycle or football helmet, **DO NOT** remove it unless:
 - You suspect an obstructed airway.
 - The helmet is so loose that you cannot stabilize the spine.

If the helmet must be removed to provide life-saving care of an airway condition, make sure to stabilize the head and neck as the helmet is carefully removed.
4. Seek medical care as soon as possible if the person:
 - Looks very drowsy or cannot be awakened
 - Has one pupil (the black part in the middle of the eye) that is larger than the other
 - Has a seizure
 - Cannot recognize people or places
 - Becomes more and more confused, restless, or agitated
 - Exhibits unusual behavior
 - Becomes unresponsive
 - Has a headache that gets worse and/or does not go away
 - Has repeated vomiting or nausea
 - Has slurred speech
5. Following the injury, the person should:
 - Get plenty of sleep at night and rest during the day.
 - Avoid visual and sensory stimuli, including video games and loud music.
 - Ease into normal activities slowly, not all at once.
 - Avoid strenuous physical activities that increase the heart rate or require a lot of concentration.
 - Avoid driving, cycling, operating machinery, or playing sports until assessed by a health care provider.
 - Avoid anything that could cause another blow to the head or body.
 - **DO NOT** use aspirin or anti-inflammatory medications such as ibuprofen or naproxen because of the risk of bleeding. (Acetaminophen can be used for postconcussion headaches.)

Further Care of Head Injury

Several signs appearing within 48 hours of a head injury indicate the need to seek medical care. A person who has a concussion and experiences any of the following signs and symptoms may have a blood clot that is pushing the brain against the skull:

- *Headache.* Expect a headache. If it lasts more than 1 or 2 days or increases in severity, seek medical advice.
- *Nausea, vomiting.* If nausea lasts more than 2 hours, seek medical advice. Vomiting once or

twice, especially in children, may be expected after a head injury. Vomiting does not indicate the severity of the injury. However, if vomiting begins again hours after the initial episodes have ceased, seek medical care.

- *Drowsiness.* Allow the person to sleep, but wake the person at least every 2 hours to check the state of consciousness and sense of orientation by asking his or her name and testing information-processing skills (eg, “Recite the months of the year backward.”). If the person cannot respond or appears confused or disoriented, seek medical advice.

- *Vision impairment.* If the person “sees double,” if the eyes do not move together, or if one pupil appears to be larger than the other, seek medical advice.
- *Mobility impairment.* If the person cannot use his or her arms or legs as well as previously or is unsteady when walking, seek medical care.
- *Speech impairment.* If the person has slurred speech or is unable to talk, seek medical care.
- *Seizures (convulsions).* If the person has a violent involuntary contraction (spasm) or series of contractions of the skeletal muscles, seek medical care.

Refer to **Flowchart 12-1** for additional information regarding the care of head injuries.

Eye Injuries

Significant eye injuries are rare. However, of all the parts of the human body, an injured eye probably causes the most anxiety and concern in a person. The eyes—arguably the most important human sense

organs—are easily damaged by trauma. A very slight penetration by a metal fragment, for example, means hospitalization. Medical care may include surgery; despite technical advances, blindness or the loss of an eye remains a possibility whenever there is an eye injury. Have an ophthalmologist or other physician examine the eye as soon as possible, even if an injury seems minor at first.

FYI

Blows to the Eye

A direct blow or a flying object that lands against the eye or pierces it can potentially cause a severe injury. The chance of partial or complete vision loss is especially high if the injury involves leakage of either of the fluids inside the eyeball. These fluids, vitreous humor and aqueous humor, give the eyeball its shape and grapelike compressibility. When injured, it may be difficult for the first aid provider to determine whether the eye fluid is leaking. Do not touch the area to find out. The fluid could be the result of an allergy or infection.

What to Look For

Blow to the eye (ranging in severity from minor to sight threatening), indicated by:

- A shiner or black eye, occurring when some of the many delicate blood vessels around the eye rupture **Figure 12-6**
- Person reports being hit by a fist, ball, or other blunt object
- Broken bone around the eyeball indicated by double vision and the inability to look upward

Loose object in the eye, indicated by:

- Severe pain
- Tearing (the body’s way of trying to remove the object)

What to Do

1. Apply an ice or cold pack around the eye for 15 minutes. **DO NOT** place the pack on the eye.
2. Have the person keep the eyes closed.
3. Seek medical care.

Try, in order, each of the following methods:

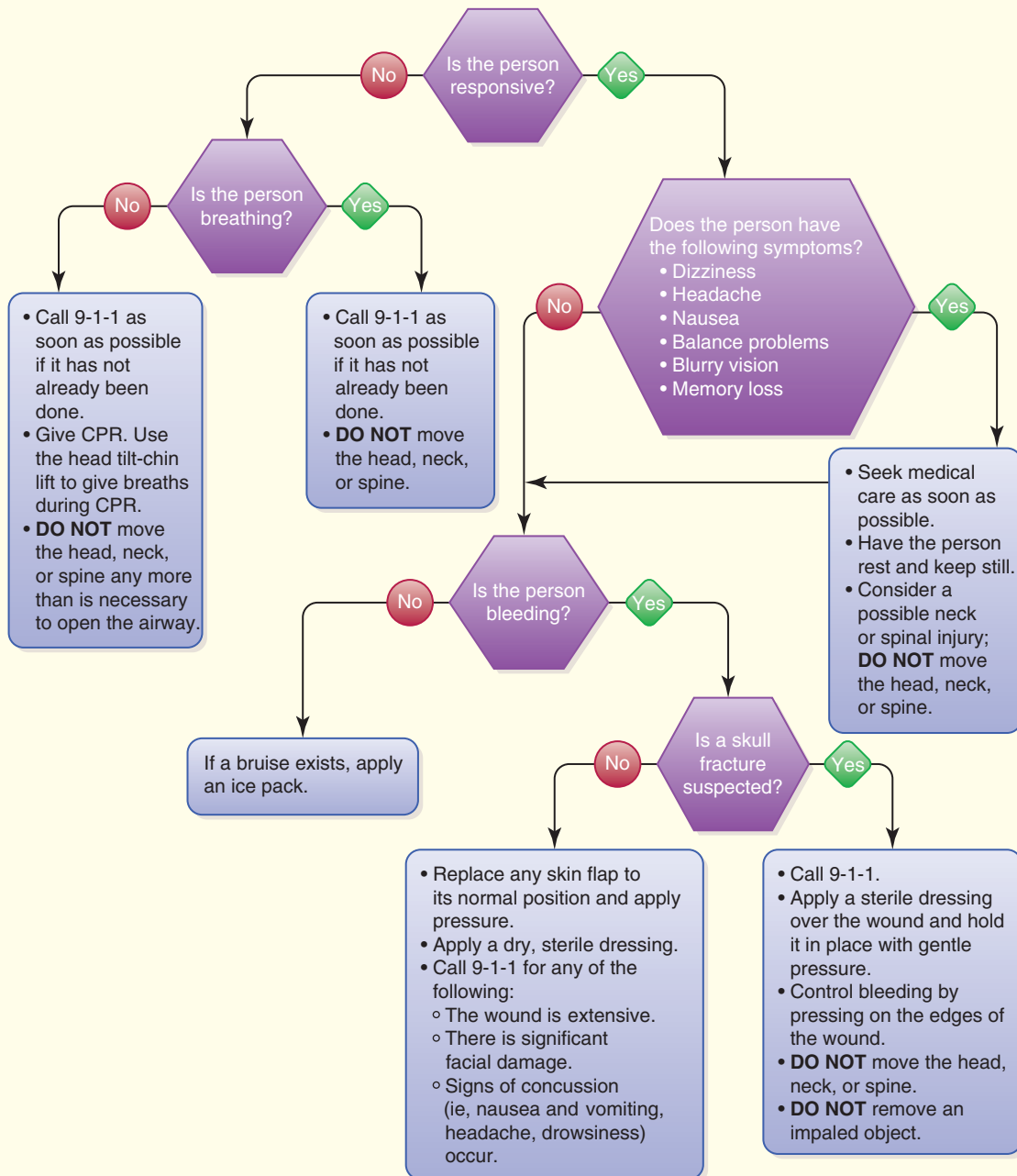
1. Have the person blink the eye several times.
2. Pull the upper eyelid out and over the lower lid. This allows the lower lashes to brush the object off the inside of the upper lid. Have the person blink a few times and let the eye move the object out.
3. Gently irrigate the eye with clean, warm water. Hold the eyelid open and tell the person to move the eye as it is rinsed.
4. Examine the lower lid by pulling it down gently. If you see the object, remove it with a moistened gauze pad **Figure 12-7**.
5. Lift the upper eyelid up and over a cotton swab. Many foreign bodies lodge under the upper eyelid; if the object is seen, remove it with the corner of a wet gauze pad.
6. If any of the previously discussed methods are successful, medical care is usually not needed unless there is continued pain or itching to the eye.

(Continues)

What to Look For

What to Do

<p>Penetrating eye injury, indicated by lid laceration or cut</p>	<ol style="list-style-type: none"> 1. DO NOT remove the object. 2. For a long object, place padding around the object to stabilize against movement, and place a paper cup or similar object over the object for protection Figure 12-8. 3. For a short object, place a doughnut-shaped pad (formed from a roller gauze bandage or a cravat bandage made from a triangular bandage) around the eye, and wrap a bandage around the head to hold the pad in place. 4. Cover both eyes; movement of the uninjured eye will cause movement of the injured eye. 5. Keep the person flat on his or her back. 6. Call 9-1-1.
<p>Cut on the eyeball Figure 12-9, indicated by:</p> <ul style="list-style-type: none"> • Cut appearance of the cornea (clear part of the eye) or sclera (white part of eye) • Inner liquid filling of the eye coming out through the wound • Cut lid 	<ol style="list-style-type: none"> 1. DO NOT apply pressure to the eye. 2. Cover both eyes with gauze pads, and lightly wrap a bandage around the head to hold the pads in place. 3. Call 9-1-1 or drive the person to a medical facility as soon as possible.
<p>Chemical, smoke, or other irritant in eye</p>	<p>Chemicals in the eyes can threaten sight, with alkalis causing greater damage than acids. Because damage can occur in 1 to 5 minutes, the chemical must be removed immediately. First aid may determine the fate of the eye and vision.</p> <ol style="list-style-type: none"> 1. Hold the eye wide open; flush with warm water for at least 15 minutes or until emergency medical services (EMS) arrives Figure 12-10. If tap water is not available, normal saline or other eye irrigation solution may be used. <ul style="list-style-type: none"> • Irrigate from the nose side of the eye toward the outside to avoid flushing the material into the other eye. • Tell the person to roll the eye as much as possible to help wash out the eye. 2. Loosely bandage the eye(s) if necessary. 3. For a chemical eye injury, contact the poison control center (1-800-222-1222). If not available, seek medical care as soon as possible or call 9-1-1.
<p>Eye avulsion, indicated by:</p> <ul style="list-style-type: none"> • Eye knocked out from its socket 	<ol style="list-style-type: none"> 1. Cover the eye loosely with a sterile or clean dressing that has been moistened with clean water. Do not try to push the eyeball back into the socket. 2. Protect the injured eye with a paper cup, a piece of cardboard folded into a cone, or a doughnut-shaped pad made from a roller gauze bandage or a cravat bandage. 3. Cover the undamaged eye with a patch to stop movement of the damaged eye. 4. Call 9-1-1.
<p>Burns caused by light, indicated by:</p> <ul style="list-style-type: none"> • Person reports looking at a source of ultraviolet light such as sunlight, arc welding, bright snow, or tanning lamps • Severe pain occurring 1 to 6 hours after exposure 	<ol style="list-style-type: none"> 1. Cover both eyes with moist, cool cloths. 2. Give pain medication if needed. 3. Seek medical advice.

Flowchart 12-1**Head Injuries**

Refer to **Flowchart 12-2** for additional information regarding the care of eye injuries.

CAUTION

DO NOT assume that any eye injury is minor. When in doubt, seek medical care immediately.
DO NOT remove an object stuck in the eye or try to wash out an object with water.
DO NOT exert pressure on an injured eyeball or a penetrating object.

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Figure 12-6

Blow to the eye.

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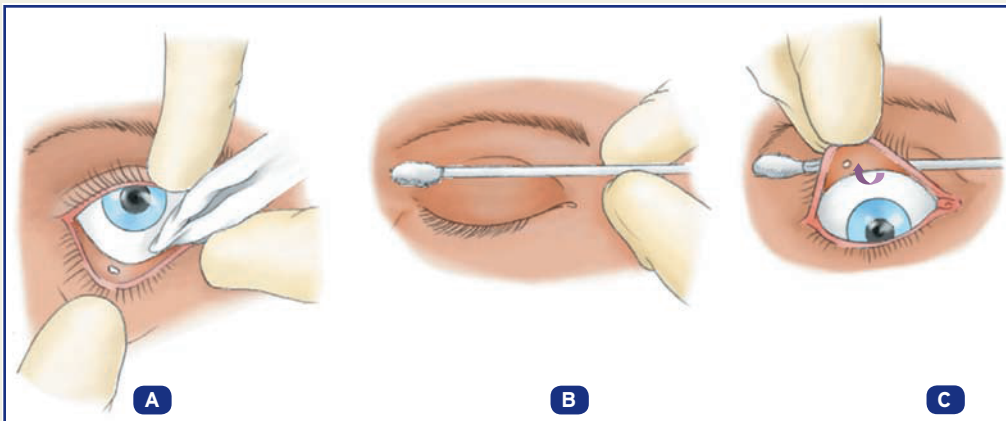


Figure 12-7

Removing loose objects from the eye. **A.** If tears or gentle flushing do not remove the object, gently pull down the lower lid. Remove an object by gently flushing with lukewarm water or by using wet, sterile gauze. **B.** If unsuccessful, tell the person to look down. Pull gently downward on the upper eyelashes. Lay a swab or matchstick across the top of the lid. **C.** Next, fold the lid over the swab or matchstick. Remove an object by gently flushing with lukewarm water or by using wet, sterile gauze.

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A

Figure 12-8



B

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C

Stabilize a long penetrating object against movement. **A.** Place padding around the object. **B.** Place a shield (ie, paper cup or similar object) over, but not touching, the penetrating object to protect the object from being hit. **C.** Cover both eyes to prevent the uninjured eye from moving with the injured eye.

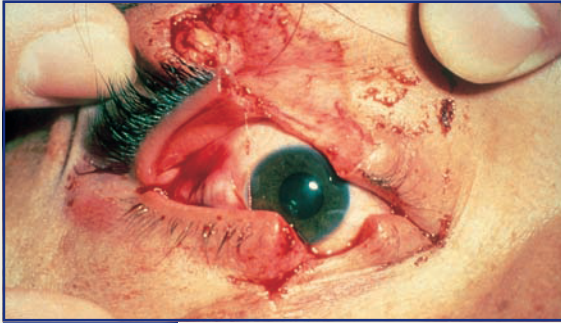


Figure 12-9

Lacerated eyelid.



Figure 12-10

Flushing the eye to treat a chemical burn.

FYI

Sympathetic Eye Movement

Eyes move in the same direction together, focusing on the same object. This is known as sympathetic eye movement. Therefore, when the uninjured eye moves, the injured eye moves as well. This movement may aggravate an injury.

To lessen movement in an injured eye:

- Tell the person to keep the uninjured eye closed.
- Cover the undamaged eye with a cravat or roller bandage.

The person may become anxious if both eyes are covered and he or she cannot see. Help overcome anxiety by:

- Explaining everything that you are doing.
- Leaving a small peephole at the bottom of the bandage for the uninjured eye to see through. This keeps the person's eyes still by allowing the eyes to look in only one direction.

Q&A

What causes a black eye?

A black eye is a bruise (contusion) caused by the leakage of blood from the small capillary blood vessels that have been injured. The extent of a blue-black discoloration depends on how much blood seeps from the damaged vessels, and it varies in different areas of the body. The tissues around the eyes have a lot of blood vessels. As a result, they bruise easily. The discoloration appearing in this area is more pronounced and prolonged than a contusion of the leg or arm.

CAUTION

DO NOT try to neutralize a chemical in the eye. Water usually is readily available for eye irrigation.

DO NOT use an eye cup for a chemical burn.

DO NOT bandage an eye tightly.

DO NOT try to remove an object stuck in the eye.

DO NOT allow the person to rub an injured eye.

DO NOT try to remove an embedded foreign object in the eye.

DO NOT use dry cotton (cotton balls or cotton-tipped swabs) or instruments such as tweezers to remove an object from the surface of an eye.

FYI

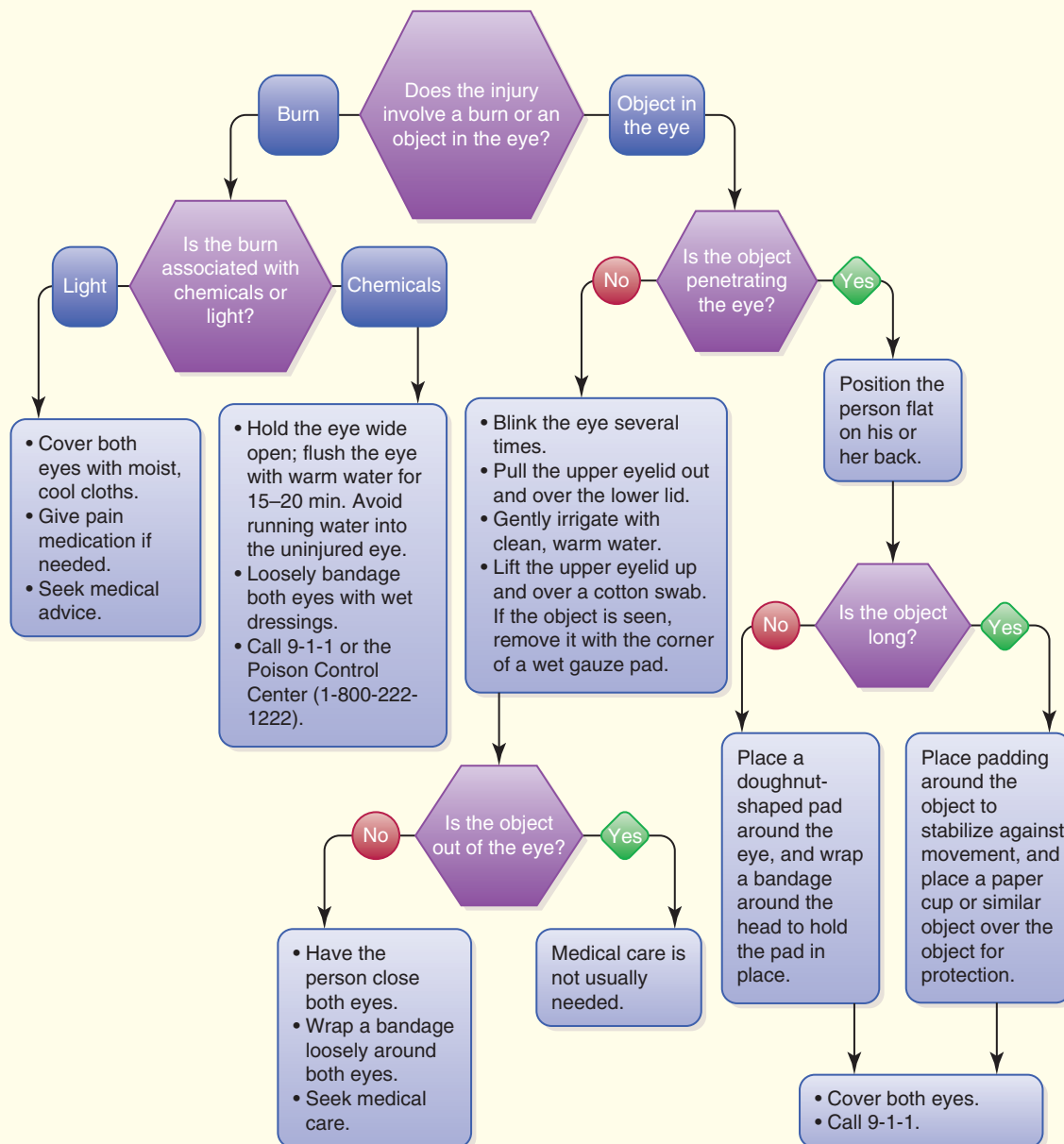
An Unresponsive Person's Eyes

An unconscious person may lose the reflexes that protect the eye, such as blinking. If the eyes do not stay closed, keep them closed by covering them with moist dressings.

FYI

Contact Lenses

Determine whether a person is wearing contact lenses by asking, by checking a driver's license, or by looking for them on the eyeball, using a light shining on the eye from the side. In cases of chemicals in the eye, lenses should be removed immediately. Usually the person can remove the lenses.

Flowchart 12-2**Eye Injuries**

Ear Injuries

Most ear conditions are not life threatening. Fast action may be needed, however, to relieve pain and to prevent or reverse hearing loss. Head trauma may involve the ear. Foreign bodies in the ear canal usually produce overzealous removal attempts. Except for disk batteries (which damage moist tissue by creating a current) and live insects, few foreign bodies must be extracted immediately. Seek medical care for the person; attempts to remove a foreign body

from the ear can rupture the eardrum or lacerate the ear canal.

Children insert all sorts of things into their ears that may be impossible for you to remove safely. If the object is visible near the ear canal opening and you feel it is safe, cautiously try to remove the object with tweezers. Small objects can sometimes be removed by irrigating the ear with warm water. Do not try irrigation if the object blocks the entire ear canal or if the object is vegetable matter such as a kernel of corn or a bean, which will swell when wet.

What to Look For

Objects stuck in an ear

What to Do

1. **DO NOT** use tweezers or try to pry an object out unless the object can be seen near the ear canal opening.
2. Seek medical care to remove the object. Except for disk batteries and live insects, few foreign bodies must be removed immediately.
3. For a live insect in the ear canal, shine a small light into the ear. The insect may crawl out toward the light; if it does not, pour warm water into the ear and then drain it. This may drown the insect; regardless of whether it is dead or alive, it should wash out. When draining the water, turn the head to the side. If the insect cannot be removed, seek medical care.

Fluids coming from the ear (blood or clear fluid draining from the ear may indicate a skull fracture)

1. **DO NOT** attempt to stop bleeding or clear fluid (CSF) with or without blood coming from an ear. Doing so could increase pressure on the brain, causing permanent damage.
2. Place a sterile gauze dressing over the ear and loosely bandage it in place to prevent bacteria getting into the brain.
3. Stabilize the head and neck against movement. Have the person remain as still as possible.
4. Call 9-1-1.

Nose Injuries

A severe nose injury frightens the injured person and often challenges the first aid provider's skill. Most nosebleeds are self-limiting and do not require

medical attention. In cases of accompanying head or neck injuries, stabilize the head and neck for protection. In some cases, loss of blood could cause shock.

What to Look For

Broken nose, indicated by:

- Pain, swelling, and a possible crooked appearance
- Bleeding and difficulty breathing through the nostrils
- Black eyes appearing 1 to 2 days after the injury

What to Do

1. If bleeding, provide care as you would for a nosebleed.
2. Apply an ice or cold pack for 15 minutes.
3. Medical care can be delayed.
4. **DO NOT** try to straighten a crooked nose.

(Continues)

What to Look For

Nosebleed

- The **anterior nosebleed** (front of nose) is the most common type (90%). Blood flows from the nose through one nostril.
- The **posterior nosebleed** (back of nose) may involve massive bleeding, usually backward into the mouth or down the back of the throat. A posterior nosebleed is serious and requires medical care.

Foreign object in the nose (a medical condition mainly occurring to small children, who often put peanuts, beans, raisins, and other similar objects into their nostrils)

What to Do

1. If the nose was hit, suspect a broken nose.
2. Have the person sit leaning slightly forward. **DO NOT** tilt the head back or lie the person down.
3. Pinch the nostrils shut constantly for 10 minutes **Figure 12-11**. Tell the person to breathe through the mouth and not swallow any blood.
4. If bleeding has not stopped, have the person gently blow his or her nose to get rid of ineffective blood clots. Pinch the nostrils shut again for 10 minutes.
5. If bleeding continues, try other methods in addition to nose pinching, such as applying an ice pack or spraying nasal decongestant spray into the nostrils.
6. Medical care is not usually needed. If bleeding reoccurs or if the nose is broken, seek medical care.
7. After a nosebleed has stopped, suggest that the person:
 - Sneeze through an open mouth, if he or she needs to sneeze.
 - Avoid bending over and participating in too much physical exertion.
 - Elevate the head with two pillows when lying down.
 - Keep the nostrils moist by applying a little petroleum jelly just inside the nostril for 1 week; increase the humidity in the bedroom during the winter months by using a cold-mist humidifier.
 - Avoid picking or rubbing the nose.

Try one or more of the following methods to remove the object:

1. Have the person gently blow his or her nose while compressing the opposite nostril.
2. If an object is visible, pull it out with tweezers. **DO NOT** push the object deeper.
3. Seek medical care if the object cannot be removed.

Refer to **Flowchart 12-3** for additional information regarding the care of nosebleeds.

CAUTION

- DO NOT** allow the person to tilt the head backward.
- DO NOT** probe the nose with a cotton-tipped swab.
- DO NOT** move the person's head and neck if a spinal injury is suspected.

Tooth Injuries

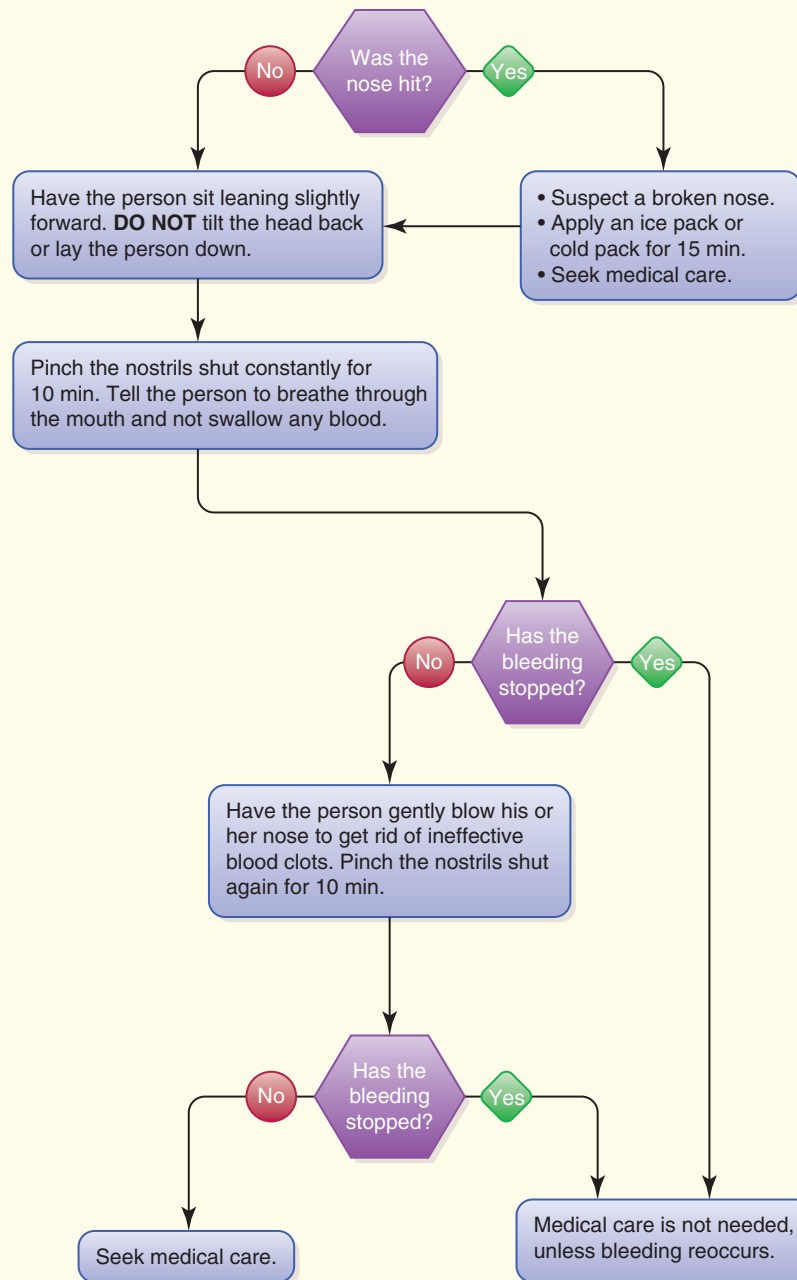
Because dental emergencies generally cause considerable pain and anxiety, managing them promptly can provide great relief to the person.

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Figure 12-11

Control bleeding from the nose by pinching the nostrils together.

Flowchart 12-3**Nosebleeds**

What to Look For

What to Do

<p>Object caught between teeth, indicated by:</p> <ul style="list-style-type: none"> • Person reports that something is caught between his or her teeth • An object that may or may not be seen (Even with the use of a flashlight, it is still difficult to see a small object.) 	<ol style="list-style-type: none"> 1. Try to remove the object with dental floss. Guide the floss carefully to avoid cutting the gums. 2. DO NOT try to remove the object with a sharp or pointed instrument. 3. If unsuccessful, seek dental care.
<p>Bitten lip or tongue, indicated by:</p> <ul style="list-style-type: none"> • Immediate pain • Bleeding • Swelling 	<ol style="list-style-type: none"> 1. Apply direct pressure to the bleeding area with sterile gauze or a clean cloth. 2. Clean the area with a cloth. 3. If swelling is present, apply an ice pack or have the person suck on a Popsicle or ice chips. 4. If the bleeding does not stop, seek medical care.
<p>Loosened tooth</p> <ul style="list-style-type: none"> • Apply pressure on either side of each tooth with the fingers to determine looseness. • Any tooth movement, even if it is barely felt, indicates a possibly loose tooth. 	<ol style="list-style-type: none"> 1. Have the person bite down on a piece of gauze to keep the tooth in place. 2. Consult a dentist or an oral surgeon.
<p>Toothache, indicated by:</p> <ul style="list-style-type: none"> • Person reports pain limited to one area of the mouth (although it can be more widespread); pain can also affect the ear, eye, neck, or even the opposite side of the jaw • Person reports a tooth that is sensitive to heat and cold • Dental decay (identified by tapping the area with a spoon handle or similar object; a diseased tooth will hurt.) 	<ol style="list-style-type: none"> 1. Rinse the person's mouth with warm water. 2. Use dental floss to remove any trapped food. 3. Place an ice pack on the outside of the cheek to reduce swelling. 4. If available, use a cotton swab to paint the aching tooth with oil of cloves (eugenol) to help suppress the pain. Take care to keep the oil off the gums, lips, and inside surfaces of the cheeks. 5. Give pain medication (eg, acetaminophen, ibuprofen). 6. Seek a dentist.
<p>Broken tooth Figure 12-12</p>	<ol style="list-style-type: none"> 1. Collect all the tooth or teeth fragments. Depending upon the severity of injury, a dentist may be able to reattach them. 2. Rinse the person's mouth with warm water. 3. For swelling over the injured area, place an ice pack on the outside of the cheek. 4. For pain, have the person keep air exposure to a minimum by keeping the mouth closed. Additionally, consider providing pain medication, which should be swallowed. 5. If a jaw fracture is suspected, stabilize the jaw by wrapping a bandage under the chin and over the top of the head. 6. Seek a dentist as soon as possible. 7. Transport the fragments as you would a knocked-out tooth.

What to Look For

What to Do

<p>Knocked-out (avulsed) tooth Figure 12-13</p>	<ol style="list-style-type: none"> 1. Attempt to reimplant the tooth (only if it is a permanent [adult] tooth): <ul style="list-style-type: none"> • Hold the tooth by the crown (tooth part normally seen when looking into a mouth). • If the tooth is dirty, rinse it in a bowl of warm water. • Gently push the tooth down into the socket so the top is even with adjacent teeth. The person can bite down gently on gauze or a handkerchief placed between the teeth. 2. If unable to reimplant the tooth, keep the knocked-out tooth viable by storing it in a solution (listed in order of preference): <ul style="list-style-type: none"> • Hank's Balanced Salt Solution • Egg white • Coconut water • Whole milk • If none of these is available, have the person spit saliva into a small container into which the tooth can be placed. 3. Seek a dentist as soon as possible.
<p>Infected or abscessed tooth, indicated by:</p> <ul style="list-style-type: none"> • Swelling of the gums around the affected tooth • Foul breath • Pain that is increased by tapping the tooth with something metal (eg, spoon handle) 	<ol style="list-style-type: none"> 1. Have the person rinse his or her mouth several times a day with warm water. 2. Give pain medication. DO NOT have the person suck an aspirin, and DO NOT place an aspirin on the tooth or gum tissue. 3. An ice pack on the cheek may help. 4. Use dental floss to remove any trapped food. 5. Seek a dentist.
<p>Cavity—caused by decay or lost filling—indicated by:</p> <ul style="list-style-type: none"> • Sensitivity to heat, cold, or sweets • Sensitivity to touch (Tap the tooth gently with something metal [eg, spoon handle] on the top and side. This increases the pain in the affected tooth.) 	<ol style="list-style-type: none"> 1. Have the person rinse his or her mouth with warm water. 2. Apply oil of cloves (eugenol) with a cotton swab to the cavity to deaden the pain. DO NOT apply any on the gums or lips, or inside the cheeks. 3. If available, apply a temporary filling with cavity dental filling paste. Other options include sugarless chewing gum, candle wax, or ski wax. 4. Seek a dentist.
<p>Bleeding from mouth</p>	<ol style="list-style-type: none"> 1. Allow blood to drain out of the mouth. 2. For a bleeding tongue, put a dressing on the wound and apply pressure. 3. For a cut through a lip, place a rolled dressing between the lip and gum and press another dressing against the outer lip. 4. Seek medical care.



Figure 12-12

Broken teeth.

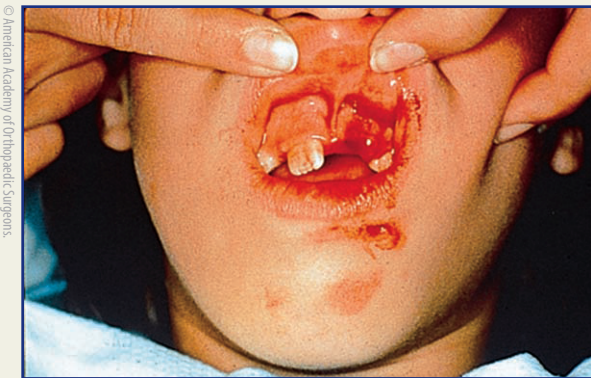


Figure 12-13

Knocked-out tooth.

CAUTION

- DO NOT** touch the root of a knocked-out tooth.
- DO NOT** handle a knocked-out tooth roughly.
- DO NOT** put a knocked-out tooth in water, mouth-wash, alcohol, or povidone iodine (Betadine).
- DO NOT** put a knocked-out tooth in skim milk, reconstituted powdered milk, or milk by-products such as yogurt.
- DO NOT** rinse a knocked-out tooth unless you are reinserting it in the socket.
- DO NOT** place a knocked-out tooth in anything that can dry or crush the outside of the tooth.
- DO NOT** scrub a knocked-out tooth or remove any attached tissue fragments.
- DO NOT** remove a partially extracted tooth. Push it back into place and seek a dentist so the loose tooth can be stabilized.

FYI

Dental First Aid

If you are in a remote area with no dentist nearby, you can make a temporary cap from melted candle wax or paraffin and a few strands of cotton. When the wax begins to harden but can still be molded, press a wad of it onto the tooth. Other improvisations include using ski wax or chewing gum (preferably sugarless).

CAUTION

- DO NOT** place pain medication (such as aspirin, acetaminophen, or ibuprofen) on the aching tooth or gum tissues or allow them to dissolve in the mouth. A serious acid burn can result.
- DO NOT** cover a cavity with cotton if there is any pus discharge or facial swelling. See a dentist immediately.

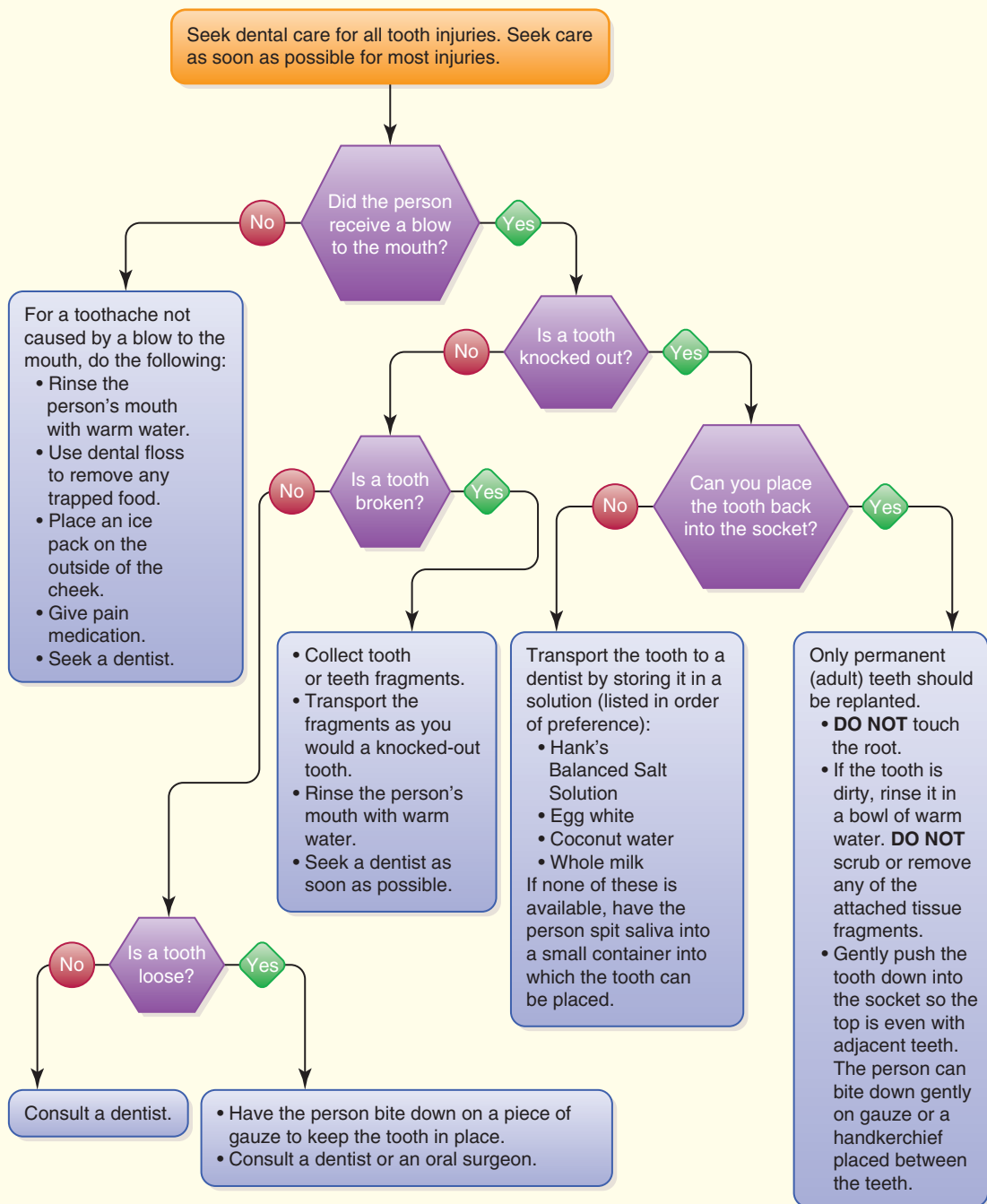
Refer to [Flowchart 12-4](#) for additional information regarding the care of tooth injuries.

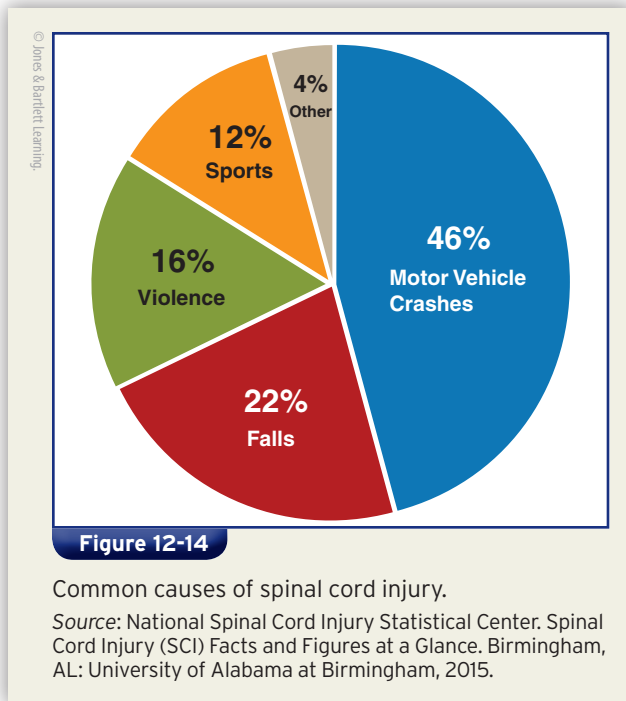
Spinal Injuries

The *spine* is a column of **vertebrae** stacked on one another from the tailbone to the base of the skull. Each vertebra has a hollow center through which the spinal cord passes. The spinal cord consists of long tracts of nerves that join the brain with all other body organs and parts.

If a broken vertebra pinches spinal nerves, paralysis can result. All unresponsive people with an injury should be treated as though they have a spinal injury. Suspect a possible spinal injury any time one of the following are encountered [Figure 12-14](#):

- Motor vehicle crashes (includes motorcycles, snowmobiles, and all-terrain vehicles)
- Pedestrian-motor vehicle crashes
- Falls from heights
- Penetrating injury to the head, neck, back, or torso
- Violent assaults and direct blows
- Diving incidents
- Sports injuries

Flowchart 12-4**Tooth Injuries**



A mistake in the handling of a person with a spinal injury could mean a lifetime of paralysis for the person. Suspect a spinal injury whenever a significant cause of injury occurs.

Spinal cord injuries result in paralysis or loss of function. Paralysis occurs when the neural connections between the brain and the extremities are severed or damaged. **Paraplegia** refers to spinal damage that paralyzes just the legs, while **quadriplegia** affects the arms and the legs. Most people who suffer total loss of sensation and function above the third cervical vertebra (C3) die before medical care can be provided.

In cases in which spinal injury is suspected, it is important not to move the person and to encourage the person to be still and wait for EMS to arrive. In the unusual event that a life is threatened, such as from a fire or imminent explosion, use good judgment about whether to move the person.

What to Look For

A reliable (alert, calm, cooperative, lacking distracting injuries, not intoxicated by drugs or alcohol) person with signs of spinal injury (**Skill Sheet 12-1**), indicated by:

- Reports of back pain and leg numbness and tingling
- Tenderness/pain when you run fingers all the way down spine (if possible). (Press each bump of vertebrae and press on depressions produced on each side when you touch or push on the spine bones.)
- Failure of the following tests for sensation and movement (test all four extremities):
 - Upper body:
 - Pinch several fingers while the person has his or her eyes closed, and ask, “Can you feel this?” and “Which finger am I touching?”
 - Ask, “Can you wiggle your fingers?”
 - Have the person squeeze your hand.
 - Lower body:
 - Pinch toes while the person has his or her eyes closed, and ask, “Can you feel this?” and “Which toes am I touching?”
 - Ask, “Can you wiggle your toes?”
 - Have the person push and pull a foot against your hand.

A reliable person without signs of a spinal injury, indicated by:

- Alert, not intoxicated, and no distracting injuries
- No report of neck pain or neurologic symptoms (eg, tingling, numbness)
- No neck tenderness when felt, no loss of sensation when fingers and toes are pinched, and able to move the fingers and toes

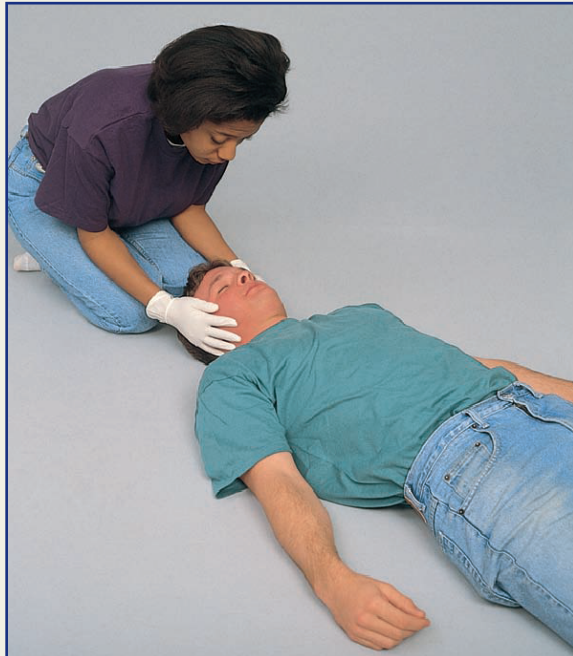
An unreliable person (altered mental status, intoxicated by drugs or alcohol, combative, confused, painful distracting injury) with signs of a spinal injury (see examples previously discussed)

What to Do

1. Call 9-1-1.
2. **DO NOT** attempt to move the person. Leave the person in the position in which found. Tell the person to remain as still as possible. Consider moving a person only for the following: to provide CPR, to open a blocked airway, to control life-threatening bleeding, or to reach a safe location.
3. Apply spinal stabilization by placing your hands on both sides of the head with the palms over the ears (**Figure 12-15**). Once spinal stabilization is applied, **DO NOT** let go until EMS arrives.
4. **DO NOT** apply a cervical (neck) collar (**Figure 12-16**).
5. Cover to prevent heat loss.

1. Person does not require spinal stabilization.
2. Treat other injuries (eg, wounds, bruises, fractures).

1. Assume a spinal injury exists.
2. Use the methods previously discussed to stabilize the person.



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Figure 12-15

Spinal stabilization.

Refer to **Flowchart 12-5** for additional information regarding the care of spinal injuries.



© ISHP SA/Alamy.

Figure 12-16

Do not place a cervical (neck) collar on a person with a suspected spinal injury.

CAUTION

DO NOT move the person with a suspected spinal injury, even if the person is in water, unless the person's location puts him or her in additional danger. (For a water-related rescue, manually stabilize the person while keeping the injured person floating on the water's surface. Only perform a water rescue if you are properly trained.) Wait for EMS personnel to arrive; they have the proper training and equipment to safely move the injured person.

Skill Sheet**12-1****Checking for Spinal Injuries in a Responsive Person**

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**1**

Have the person wiggle his or her fingers.

(Continues)

Skill Sheet Continued

12-1

Checking for Spinal Injuries in a Responsive Person

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2

Squeeze the person's fingers.

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3

Have the person squeeze your hand.

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4

Have the person wiggle his or her toes.

Skill Sheet Continued

12-1

Checking for Spinal Injuries in a Responsive Person

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5

Squeeze the person's toes.

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6

Have the person push his or her foot against your hand.

Flowchart 12-5**Spinal Injuries**

Suspect a spinal injury if the person:

- Was involved in a motor vehicle crash (ie, car, motorcycle, motor bike, ATV, snowmobile)
- Was involved in a severe bicycle or skateboard crash
- Fell greater than his or her standing height
- Dove into shallow water
- Received a hit or blow to the head

- Is the person alert, calm, and cooperative?
- Is the person not intoxicated by drugs or alcohol?
- Are there no painful, distracting injuries present?
- Can the person wiggle his or her toes and fingers?
- Can the person feel you pinch specific toes and fingers while his or her eyes are closed?
- Can the person squeeze both of your hands simultaneously?
- Can the person push both feet against your hands simultaneously?

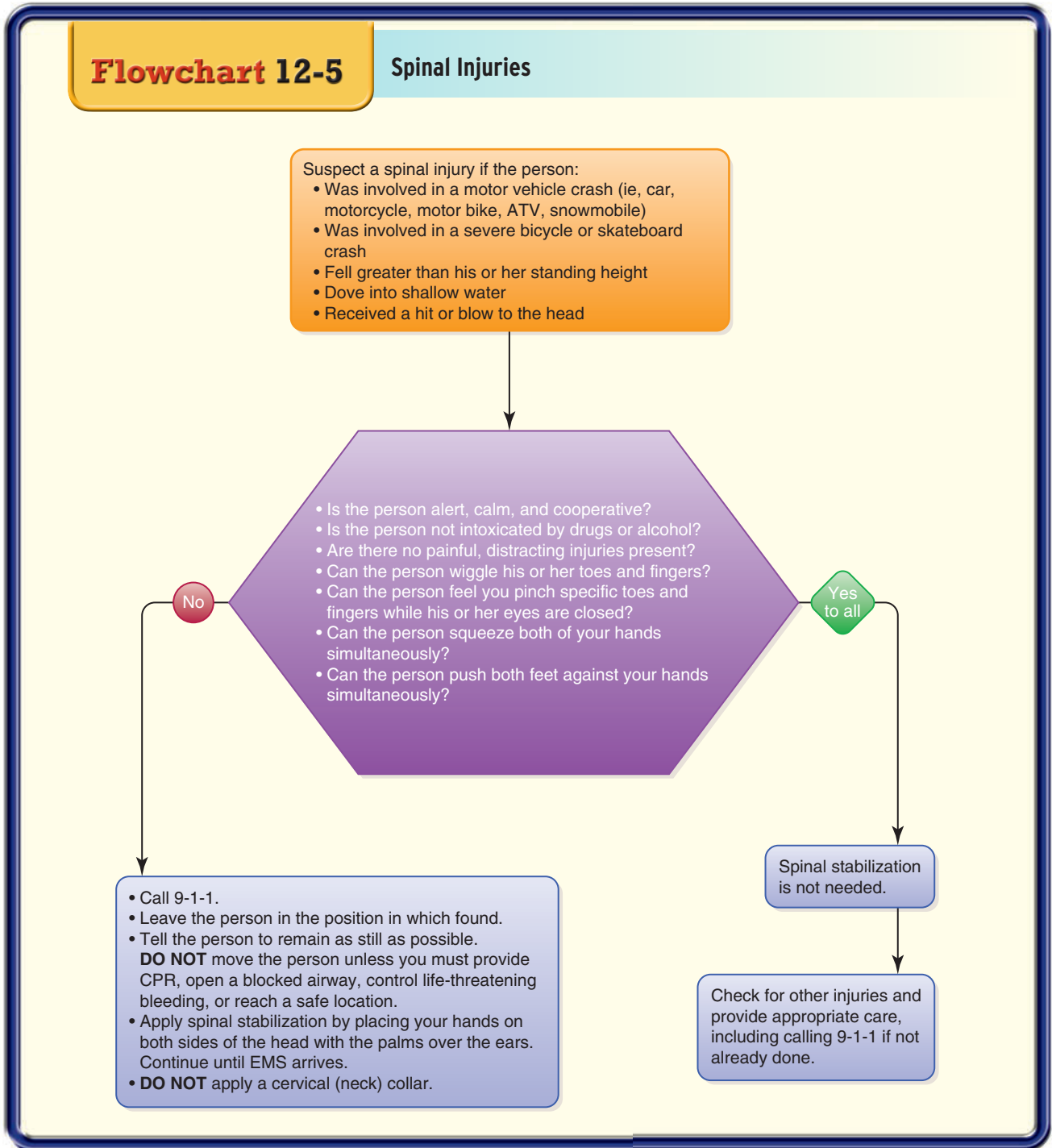
No

Yes to all

- Call 9-1-1.
- Leave the person in the position in which found.
- Tell the person to remain as still as possible.
DO NOT move the person unless you must provide CPR, open a blocked airway, control life-threatening bleeding, or reach a safe location.
- Apply spinal stabilization by placing your hands on both sides of the head with the palms over the ears. Continue until EMS arrives.
- **DO NOT** apply a cervical (neck) collar.

Spinal stabilization is not needed.

Check for other injuries and provide appropriate care, including calling 9-1-1 if not already done.



prep kit

► Ready for Review

- Any head injury is potentially serious. If not properly treated, injuries that seem minor could become life threatening.
- Scalp wounds bleed profusely because the scalp has a rich supply of blood.
- A skull fracture is a break or crack in the cranium. Skull fractures may be open or closed.
- Injuries to the brain cause short- and long-term conditions.
- An injured eye probably causes the most anxiety and concern in a person.
- Penetrating eye injuries are severe injuries that result when a sharp object penetrates the eye.
- Blows to the eye can range in severity from minor to sight threatening.
- Cuts of the eye or lid require medical care.
- Chemicals in the eyes can threaten sight.
- A blow to the eye can knock it from its socket.
- Loose objects in the eye are the most frequent eye injury and can be very painful.
- Burns to the eye can result if a person looks at a source of ultraviolet light.
- Most ear injuries are not life threatening, but fast action may be needed to relieve pain or to prevent or reverse hearing loss.
- Most nosebleeds are self-limiting and seldom require medical attention.
- A foreign object in the nose is a condition mainly among small children who put small objects up their nostrils.
- Because dental emergencies generally cause considerable pain and anxiety, managing them promptly can provide great relief to the person.
- Trauma can cause teeth to become loosened in their sockets.
- A knocked-out tooth is a dental emergency.
- The front teeth are frequently broken by falls or direct blows.
- The most common reason for toothaches is dental decay.
- A mistake in the handling of a person with a spinal injury could mean a lifetime of paralysis for the person.

► Vital Vocabulary

anterior nosebleed Bleeding from the front of the nose.

Battle sign A contusion on the mastoid area of either ear; sign of a basilar skull fracture.

cerebrospinal fluid (CSF) A clear, watery solution similar to blood plasma.

concussion A temporary disturbance of brain activity caused by a blow to the head; also known as mild traumatic brain injury.

contusion A bruise; an injury that causes a hemorrhage in or beneath the skin but does not break the skin.

coup-contrecoup Dual impacting of the brain into the skull; coup injury occurs at the site of impact; contrecoup injury occurs on the opposite side of impact, as the brain rebounds.

diffuse axonal Tearing brain injury caused by shaking or strong rotation of the head.

paraplegia Paralysis of the legs caused by damage to the spine.

posterior nosebleed Bleeding from the back of the nose, which may flow out of the nostrils and into the mouth or throat.

quadriplegia Paralysis of the arms and legs caused by damage to the spine.

skull fracture A break or a crack in the cranium (bony case surrounding the brain).

vertebrae The 33 bones that make up the spinal column.

► Assessment in Action

While working at a construction site, you witness a fellow worker fall to the ground after being struck by a piece of wood thrown by a table saw. He was not wearing his safety glasses and you see a cut to his eyeball and eyelid.

prep kit

Directions: Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. Apply pressure immediately to the injured eyeball.
- Yes No 2. Tell the person to keep both eyes closed. Both eyes can be covered with a cravat or roller bandage.
- Yes No 3. Position the person with his head elevated.
- Yes No 4. Medical care is not necessary in this case.

► Check Your Knowledge

Directions: Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. Remove objects embedded in an eyeball.
- Yes No 2. Scalp wounds produce very little bleeding.

- Yes No 3. Scrub and rinse the roots of a knocked-out tooth.
- Yes No 4. After a blow to the area around an eye, apply a cold pack.
- Yes No 5. Tears are sufficient to flush a chemical from the eye.
- Yes No 6. Use clean, damp gauze to remove an object from the eyelid's surface.
- Yes No 7. Preserve a knocked-out tooth in mouthwash.
- Yes No 8. Do not move a person with a suspected spinal injury.
- Yes No 9. Inability to move the hands or feet, or both, may indicate a spinal injury.
- Yes No 10. To care for a nosebleed, have the injured person sit down and tilt his or her head back.