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## Trauma Center Designation

According to the Centers for Disease Control and Prevention (CDC), traumatic injuries are the leading cause of death for American children and adults ages 1 to 44. The CDC reports that the leading causes of trauma are motor vehicle accidents, falls, and assault with a deadly weapon. Trauma, with approximately 170,000 deaths per year and more than 400 deaths per day, is the 4th leading cause of death for all ages. Trauma kills more Americans than stroke and AIDS combined, and it is a leading cause of disability for survivors according to the CDC.

A trauma center is a hospital equipped and staffed to provide emergency medical services to patients who have sustained a traumatic injury. Although an emergency room also treats ill and injured patients, a trauma center is designed to treat severe, life-threatening injuries, including blunt force and penetrating trauma. Each trauma center is part of a larger system that uses state and local resources hospitals and specialized equipment, physicians, surgeons, healthcare staff, ambulances, helicopters, paramedics, and emergency management teams—to achieve the best possible outcomes for patients. Trauma centers grew out of the realization



that traumatic injury requires experienced physicians and surgeons who specialize in multidisciplinary treatments and specialized resources available 24 hours a day.

The concept of a trauma center was developed in Baltimore at the University of Maryland during the 1950s and 1960s by thoracic surgeon and shock researcher, R Adams Cowley, MD. The R Adams Cowley Shock Trauma Center was the first shock trauma center in the world. Trauma center levels across the United States are identified in 2 fashions—a designation process and a verification process. Trauma center designation is a process outlined and developed at the state level; for example, Georgia has 5 levels, while Florida has 2 levels. Trauma center verification is an evaluation process completed by the American College of Surgeons (ACS) to evaluate and improve trauma care.

The categories that define national standards for trauma care hospitals and the specific levels (i.e. Level I, II, III, IV, or V in the state of Georgia) refer to the types of resources available in the trauma center, including speciality physicians, hospital staff and equipment, participation in trauma research, healthcare professional education and injury prevention, and the number of patients admitted annually. Special trauma centers, such as pediatric and burn centers can be part of a larger trauma center or a separate facility. The majority of low-level trauma patients can be appropriately cared for at lower-level trauma centers. Patients with injuries that threaten life or limb can be transported to a level I or level II facility within the local geographic area.

The Georgia Trauma Care Network Commission was established on May 11, 2007, to create a trauma system for the state of Georgia and to act as the accountability mechanism for distribution of trauma resources appropriated each fiscal year by the legislature. Funding the cost of a trauma center can be challenging for the various facilities and state legislatures. The Georgia Department of Human Resources designates the assigned trauma center level classification. Currently in Georgia, there are 20 trauma centers that are active at levels I thru IV of trauma designation.

When a hospital is designated as a trauma-care facility, the hospital must be prepared for any individual with a traumatic injury who comes through the door. Often, trauma teams are in a race against time. The first hour after an injury occurs, the so-called golden hour, can mean the difference between life and death. Rapid access to trauma care is often the patient's best hope for a good outcome.

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Further Reading: American Trauma Society, www.amtrauma.org

### Trauma center levels in Georgia

The levels that classify a trauma center are based upon the care provided, staff qualifications, and the amount and type of equipment available.

### Level I

A level I trauma center is a comprehensive regional resource that is a tertiary (high level, speciality care) referral facility essential to the trauma system. A level I trauma center is capable of providing total care for every aspect of injury, from prevention through rehabilitation.

### Elements of a level I trauma center:

- Provides 24-hour in-house coverage by general surgeons, a full range of specialists, and specialty care resources, such as orthopedic surgery, neurosurgery, anesthesiology, laboratory services, emergency medicine, radiology, internal medicine, plastic surgery, oral and maxillofacial, pediatric, and critical care.
- Serves communities in nearby regions.
- Provides leadership in prevention and public education to surrounding communities.
- Provides continuing education programs for the trauma team members.
- Incorporates a comprehensive quality assessment program.
- Operates an organized teaching and research program to help direct new elevations in trauma care.
- Operates a program for sepsis, or substance abuse screening and patient intervention.
- Meets the minimal requirement for annual volume of severely injured patients.

### Level II

A level II trauma center can initiate definitive care for all injured patients, but may need to transfer some patients to a level 1 center.

### Elements of level II trauma centers:

- Provides 24-hour immediate coverage by general surgeons, and speciality care coverage, such as orthopedic surgery, neurosurgery, anesthesiology, emergency medicine, radiology, and critical care.
- May refer tertiary (high level, specialty care) needs, such as cardiac surgery, hemodialysis, and microvascular surgery to a level I trauma center.
- Provides trauma prevention and continuing education programs for staff.
- Incorporates a comprehensive quality assessment program.

### Level III

A level III trauma center provides assessment, surgery,

intensive care, and stabilization of injured patients in emergency operations.

### Elements of a Level III trauma center:

- Provides 24-hour immediate coverage by emergency medicine physicians and prompt availability of general surgeons and anesthesiologist.
- Incorporates a comprehensive quality assessment program.
- Transfers patients requiring more comprehensive care to a level I or level II trauma center.
- Provides backup care for referral and community hospitals.
- Offers education of the nursing and allied healthcare professional or the trauma team.
- Involved with prevention efforts and an active outreach program for its referring communities.

### Level IV

A level IV trauma center provides advance trauma life support before transferring the patient to a highlevel trauma center. The center provides evaluation, stabilization, and diagnostic testing for injured patients. **Elements of a level IV trauma center:** 

- Provides basic emergency department facilities to implement Advanced Trauma Life Support (ATLS) protocol and 24-hour laboratory coverage. The trauma nurses and physicians are available upon the patient's arrival.
- Can provide surgery and critical care services.
- Transfers patients requiring more comprehensive care to a level I or a level II trauma center.
- Incorporates a comprehensive quality assessment program.
- Involved with prevention efforts and an active outreach program for its referring communities.

### Level V

A level V trauma center provides initial evaluation, stabilization, and diagnostic testing, and prepares patients for transfer to higher levels of care.

### Elements of a level V trauma center:

- Basic emergency department facilities to implement ATLS protocols.
- Trauma nurses and physicians are available upon patient arrival.
- After hours activation protocols at the facility, but not available 24 hours a day.
- Can provide surgery and critical care services, if available.
- Transfers patients requiring more comprehensive care to a level I, II, or III trauma center.

## First Aid for Snakebites

Most snakes in the US are not poisonous, but you should treat all snakebites as if they are and seek medical attention immediately. Even if the snake is not poisonous, you can have an allergic reaction to the bite or you may need a tetanus shot for the puncture wound.

If a snake has bitten you or a friend, do not panic. Immediately, get away from the snake to prevent a second bite or becoming a second victim and call 911. Snakes can continue to bite and inject venom during successive bites. If possible, try to identify or be able to describe the snake, but only if it can be done without risk. A photograph taken with a cell phone or making note of the snake's identifying features, such as the color and pattern of the snake's skin, the shape of its head, or any identifying behavior can be helpful. Do not attempt to catch or trap the snake or waste time hunting it down.

Stay as calm as possible. Remaining calm and being still can keep your heart rate down and slow the spread of venom. Remove constricting items, such as rings, watches, bracelets, or other jewelry that can cut off blood flow if the bite area swells. You should quickly and safely transport the victim to an emergency medical facility if emergency medical technicians cannot come to you. Do not wait to see if symptoms appear before seeking medical attention. The sooner a snakebite victim receives medical attention the better the outcome.

**Fig. 1.** Elastic bandage being wrapped starting at the elbow towards the snake bite on the hand.





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If you are in a remote area and transportation to an emergency room will take an extended period of time, apply an elastic bandage to the bite area. Wrap the bite, beginning on the part of your body closest to your heart, and wrap down towards the bite. For example, if you were bitten on the hand, start wrapping the bandage at or above the elbow, and wrap down towards the bite on your hand (**Fig. 1**). Once you have wrapped the bite, keep the wound below your heart. The bandage is not meant to be a tourniquet. It should be tight, but not constricting enough to cut off the circulation. Do not use tourniquets or constriction bands on the bite. Tourniquets can cause tissue damage and could cost the victim a limb.

A snakebite victim should go to the emergency room for evaluation and, if needed, for anti-venom treatment that can counteract the poison. While you wait for help, provide emergency medical care within the limits of your abilities; you do not want to provide care to yourself or a friend that can cause more harm than good.

### What NOT to do

No matter what you have seen or heard, do not cut or lance the bite and attempt to suck the venom out. It does not remove the venom and cutting into the bite can damage tissue and increase the risk of infection. Do not apply ice, a cold compress, or alcohol to the bite. Ice does not deactivate the venom and it can damage your skin if you leave it on too long. Alcohol may deaden the pain, but it can also make the blood vessels larger, which can increase venom absorption. Do not drink alcohol or caffeinated drinks, which can increase your heart rate.

#### Identifying venomous snakes

Although there are many varieties of snakes throughout the US, only 4 types (rattlesnakes, cottonmouths, copperheads, and coral snakes) are venomous. Being able to tell the difference between venomous and nonvenomous snakes can be crucial. If the snake has a "triangular" shaped head and vertical, cat-like pupils, the snake is likely a venomous pit viper. The snake is likely to be nonvenomous if it has a "round" shaped head and round pupils (**Fig. 2**). The only exception is the colorful coral snake, which has a round head and round eyes.

The most common venomous snake in the US is the rattlesnake. A rattlesnake has rattles on its tail and a "diamond" or "V" shape pattern on its back. Often, victims of rattlesnake bites remember hearing a "rattling" sound, much like a rapidly shaken baby rattle, before being bitten.

Fig. 2. Head shape.





Copperhead snake. Triangular head shape and vertical pupils indicate a venomous snake.



Garter snake. Round head shape and round pupils indicate a nonvenomous snake.

If you hear a rattle, do not run away immediately. Locate the snake before you move because sudden movements and noises can trigger the snake to strike.

Cottonmouths, or water moccasins, are aggressive snakes that can be seen swimming in fresh water, such as swamps, rivers, lakes, and creeks. They are called "cottonmouths" because the inside of their mouth resembles a white piece of cotton. The difference between a cottonmouth and a common water snake is that water snakes usually swim with only their head above water; whereas, cottonmouths seem to have their entire bodies "floating" on water as they swim. Either way, if you see a snake in water, avoid it.

Copperhead snakes get their name from their copperred head. The pattern along the snake's back resembles an hourglass, they have a triangle or "V" shaped head, and the vertical, cat-like pupils typical of a pit-viper. Young copperheads are grayish in color and have a yellow tail that they flick as bait for prey. The gray color fades to bright reddish-tan as the snake ages.

Coral snakes are small, colorful, nonaggressive snakes with deadly venom. Coral snakes have a distinctive pattern of bright black, yellow, and red bands, with a yellow head, and a black nose. The saying, "red touch yellow, can kill a fellow; red touch black, a friend to Jack" makes the distinction between the deadly coral snake and harmless king snake (**Fig. 3**). The coral snake is not in the pit-viper family. It has a small round head with round eyes and does not effectively inject its venom.

Snakes are cold-blooded; which means, they are most aggressive and active in warmer weather and they like to hide in cool, dark locations. When you are outdoors in late spring, summer, and early fall be watchful for snakes. Do not place your hands or feet in areas that you cannot see, such as in holes, in woodpiles, or underneath objects left in your backyard.

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#### Fig. 3. Pattern and color.

## **Shoulder Dislocations**

Shoulder dislocations are a common injury; roughly 20 out of 100,000 people dislocate their shoulders each year. The shoulder joint has a unique anatomy, which can be why it tends to dislocate more often than the other large joints in the body. Your shoulder has a huge range of motion that allows you to swing your arms above, behind, and around your body. The shoulder joint is formed where the humerus, the upper arm bone, meets the scapula, the shoulder blade. The scapula forms a shallow cavity, known as the glenoid, where the head of the humerus rests. The labrum is a rim of cartilage that attaches around the edge of the glenoid and contributes to the stability of the shoulder (**Fig. 1**).



Unlike the hip joint with its tight-fitting ball and socket and a limited range of motion, the bones in the shoulder are loosely connected. The shoulder joint is more like Who is at risk for shoulder dislocation?

Although dislocations can occur at any age, there are 2 particular age-related peaks in the frequency of injury. The first occurs in men between the ages of 16 and 30 years old and often results from participating in vigorous sporting activity, such as football, basketball, baseball, hockey, or skiing. Another age-related peak occurs in women more often than men during the ages of 60 to 80 years. The dislocation often occurs at home as the result of a simple fall on an outstretched arm.

If you have dislocated your shoulder, you have more than likely stretched or torn some of the ligaments, muscles, and tendons of your shoulder, as well. After dislocating your shoulder, it can be difficult and painful to move your arm and you can experience bruising and swelling at the shoulder. You can also have numbness, tingling, or weakness in your arm, hand, and fingers.

### Nonsurgical treatment

After a shoulder injury, keep your arm close to your body and try not to move it. If possible, place an ice pack on your shoulder to help slow the swelling. Remove any rings from your fingers and any bracelets or other jewelry from your wrist and arm to avoid cutting off the circulation if swelling occurs.

A shoulder dislocation should be evaluated and reduced, or put back in place, as soon as possible. Your doctor may sedate you because pain and the injury can cause severe muscle spasms that can make reduction difficult. Your arm may be placed in a sling and held at your side while the stretched and torn soft tissues heal.

### **Chronic dislocation**

Often, shoulder dislocations produce a lasting injury to the shoulder that causes chronic problems. Some of the most common injuries sustained during dislocation are Bankart lesions, Hill-Sachs lesions, and tears of the

a ball on a plate rather than a ball in a socket. The joint capsule, consisting of ligaments (tissues that connect bone to bone), muscles, and tendons (tissues that connect muscle to bone), helps to stabilize the joint (Fig. 2). If an injury occurs, such as a hard blow or a fall on an outstretched arm, it can force the humeral head out of the glenoid, causing a dislocation.



capsule and rotator cuff (Fig. 3). A Bankart lesion occurs when the humeral head tears part of the labrum from the glenoid as the shoulder dislocates. A Hill-Sachs lesion can occur when the humeral head is forced forward causing the back of the head to strike against the front of the glenoid, creating an indentation fracture. Tears of the capsule and the rotator cuff are injuries to the ligaments,



muscles, and tendons that surround the shoulder joint. These types of injuries make the shoulder even more unstable and likely to dislocate again. In the general population, the risk of another dislocation is fairly low at around 20%; however, in young athletic men, the rate of recurrence within 5 years is higher than 85%. With every dislocation, the shoulder sustains more damage and becomes more unstable. In young men, who are likely to have recurrences, surgical intervention can repair the damaged structures in the shoulder. After surgery, the risk of another dislocation is reduced to 10% to 15% in young, active men.

### Surgical treatment

Surgical stabilization of the shoulder can be performed arthroscopically. The surgeon makes several small incisions around the shoulder and inserts a camera and microscopic instruments through the portals to examine the injury. Arthroscopic repair of the tears helps to restore normal shoulder function and improve stability.

Shoulder dislocations are common and can result from falls, accidents, and sporting injuries. Most people who sustain a shoulder dislocation from an isolated trauma can go on to heal and have normal function and stability in the shoulder. For some patients, however, especially young athletes—and young male athletes, in particular the rate of repeated dislocation can be quite high when treated nonsurgically. Physicians often recommend that anyone who continues to participate in vigorous activities following a shoulder dislocation strongly consider having the injury repaired surgically to reduce the risk of another dislocation. Recovery after surgery can take from 3 to 6 months; however, the return to normal function and stability of the shoulder often makes it worth the time and effort.

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## Concussions & ImPACT<sup>™</sup> Testing Guidelines for Athletes

A concussion is a type of traumatic brain injury that causes a temporary change in mental function. A concussion occurs when your head is hit or jolted and your brain's soft tissue moves in reaction to the sudden force (**Fig.**). At impact with the skull, the brain can become bruised, tissues can be torn, and minor swelling can occur. Concussions and the symptoms they produce range in severity; not everyone experiences the same signs and symptoms after a head injury. Balance problems, disorientation, lightheadedness, headache, nausea, tinnitus (ringing in the ears), fatigue, and sensitivity to light or noise are some of the symptoms.

#### Range of severity and symptoms for concussions. Mild • Momentary confusion • Remains conscious Lightheadedness • Short recovery • Short span of disorientation time **Moderate** Longer span of confusion • Remains conscious Disorientation Loss of balance Recovery takes • Slight amnesia • Headache longer Severe • Nausea • Balance problems • Loss of • Tinnitus (ringing in the ears) consciousness Late • Sleep irregularities • Depression/anxiety • Lethargy • Memory dysfunction • Personality changes The Hughston Foundation, Inc. ©2014

The Centers of Disease Control and Prevention (CDC) analyzed data from the National Electronic Injury Surveillance System-All Injury Program for the period of 2001 to 2009 and found that an estimated 173,284 people under 19 years of age were treated in emergency departments annually for nonfatal traumatic brain injury related to sports and recreation activities. The number may seem high, but researchers believe far more concussions occur in sports than are reported. Research published in the *Clinical Journal of Sports Medicine* in 2004 found that nearly half of the football players surveyed failed to report their symptoms. Researchers discovered that athletes sometimes neglect to report their symptoms because they either don't know something is wrong or they are afraid of being taken out of play.

Concussions are the mildest form of traumatic brain injury; however, the cumulative effect of having more than 1 concussion can be permanently damaging or deadly. Second impact syndrome occurs when another concussion



happens before the first concussion heals. The results can be life threatening. The question now becomes how do we prevent this from continuing to occur? Some athletic training programs are taking steps to help resolve the problem by teaching athletes, parents, and coaches how to recognize symptoms and by implementing a testing program to help evaluate the symptoms and identify any changes in behavior or cognitive function after a head injury.

### **ImPACT<sup>™</sup> testing**

Immediate postconcussion assessment and cognitive testing, or ImPACT<sup>™</sup> is a computerized neuropsychological test used to aid in the diagnosis of a concussion. It tests cognitive impairment after a concussion by evaluating symptoms, medical history, visual and verbal memory, and reaction time and speed.

For ImPACT<sup>™</sup> to be useful, you must take a baseline test every 2 years before the season begins. If you sustain a head injury, you are given a postinjury ImPACT<sup>™</sup> test within 24 to 72 hours. The results from the postinjury test are compared with the baseline test to identify concussionlike symptoms and determine if any abnormalities in cognitive function appear.

If you are diagnosed with a concussion, you must follow a return to play protocol under the direct supervision of a healthcare professional. After you have completed the return to play protocol, a second postinjury test is given. The test is compared with the baseline and first postinjury test to evaluate improvements in your symptoms and cognitive function.

ImPACT<sup>™</sup> testing can be a reliable tool in concussion management by helping track the cognitive status of athletes. The testing does not prevent concussions, but the information gathered from the results can help healthcare professionals to guard against premature return to play.

> Kristen Kunkel, ATC & Elizabeth Yates, ATC Columbus, Georgia

Further Reading:

1. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report (MMWR). 2011;60(39):1.

2. ImPACT Testing. www.ImPACTTesting.com Accessed: 4/30/2014.

### Return to play protocol following a concussion

# The first few days following an injury the athlete needs complete physical and mental rest.

- Stay off feet as much as possible.
- No loud music and no video games.

### **Return to play steps:**

**1.** No activity (complete rest) until all symptoms have resolved. Once asymptomatic *without medication* for a complete 24-hour period, proceed to step 2.

**2.** Begin light aerobic exercise, such as walking or stationary cycling. No weight lifting or resistance training. If still asymptomatic *without medication*, the athlete can proceed to step 3 the following day.

**3.** Begin sport-specific exercises, such as throwing a baseball or going through passing routes and light weight training. If asymptomatic *without medication*, proceed to step 4 the next day.

**4.** Begin noncontact training drills. If still asymptomatic without medication, proceed to step 5.

**5.** Begin full-contact training after medical clearance. If the athlete has made it through all the steps without a return of symptoms and has been granted clearance for return to activity by their physician, then and only then, can the athlete return to competition.

6. Game play.

If any postconcussive symptoms occur, stop all activity until asymptomatic for 24 hours *without medication* and then resume at level 2.

Adapted from the Fourth International Conference on Concussion in Sport (Zurich 2012).







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