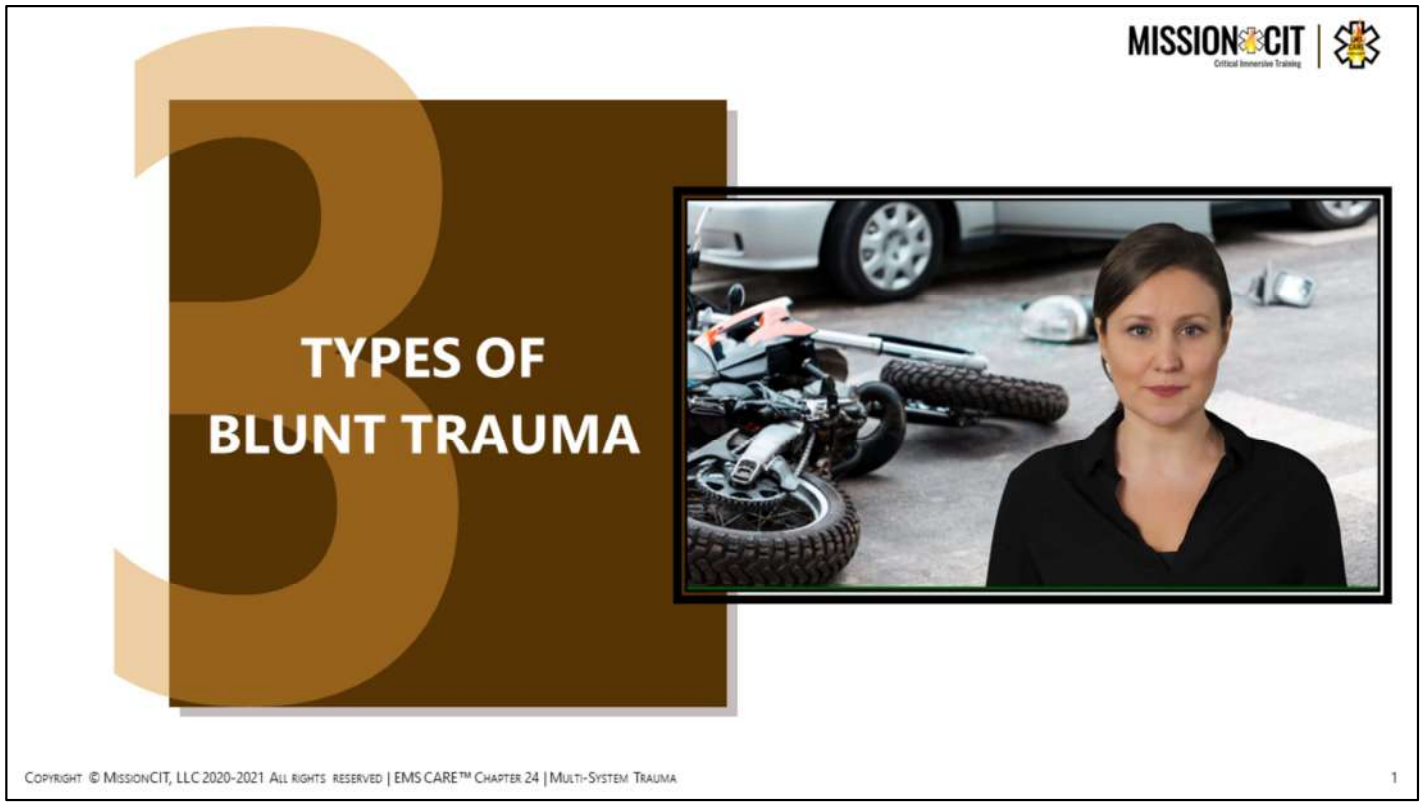
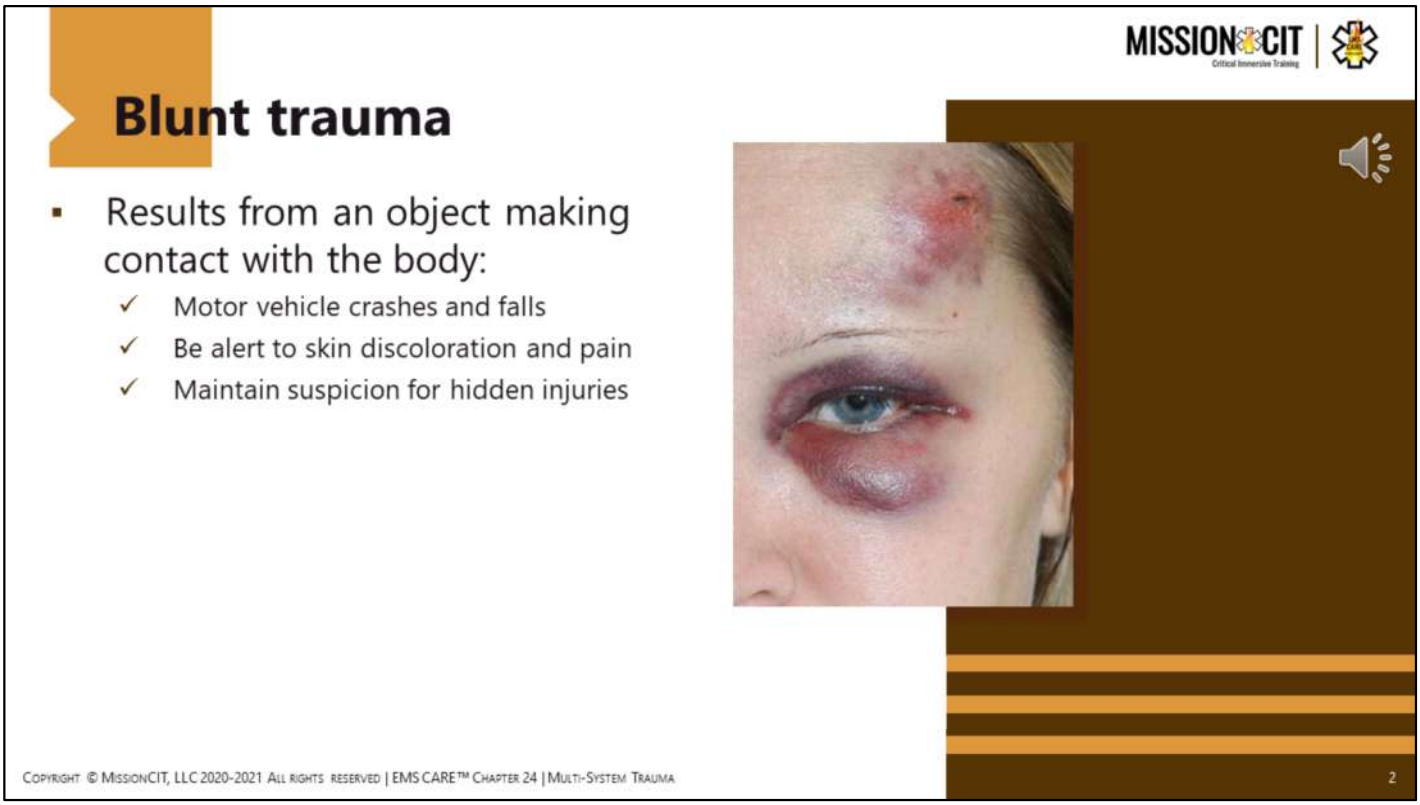


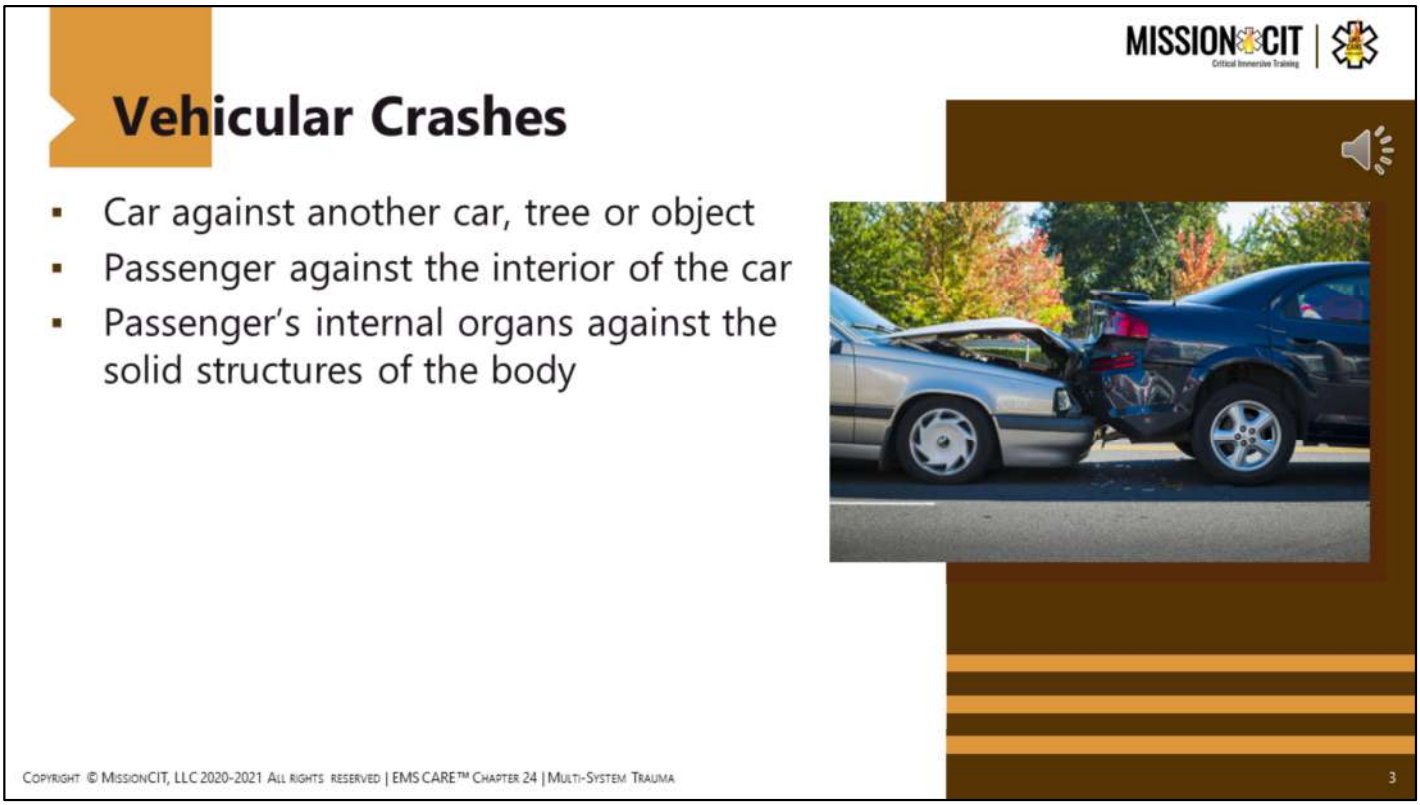
Thank you, Justin! In this lesson, we will be talking about blunt trauma which occurs when the force applied to the body is not sharp in nature. Blunt trauma may result in internal or external hemorrhage depending on location and mechanism. Blunt trauma results in fracture, laceration, and other external wounds, tearing by shear forces, pressure causing “blowout” type injuries, and coup–contrecoup injuries that are bilaterally caused by the recoil after the initial impact. This lesson will discuss common mechanisms and the expected injuries that result.

Good Studying.



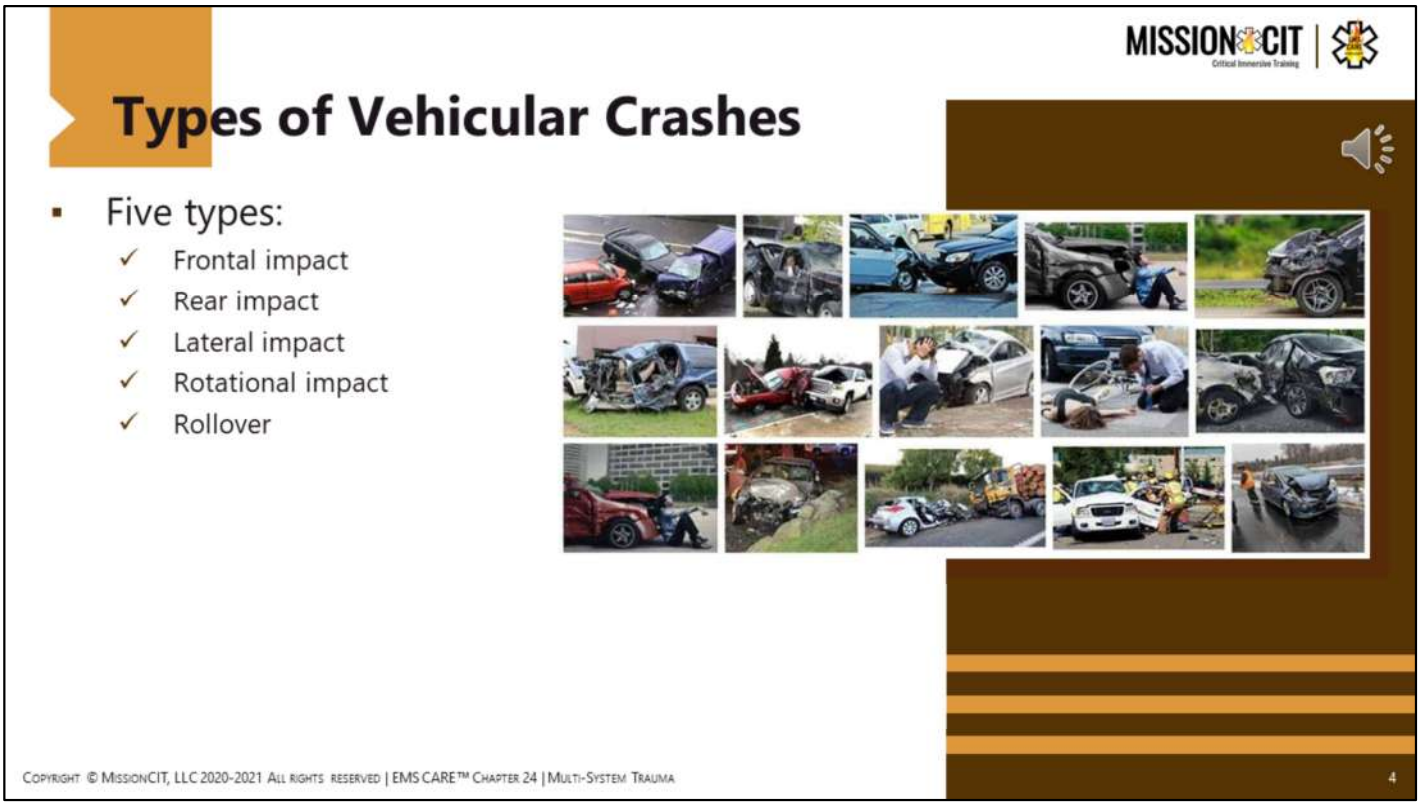
Blunt trauma results from an object making contact with the body.

- Motor vehicle crashes and falls are the most common MOIs
- Be alert to skin discoloration and pain as these may be the only signs of blunt trauma
- Maintain a high index of suspicion for hidden injuries



A crash typically consists of three collisions.

- Car against another car, tree, or object:
    - By assessing the vehicle that has crashed, you can often determine the MOI.
- Passenger against the interior of the car:
    - Kinetic energy produced by the passenger's mass and velocity is converted into the work of stopping his or her body.
    - Common passenger injuries include lower extremity fractures, rib fractures, and head trauma.
- Passenger's internal organs against the solid structures of the body:
    - Internal injuries may not be as obvious as external injuries, but they are often the most life-threatening.

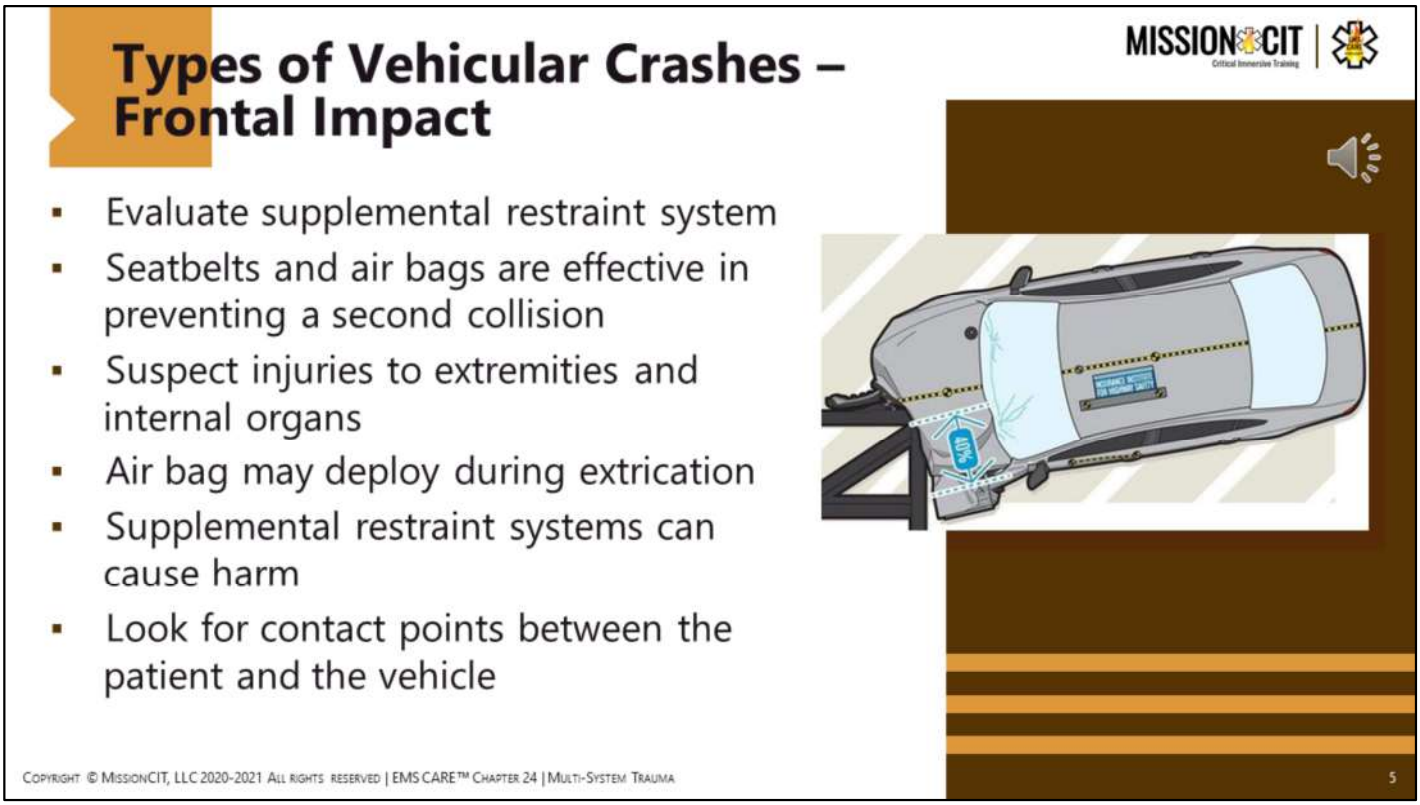


Motor vehicle crashes are a public health concern both in the United States and abroad. In the United States, motor vehicle crashes are a leading cause of death, and kill over 100 people every day.

MVCs can be divided into the following five types:

- Frontal impact
- Rear impact
- Lateral impact
- Rotational impact, and
- Rollover

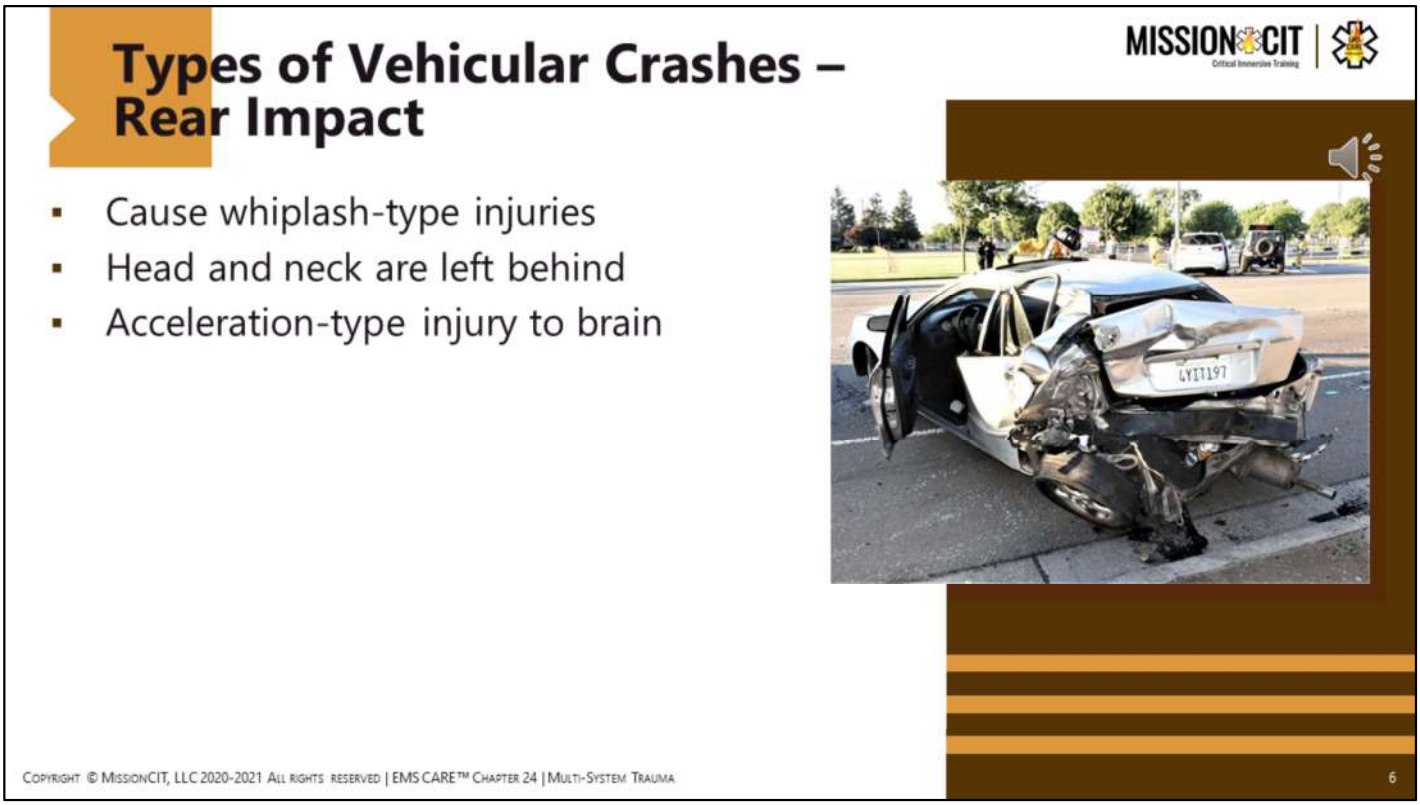
One method to estimate the potential for injury to the occupant is to look at the vehicle and determine which of the five types of collisions occurred, the energy exchange involved, and the direction of the impact. The occupant receives the same type of force as the vehicle from the same direction as the vehicle. The amount of force exchanged with the occupant, however, may be somewhat reduced by absorption of energy by the vehicle. Unbelted drivers and front-seat passengers suffer multi-system trauma due to multiple collisions of the body and organs.



Now, we will discuss each type of MVC. Frontal impact, or head-on, involves the vehicle colliding with another vehicle or object, such as a wall. The first collision occurs when the vehicle hits the wall, although the vehicle suddenly stops, the occupant continues to move forward.

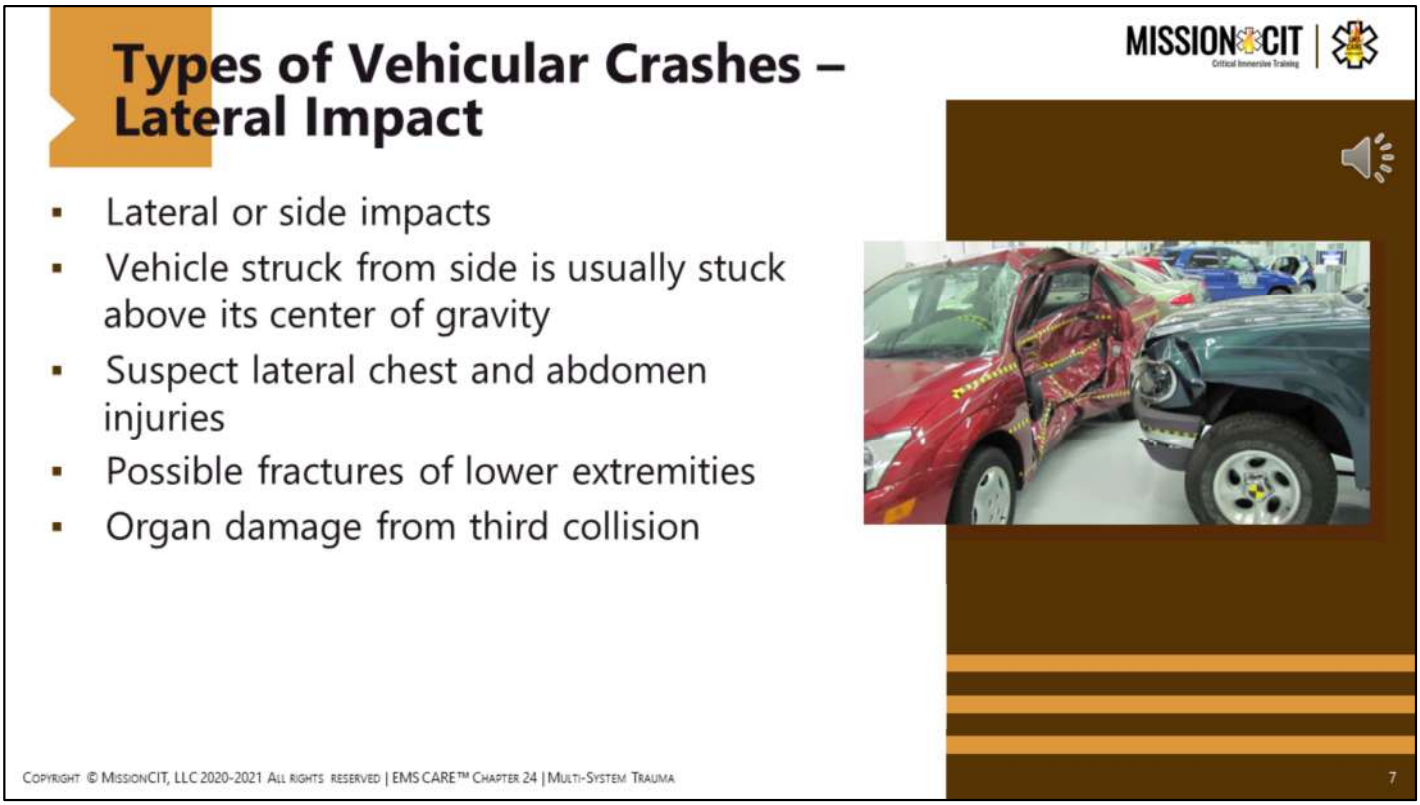
- Evaluate the supplemental restraint system.
    - Determine whether the passenger was restrained by a full and properly applied three-point restraint.
    - Determine whether the airbag was deployed.
- Seatbelts and airbags are effective in preventing a second collision inside the motor vehicle.
    - Seatbelts may decrease the severity of the third collision.
    - Airbags decrease the severity of deceleration injuries and decrease injury to the chest, face, and head.
- Despite airbags, suspect injuries to:
    - Extremities (resulting from the second collision)
    - Internal organs (resulting from the third collision)

- Remember that if the airbag did not inflate during the accident, it may deploy during extrication.
- Remember that supplemental restraint systems can cause harm whether used properly or improperly.
    - Hip dislocations may result if seatbelts are worn too low.
    - Internal injuries can occur when the belt is worn too high.
    - Lumbar spine fractures are also possible, particularly in children and older patients.
- Look for contact points between the patient and the vehicle.



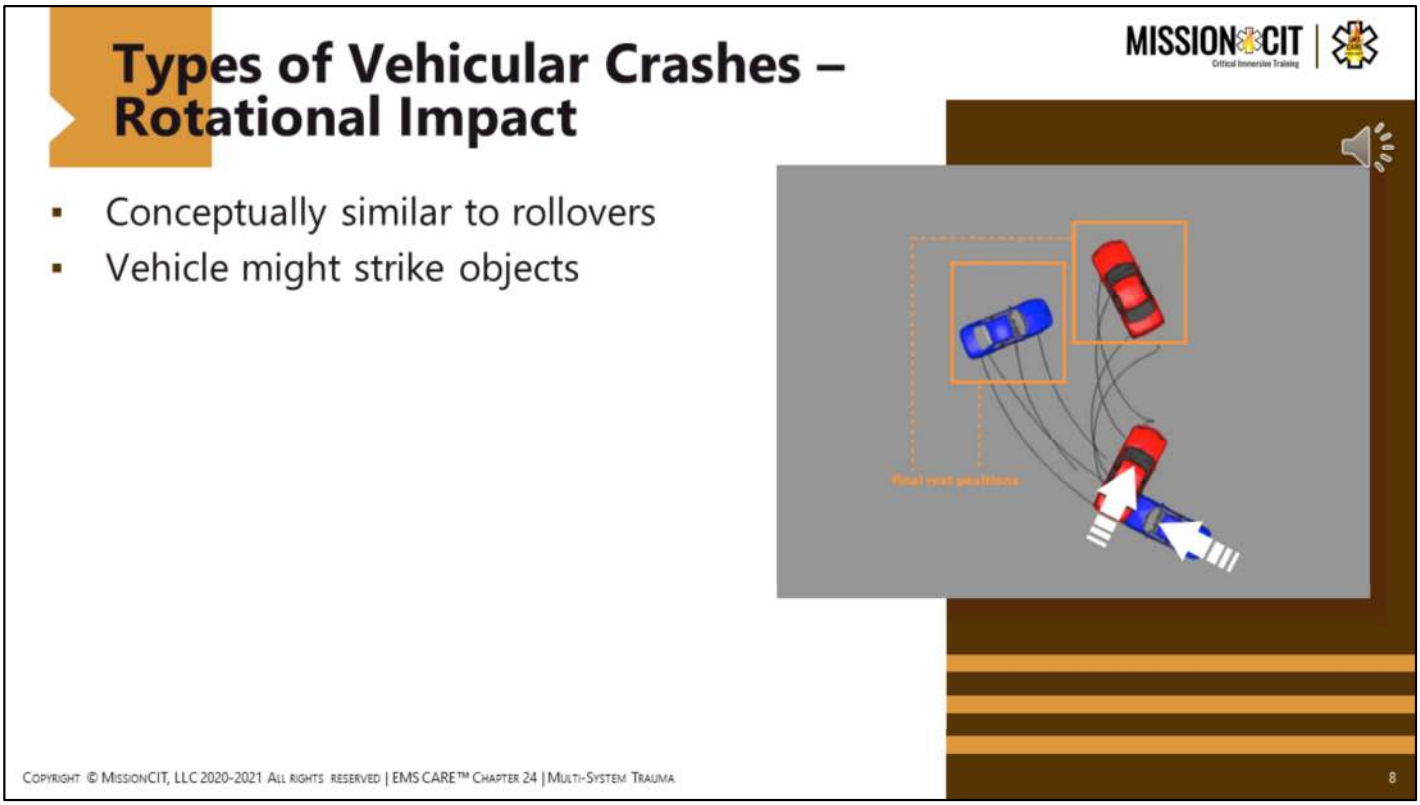
Rear impact collisions occur when a slower moving or stationary object is hit from behind by a faster-moving one. On impact, the vehicle in front is accelerated forward, as is everything in contact with the vehicle.

- Rear-end impacts cause whiplash-type injuries, particularly in absence of an appropriately placed headrest
- As the body is propelled forward, the head and neck are left behind
- Acceleration-type injury to the brain is possible



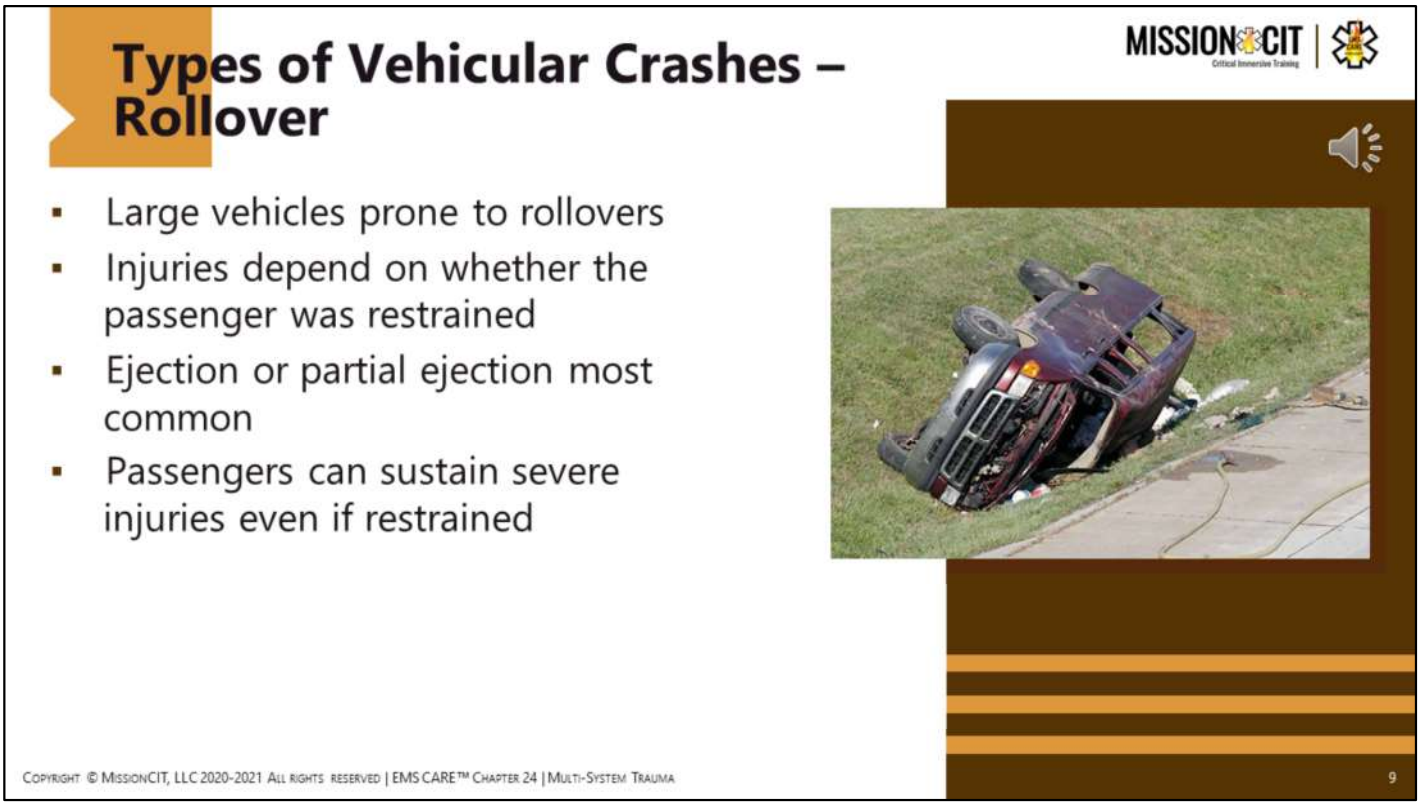
Lateral impacts occur when a vehicle is struck from the side, for example, a vehicle failing to stop at a given way and striking a vehicle on a major road. The vehicle is pushed sideways by the collision and the side of the vehicle or door may be pushed against the side of the occupant.

- Lateral or side impacts are a very common cause of death associated with motor vehicle crashes
- A vehicle struck from the side is usually struck above its center of gravity
    - Begins to rock away from the side of impact
    - This results in the passenger sustaining a lateral whiplash injury
- If there is a substantial intrusion into the passenger compartment, suspect:
    - Lateral chest and abdomen injuries on the side of the impact
    - Possible fractures of the lower extremities, pelvis, and ribs
    - And, organ damage from the third collision



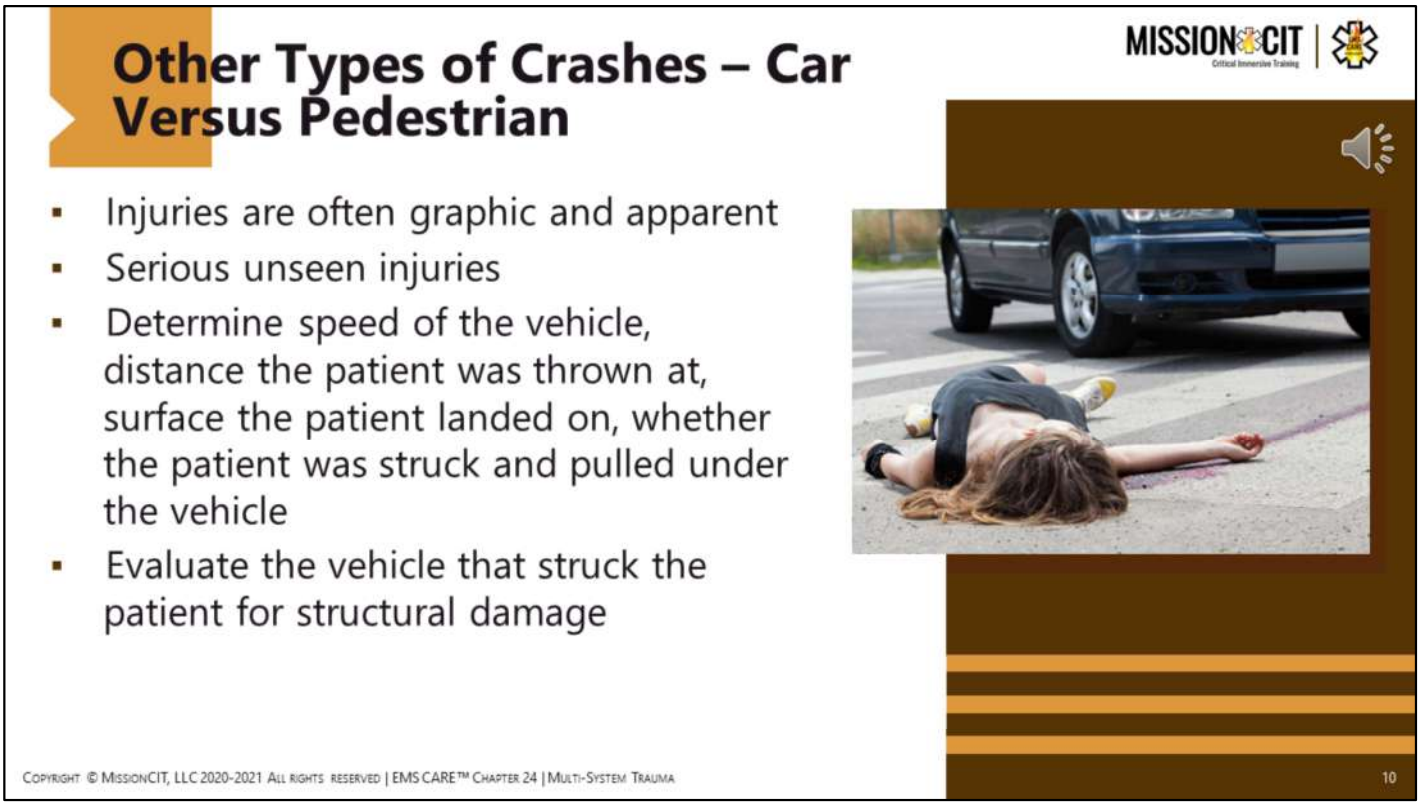
Rotational impact collisions occur when one corner of the vehicle strikes another vehicle or object, for example, a car clipping a bus. The corner of the vehicle striking the object will come to a standstill while the rest of the vehicle will spin.

- Rotational crashes (spins) are conceptually similar to rollovers
- The rotation of the vehicle as it spins provides opportunities for the vehicle to strike objects, such as utility poles



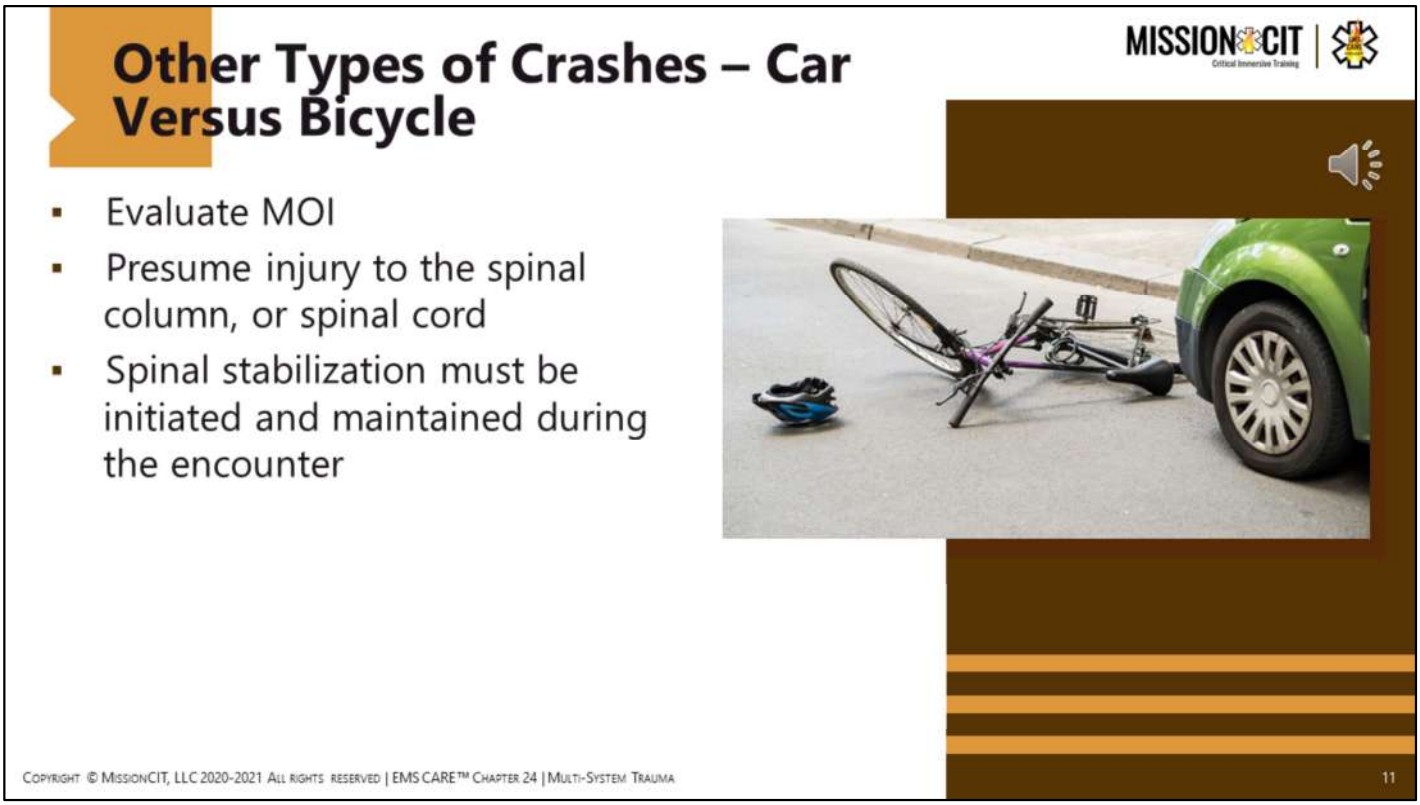
During a rollover collision, a vehicle may undergo several impacts at many different angles, as may the occupant's body and internal organs. As injury and damage can occur with every single impact it is not possible to predict the injuries that these victims receive.

- Large trucks and sport utility vehicles are prone to rollovers because of their high center of gravity
- Injuries depend on whether the passenger was restrained
- The most common life-threatening event in a rollover is ejection or partial ejection of the passenger from the vehicle
- Even when restrained, passengers can sustain severe injuries

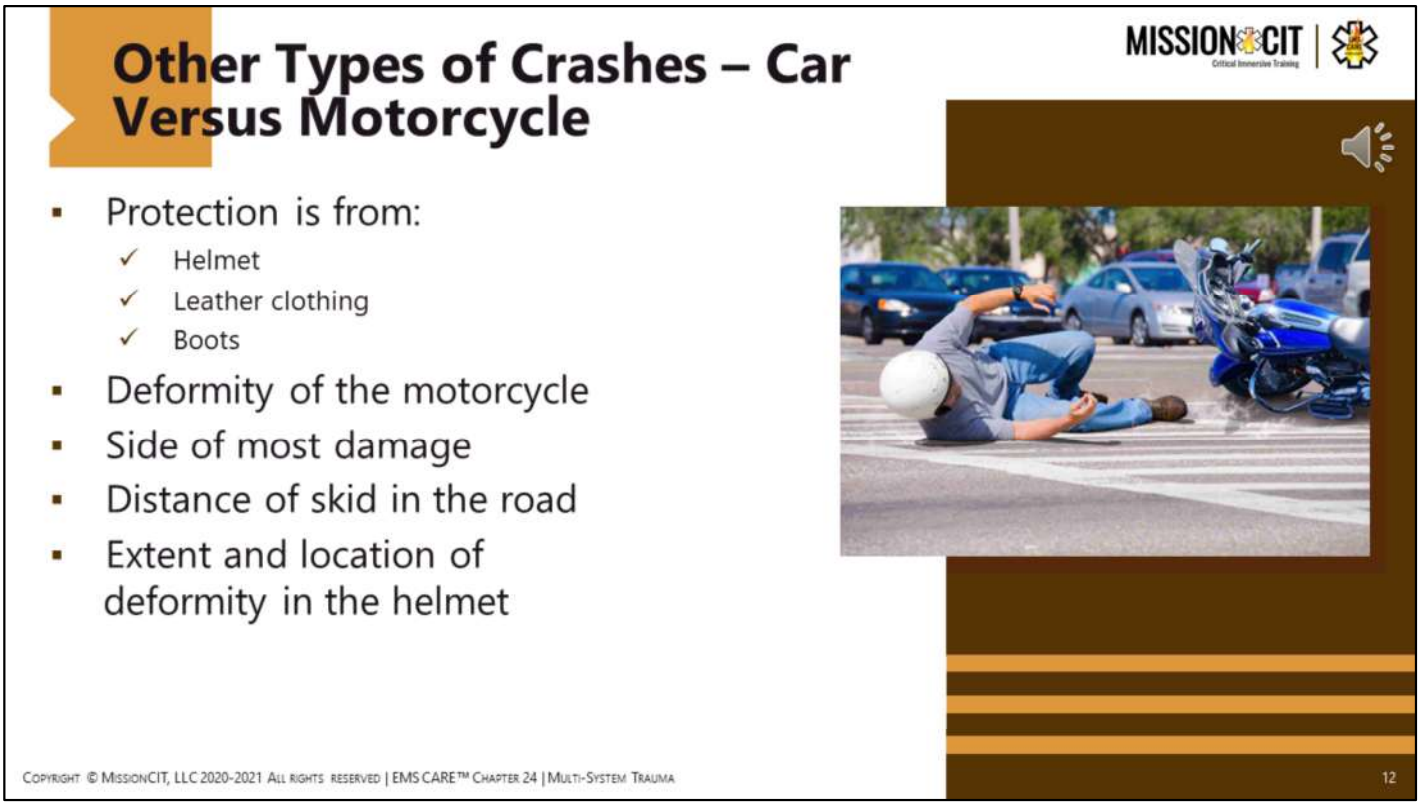


Pedestrians are the most vulnerable road users in traffic crashes. On road accidents the impact between pedestrian and motor vehicle generates, in most situations, severe injuries and even deaths among pedestrians.

- In these type of accidents, the injuries are often graphic and apparent
- There can also be serious unseen injuries
- You should determine:
    - Speed of the vehicle
    - Whether the patient was thrown through the air and at what distance
    - Surface the patient landed on
    - Whether the patient was struck and pulled under the vehicle
- Evaluate the vehicle that struck the patient for structural damage



- In a car versus bicycle crash, evaluate the MOI in much the same manner as car-versus-pedestrian crashes
    - Evaluate the damage to, and position of, the bicycle
    - If the patient was wearing a helmet, inspect it for damage
- Presume that the patient has sustained an injury to the spinal column, or spinal cord
- Spinal stabilization must be initiated and maintained during the encounter

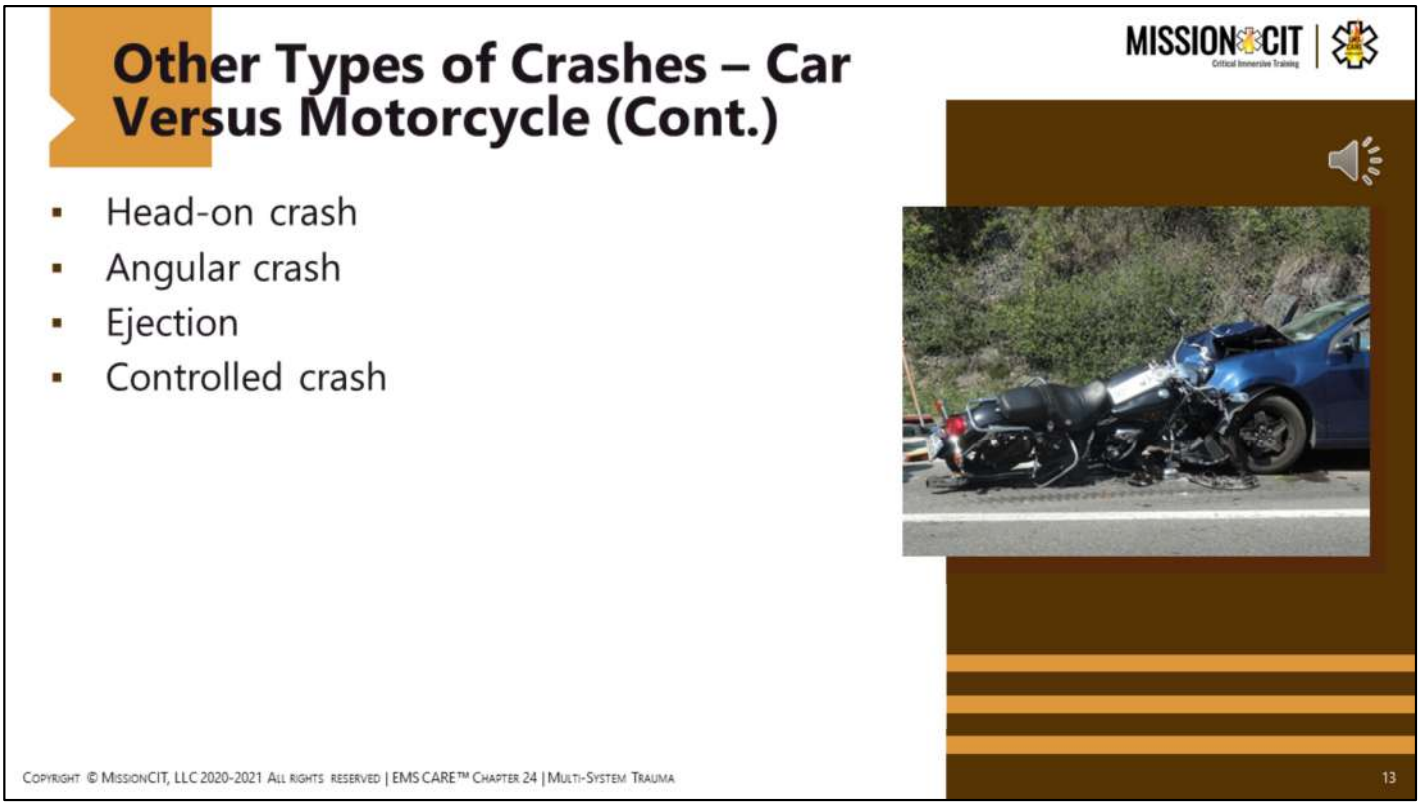


Motorcyclists can get protection from a helmet, leather clothing and boots.

- A helmet does not protect against severe cervical injury
- Leather or abrasion-resistant clothing will protect against road abrasion not against blunt trauma from secondary impacts

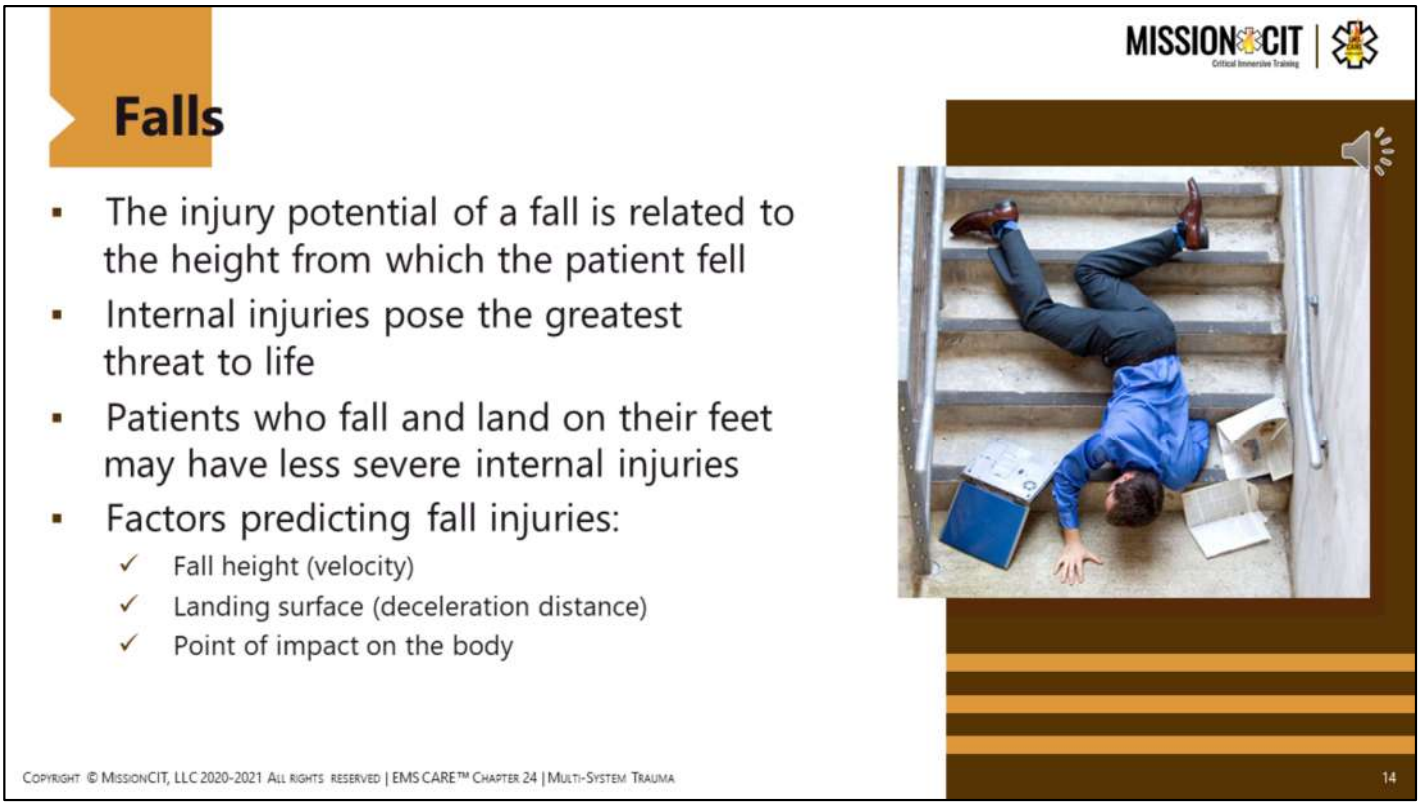
When assessing the scene of a motorcycle crash, look for:

- Deformity of the motorcycle
- Side of the most damage
- Distance of skid in the road
- Extent and location of deformity in the helmet



There are four types of motorcycle impacts.

- Head-on crash: The motorcycle strikes another object and stops its forward motion while the rider continues his or her forward motion until stopped by an outside force.
- Angular crash: The motorcycle strikes an object or another vehicle at an angle so that the rider sustains direct crushing injuries to the lower extremity between the object and the motorcycle.
- Ejection: The rider will travel at high speed until stopped by a stationary object, another vehicle, or road drag. Severe abrasion injuries down to bone can occur with drag.
- Controlled crash: A technique used to separate the rider from the body of the motorcycle and the object to be hit is referred to as laying the bike down.



Falls remain one of the most common mechanisms across the age groups, with the highest occurrence in children and the elderly. Falls can be as simple as tripping or slipping on a wet surface to falls from a significant height, like parachutes and bungee jumping, which result in severe injuries. The mechanics of the fall and the position of landing give clues to the injuries sustained. In the case of intentional injury, psychiatric support must be anticipated in addition to identifying and managing the injuries.

- The injury potential of a fall is related to the height from which the patient fell
    - The greater the height of the fall, the greater the potential for injury
    - A fall from more than 20 ft (6m) is considered significant
- Internal injuries pose the greatest threat to life
- Patients who fall and land on their feet may have less severe internal injuries because their legs may have absorbed much of the energy of the fall
    - They may have very serious injuries to the lower extremities, pelvis and spine

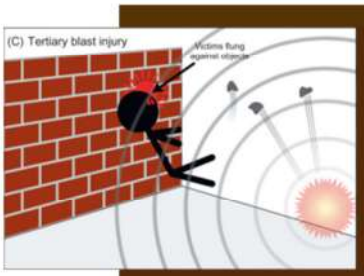
Factors predicting fall injuries:

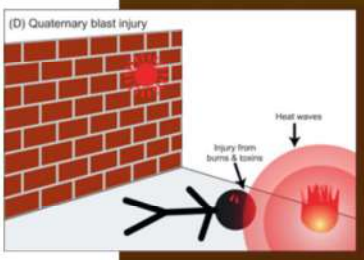
- Fall height (velocity) – more than 15 feet or 3 x the patient's height is considered significant

- Landing surface (deceleration distance)
- Point of impact on the body – where the energy was initially applied

Blunt Trauma – Blast Injuries

- Tertiary and quaternary blast injury to extremities
- Victims propelled against surrounding structures
- Building collapse may produce crush injury and compartment syndrome





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Blast injuries are a special form of blunt trauma with serious internal injuries often without evidence of external lesions. Tertiary and quaternary blast injury to extremities more closely resembles civilian trauma. Victims suffer from blunt impact forces when propelled against surrounding structures. Building collapse may produce crush injury and the potential for compartment syndrome.



A gunshot wound, or an injury caused by a bullet or other projectile from a firearm, is considered a medical emergency. A bullet can enter or pass through the body at a high velocity, possibly causing serious blood loss and structural damage.

Gunshot wounds can be either penetrating or perforating. In a penetrating wound, the bullet enters an object and remains inside, while in a perforating wound, the bullet passes completely through the object. In some cases, the wound can be both penetrating and perforating, in that it penetrates some part of the body, such as the head, but perforates certain parts, such as the skull or brain.

In a perforating wound, the bullet creates an exit wound as it escapes the body. An exit wound differs greatly from an entrance wound. An entrance wound is surrounded by a reddish-brown area of abraded skin, known as the abrasion ring, and small amounts of blood escape through. An exit wound, on the other hand, is larger and more irregular, with extruding tissue and no abrasion ring. There is far more blood that escapes an exit wound, and it can possibly be profuse.

After the bullet enters through the skin, the skin retracts due to its elasticity. This will make the wound appear smaller than the bullet that has passed through. The bullet usually travels in a straight line, but its direction is unpredictable if it hits a bone. When this occurs, the bone may be shattered or the bullet may deflect and be sent to another area of the body.

Gunshot wounds can cause serious injury, including:

- Severe bleeding
- Damage to tissues and organs
- Broken bones
- Wound infections, and
- Paralysis

This brings us to the end of this lesson and in the next one, Justin will talk about penetrating trauma.