

Trauma assessment

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What is trauma?

- So what is trauma?
 - Injury to human tissues and organs resulting from the transfer of energy from the environment.
 - Injuries are caused by some form of energy that is beyond the bodies resilience to tolerate
 - Accidents
 - MVA
 - Accidental falls
 - All other accidents
 - Poisonings (not included in VSTORM)
 - Violence

Major Trauma

- Leading cause of death in 0-40 year olds
- Major trauma comprises a low volume – high complexity proportion of overall emergency cases
- 2009-10 - 1.5 million presentations to Victorian Emergency Departments – VSTR identified 2745 major trauma patients
- During 2009–2010 the overall death rate due to major trauma in Victoria was 24.7 deaths per 100,000 population

Trimodal distribution of death

- **'The Golden Hour'**
- Trunkey (1983)

T1: 50% of deaths within seconds or minutes due to major blood vessel disruption or massive spinal cord/CNS injury

T2: 30% of deaths within 1st hour due to truncal injury causing respiratory & circulatory compromise

T3: 20% of deaths much later from MOF, ARDS, sepsis and diffuse brain injury

Body's response to trauma

- Major patient problems:
 1. Hypovolaemia
 2. Respiratory dysfunction
 3. Cerebral dysfunction
 4. Hypoperfusion
- Factors influencing outcome
 - Severity: single verses multiple system injury
 - Age

Types of injuries

- **Blunt**
 - Injury is produced by:
 - compression and change of speed (may disrupt tissue)
 - direct compression or pressure on a structure (most common type of **force** in blunt trauma)
 - Severity of injury depends on:
 - Time of compression
 - Force of compression
 - Area compressed
- **Penetrating**
 - Injury is produced by either a stab wound or firearm
 - Severity depends on
 - Length of instrument (stab)
 - Velocity
 - Angle of entry
 - Bullets
 - projectile mass, fragmentation, type of tissue struck and striking velocity

Patterns of injury

- Influenced by:
 - age of the patient
 - the mechanism of the injury
 - any pre-existing factors
 - Illness
 - Drugs and alcohol
 - Use of protective clothing/structures

Mechanism of Injury

- Trauma results from the transfer of energy in a quantity sufficient to cause damage at the cellular level.

Mechanism of Injury

- Biological tissues, organs and systems can withstand only a limited range of physical, environmental and physiological stresses.
- Injury is sustained whenever the energy delivered to a tissue exceeds the injury threshold or tolerance of that tissue.

Mechanism of Injury


- The energy can be delivered in any of its forms:
 - Kinetic energy
 - Thermal energy
 - Electrical energy
 - Chemical energy
 - Nuclear energy

Mechanism of Injury

- The tolerance of the tissue depends upon factors such as the type of tissue involved and the age and physical health of the patient


Mechanism of Injury

- Mechanism of Injury has two components:
 1. The physics of the energy transfer – influenced by the type and magnitude of the energy and the duration of the exposure to the energy;
 2. The biological response of the human body to receiving such energy – influenced by the tolerance of the tissues, organs and structures involved



Blunt trauma caused by kinetic energy

- Kinetic energy (energy related to motion) is the common type of energy that results in injury.
- It is responsible for energy transfer in road traffic collisions, penetrating trauma, falls and crush injuries.




Blunt trauma caused by kinetic energy

- Much of what is understood about kinetic energy stems from Newton's laws of motion.
- In particular, Newton's first law: a physical body will continue to move at a constant speed and direction (velocity) unless a net force acts upon it.




Blunt trauma caused by kinetic energy

- This law underpins the four collisions recognised during a sudden deceleration (or acceleration) as might be seen in a crash:




Blunt trauma caused by kinetic energy

- The first collision occurs when the vehicle strikes another object and kinetic energy is absorbed by the crushing metal and other materials



Blunt trauma caused by kinetic energy

- The second collision occurs when the occupant strikes the interior of the vehicle or another occupant



Blunt trauma caused by kinetic energy

- The third collision occurs when the occupant's internal organs continue to move and contact hard surfaces, such as the skull and chest wall, creating further potential for injury.

Blunt trauma caused by kinetic energy

- A fourth collision occurs if loose objects in the vehicle continue in motion and collide with the occupant.
- Even though a car may be stopped from moving by hitting an immovable object, the occupants, their internal organs and vasculature and other objects within the car will not stop moving until each has encountered its own point of impact

Blunt trauma caused by kinetic energy

- The human tolerance to kinetic energy is influenced by both the *magnitude* and the *duration* of exposure.
- A large energy transfer can be withstood if applied over a prolonged time period, but the same net force may not be tolerated if applied over a very short period

Blunt trauma caused by kinetic energy

- When considering kinetic energy transfer, the exposure can often be described in terms of the rate of change of velocity or the acceleration or deceleration experienced as a result of energy.

Blunt trauma caused by kinetic energy

- Most commonly, injury is sustained during excessive deceleration – a falling person decelerates as they hit the ground or a motorcyclist decelerates on hitting a tree.
- Excessive acceleration may also cause injury – the pilot in an ejector seat and the occupant of a stationary vehicle that is hit from behind

Motor vehicle collision

- Three impacts occur as the energy is transferred to produce the injury:
 1. Vehicle strikes object
 2. Occupant collides with inside of car
 3. Internal organs collide inside body
- Type of impact
- Head on
 - Lateral
 - Rear end
 - Rotational
 - Rollover

Head-On (Frontal) Impact

- Forward motion stops abruptly:
 - First collision
 - Second collision
 - Third collision
- Occupant usually travels in pathways relative to dashboard
 - Down and under
 - Up and over

Down-and-Under Pathway

- Occupant goes downward into vehicle seat and forward into dashboard or steering column
 - Knees strike dashboard
 - Upper legs absorb impact

Lateral Impact

- Vehicle is struck from side
- Injury patterns differ if vehicle:
 - Remains in place
 - Moves away from point of impact

Rear-End Impact

- Vehicle struck from behind
 - Rapidly accelerates
 - Car moves forward under occupant
- Forward collisions
 - Damage = Sum of both vehicles' speeds
- Rear-end collisions
 - Damage = Difference between two vehicles' speeds

Rotational Impact

- Off-centre portion of vehicle strikes an immovable object
 - Or one that is moving:
 - More slowly
 - In the opposite direction

Rollover Accidents

- Occupant tumbles inside car
 - Injured wherever body strikes vehicle
 - Impacts at many different angles
 - May be multiple-system injuries
- Injuries are difficult to predict
 - May produce any injury pattern seen in other types of collisions

Restraint use

- Lap belts
- Shoulder straps
- Airbags
- Child safety seats

Restraint Injuries:

- Seat belts.
 - Not worn properly can cause various injuries.
 - Even worn properly, do not protect against side impacts.
- Airbags.
 - Works best for first impact.
 - Powder burns.
 - Suffocation for infants and children.

Considerations for Infants & Children:

- Look for possible neck injuries even if child is restrained in a car seat.
- Use the car seat to immobilize the infant.

Deceleration Injuries

- After impact, organs continue to pull against structures that attach them to the body
 - Organs may separate from attachments
 - Vascular pedicle or mesenteric attachment injury may cause haemorrhage

Head Injuries

- Head strikes stationary object
 - Cranium stops abruptly
 - Brain continues moving and is compressed against skull
- Compression to head may cause:
 - Open fractures
 - Closed fractures
 - Bone fragment penetration (depressed skull fracture)
- Associated injuries
 - Brain contusion
 - Lacerations of brain tissue

Thoracic Injuries

- Aorta often injured by severe deceleration forces
 - Usually sheared at ligamentum arteriosum attachment
 - Rupture causes rapid exsanguination

Abdominal Injuries

- Abdominal organs and retroperitoneal structures (most commonly the kidneys) may be affected by deceleration forces

Thoracic Injuries

- Lungs and heart often involved in compression injury to thorax
- "Paper bag effect" may cause serious lung injury

Abdominal Injuries

- Compression injuries
 - Solid organ rupture
 - Vascular organ haemorrhage
 - Hollow organ perforation into peritoneal cavity
- Common injuries
 - Lacerations to spleen, liver, and kidney
 - Rupture of a full bladder
- Predictable injuries

Other Vehicular Collisions

- All-terrain vehicles (ATVs)
- Snowmobiles
- Motor boats
- Jet skis
- Farm machinery
- Motorcycles

Motorcycle Collisions

- Head-on impact
- Rider over handlebars
- Injuries may include:
 - Head and neck
 - Chest and abdomen
 - Femur, lower leg fractures
 - Perineal injuries

Motorcycle Collisions

- Angular impact
- Rider caught between bike and another object
- Crush injuries to affected side
 - Open fractures of femur, tibia, fibula
 - Fracture dislocation of malleolus

Motorcycle Collisions

- Laying the motorcycle down
- Massive abrasions
- Fractures of affected side

Personal Protective Equipment

- Riders of small motor vehicles
 - Boots
 - Leather clothing
 - Eye protection
 - Helmets
 - Absorb energy, reduce head and facial injuries
 - Helmet nonuse increases head injuries > 300%

Pedestrian Injuries

- Impacts in auto-pedestrian collisions
 - Bumper of vehicle strikes body
 - Pedestrian strikes vehicle hood
 - Pedestrian strikes ground or another object

Pedestrian Injuries

- Predictable injuries depend on:
 - Age of pedestrian
 - Height of pedestrian relative to bumper and hood of car
 - Velocity of vehicle

Adult Pedestrian

- Most turn away from oncoming auto
 - Lateral or posterior impacts
- Initial impact
- Second impact
- Third impact

Child Pedestrian

- Tend to face vehicle
 - Often frontal impact
- Initial impact
- Second impact
- Third impact

Wadell's Triad of injuries

Vertical Falls

- Evaluate:
 - Distance fallen
 - Body position on impact
 - Type of landing surface
- Vertical fall injuries a result of deceleration and compression

Falls

- Impact surface
- Height
- Deceleration forces cause both compression injury and shear injury
- Falls from a distance of more than three times the patient's height may produce critical injuries

Landing Feet First (Don Juan Syndrome)

- Injury pattern:
- Bilateral heel fractures
 - Ankle fractures
 - Distal tibia/fibula fractures
 - Knee dislocations
 - Femur fractures
 - Hip injuries
 - Spine compression fractures

Landing Arms/Hands First

- Injury pattern:
- Colles' fractures of the wrist
 - Shoulder dislocations
 - Fractures of the clavicles

Landing Head First

- Injury pattern:
- Spinal and spinal cord injuries
 - Facial injuries
 - Brain damage

Assessment:

- "Golden Hour"
 - Time from injury to surgical intervention.
- "Platinum 10 Minutes"
 - On scene time.
- Maintain a high index of suspicion.
- Rely on the mechanism of injury in your priority decision.

Death from Injury- Peak 1

- Seconds to minutes after injury:
 - CNS disruption
 - Heart, aorta, other major vessel disruption.
 - 50% of those who die do so in this period.

Peak 2 “The Golden Hour”

- 1-2 hours after injury
 - Head injury (subdural/extradural)
 - chest injuries
 - Shock
 - 35% of those who die do so in this period

Peak 3

- Occurs days to weeks after injury
 - Brain death
 - Multi-system organ failure
 - Sepsis
 - Accounts for 15% of all those who die from trauma do so in this period

Injury kills in reproducible time frames!

- Airway loss kills more quickly than:
- the loss of the ability to breath which kills more quickly than:
- the loss of circulating blood volume that kills more quickly than:
- the presence of an expanding intracranial mass lesion.

Principles of assessment

- Rapid
- Institution of life saving therapies
- Secondary survey
- Definitive management

Principles of assessment

- The primary and secondary survey should be repeated frequently to assess for deterioration in the patient status
- In a clinical situation the activities of the primary survey may occur in parallel or simultaneously.

Primary Survey

- The priorities of the primary survey, in order are:
 1. Airway maintenance with cervical spine protection
 2. Breathing and oxygenation
 3. Circulation and control of external haemorrhage
 4. Disability: brief neurological examination
 5. Exposure with environment control

Primary Survey

- The primary survey needs to be continually repeated throughout the initial phase of management
- The key to good trauma care is directed assessment and timely intervention and subsequent directed reassessment – the AIR (assessment, intervention, reassessment) approach

Airway and C spine stabilisation

- Assessment of the airway and ventilatory status is the top priority
- The goals are:
 1. Secure a patent airway
 2. Ensure adequate oxygenation
 3. Provide adequate ventilation
 4. Monitor ongoing status of airway patency and ventilatory status
 5. Maintain in-line spinal immobilisation

Airway and C spine stabilisation

1. Speak to the patient – if able to verbalise in a comprehensible oriented way – evidence that the airway is clear
2. Look for the presence of airway compromise – look for obvious airway obstructions
 - Foreign bodies (vomit or blood)
 - Evidence of airway burns
 - Fracture or lacerations to the face, larynx, neck or maxillofacial area

Airway and C spine stabilisation – cont.

3. Listen for abnormal sounds such as:
 - Snoring, gurgling
 - Stridor
 - Hoarseness
 - Inability to talk in sentences

Airway and C spine stabilisation – cont.

4. Feel for tracheal position and diminished air movement
5. While assessing the airway it is paramount that the cervical spine remains immobilised
 - No hyperflexion, hyperextension or rotation
 - Nurse in neutral position with cervical collar on
 - If collar removed – manual in line stabilisation is necessary

Airway and C spine stabilisation

The first priority is to establish a patent and protected airway. This may require:

- The removal of blood, vomitus and foreign bodies by posturing, suction, or Magill's forceps
- Jaw thrust and chin lift manoeuvres
- The insertion of an oropharyngeal airway
- Endotracheal intubation
- Establishment of a surgical airway

Breathing and oxygenation

Once the airway is deemed patent and protected, the adequacy of ventilation should be assessed.

- A breathing problem may have already been identified during the assessment of the airway
- Adequate ventilation requires optimum functioning of the lungs, chest and diaphragm

Breathing and oxygenation

1. Expose the chest
2. Look :examine chest wall integrity
 - Fractures, lacerations, bruising
 - Paradoxical chest movements
 - Tachypnoea or abnormal respiratory rate
 - Use of accessory and/or abdominal muscles
 - Further assessment of patient colour

Breathing and oxygenation – cont.

3. Listen for absent or decreased breath sounds and unequal air entry
4. Feel for
 - Subcutaneous air
 - Chest wall instability and crepitus
 - Position of trachea
 - Dullness or hyperresonance

Breathing and oxygenation – cont.

- If breathing is absent – PPV with BVM
- If present apply high flow oxygen
- Intubate and ventilate
- Confirm appropriate ETT placement by visualising symmetrical chest rise and fall, auscultating over the stomach, then lung fields
- ETCO₂ and oxygen saturation and arterial blood gases

Breathing and oxygenation – cont.

- Identify and provide management for life threatening injuries prior to chest x-ray
 - Tension pneumothorax
 - Large haemothorax
 - Large flail segment
 - Open pneumothorax

Circulation and control of external haemorrhage

- The maintenance of adequate tissue perfusion, especially of the brain, is the primary objective of the circulation component of the primary survey.
- Haemorrhage is the principal cause of preventable death in traumatic injury
- All hypotension is considered hypovolaemic until proven otherwise.

Circulation and control of external haemorrhage

- Look for:
 - Obvious signs of external bleeding
 - Skin colour for pallor or cyanosis
 - Level of consciousness
 - Neck veins (collapsed or distended)
 - Abnormalities underneath the collar
 - Capillary refill time

Circulation and control of external haemorrhage

- Listen for:
 - Muffled heart sounds that may indicate pericardial tamponade

Circulation and control of external haemorrhage

- Feel:
 - Assess skin for moisture and temperature
 - Palpate pulses for presence, quality, rate and rhythm
- Peripheral pulses may be absent following direct injury, hypothermia, hypovolaemia or vasoconstriction caused by an intense sympathetic nervous system response

Circulation and control of external haemorrhage

- Systolic blood pressure can be assessed via central pulses (femoral or carotid)
- Assess bilaterally for quality, rate and regularity

BOX 42.2 Estimating adult systolic blood pressure

If the pulse is palpable, systolic BP is at least:

- radial: 80 mmHg
- femoral: 70 mmHg
- carotid: 60 mmHg

Adapted from Newbury, L. ed. Sheehy's manual of emergency care, 6th edn. St Louis: Mosby, 2005:603.

Circulation and control of external haemorrhage

Class	Assessment	Interventions
Class I haemorrhage (10%–15% blood loss (up to 750 mL))	<ul style="list-style-type: none"> • Slightly anxious • Pulse < 100/min • Skin warm and dry • Normal blood pressure • Normal pulse pressure • Normal respirations (15–20/min) • Urine output > 30 mL/h 	<ul style="list-style-type: none"> • Administer oxygen • Control obvious bleeding • Establish large bore IV access (14–16 G) • Administer IV crystalloid fluid (3:1 rule) • Warm fluids and patient
Class II haemorrhage (15–30% blood loss (800–1500 mL))	<ul style="list-style-type: none"> • Tachycardia (> 100) • Normal systolic blood pressure • Pulse pressure normal • Respirations (20–30/min) • Mild anxiety • Slightly cool skin • Urine output decreased slightly (20–30 mL/h) 	<ul style="list-style-type: none"> • Administer oxygen • Establish large bore IV access (14–16 G) • Administer IV crystalloid fluid (3:1 rule) • May require blood products • Warm fluids and patient • Identify and control bleeding source • Surgical intervention may be needed
Class III haemorrhage (30–40% blood loss (1500–2000 mL))	<ul style="list-style-type: none"> • Lethargic, agitated • Tachycardia (> 120/min) • Cool, clammy and pale • Decreased systolic blood pressure • Respirations 30–40/min • Narrow pulse pressure • Urine output < 15 mL/h 	<ul style="list-style-type: none"> • Administer oxygen • Establish 2 or more large bore IV access (14–16 G), continue rapid infusion of blood and crystalloid, titrating to patient response • Warm fluids and patient • Identify and control bleeding source • Prepare for surgical intervention
Class IV haemorrhage (Greater than 40% blood loss (2000 mL or more))	<ul style="list-style-type: none"> • Confused, lethargic, decreased GCS • Tachycardic > 140, thready pulse • Pale, cool, diaphoretic • Severely decreased blood pressure • Narrowed pulse pressure • Urine output negligible • ABG's metabolic acidosis and respiratory alkalosis 	<ul style="list-style-type: none"> • Administer oxygen • Place multiple large bore IV lines (14–16 G), continue rapid infusion of blood and crystalloid, titrating to patient response • Warm fluids and patient • Identify and control bleeding source • Surgical intervention required

Adapted from (b) ATCH, Advanced trauma care for nurses, Society of Trauma Nurses, 2004 (c) ATLS, Advanced trauma life support: a program for doctors, Chicago: American College of Surgeons, 2004 (d) Hoot N, Hoot R, et al. Advanced trauma care for nurses, Society of Trauma Nurses, 2003 (e) Scales, L. Based on initial management of traumatic shock in Prehospital Advanced Trauma Care, 4th edn, St Louis: Mosby, 2002:201–221.

Circulation and control of external haemorrhage

Priorities:

- a. Control of external haemorrhage
 - Direct pressure
 - Sutures/staples
 - Packing
- b. Establishment of IV access
 - 2 large bore cannulas 14-16 gauge
 - Consider IO
- c. Consider FAST to identify major concealed haemorrhage

Circulation and control of external haemorrhage

c. Resuscitation fluids

- Normally start with 1-2 litres of 0.9% Saline or Hartmann's (Crystalloids)
- If stable after this then reduce fluids, no transfusion indicated – less than 15% loss
- If improves initially then deteriorates likely to have ongoing bleeding and will need transfusion – 15-30% loss
- If fails to respond indicates major loss, will need transfusion and surgery

Circulation and control of external haemorrhage

Considerations when giving fluids:

- Warmed fluids
- Failure to respond to initial 2 litres indication for transfusion

Disability :brief neurological examination

- A decreased level of consciousness is due to hypoxia or hypovolaemia until proven otherwise
- Beware of hypoglycaemia
- Once excluded as cause of decreased level of consciousness, the priority is to determine the presence or absence of an intracranial injury that requires urgent neurosurgical intervention

Disability :brief neurological examination

- The pupils should be assessed for size, symmetry and response to light.
- The patient's level of consciousness should be quickly assessed using the AVPU method, i.e. is the patient:
 - **A**lert?
 - Responding to **V**erbal stimuli only?
 - Responding to **P**ainful stimuli only?
 - **U**nresponsive?

Disability :brief neurological examination

- The Glasgow Coma Score (GCS) is usually deferred until the secondary survey is performed
- In conscious patients, all limbs should be assessed for movement and sensation to detect possible spinal injury

Exposure with environment control

- Exposure of the trauma patient is the final step of the primary survey.
- Completely and rapidly, remove the patient's clothing to assess for injuries, haemorrhage, or other abnormalities
- Observe the patient's overall general appearance noting body appearance, asymmetry, guarding or the presence of odours such as alcohol, petrol and urine.

Exposure with environment control

- The majority of major trauma patients are hypothermic on arrival in the ED because of environmental conditions at the scene.
- Inadequate protection, intravenous fluid administration and ongoing blood loss will worsen the hypothermic state.
- Keep the patient warm

Secondary Survey

- A detailed systematic head-to-toe examination to detect all injuries and enable planning of definitive care
- Only done once the primary survey and resuscitation is complete
- During the secondary survey all components of the primary survey should be repeated and the team should be responsive to any new findings

Secondary Survey

- Obtain a full set of vital signs
- Identify all injuries with a head to toe assessment
- Ensure the patient is log rolled to check the back

F = Full set of vital signs/five interventions

- In addition to obtaining a complete set of vital signs, consider the five interventions:
 - Cardiac monitor
 - Pulse oximeter (SpO₂)
 - Urinary catheter if not contraindicated
 - Gastric tube (oral or nasal)
 - Laboratory studies
 - Facilitate family presence

G = Give comfort measures

- Verbal reassurance
- Touch
- Pain control

H = History

- Should include mechanism of injury
- Can be obtained from family
- AMPLE is a useful mnemonic to ensure all essential information is obtained
 - **A**llergies
 - **M**edications currently used
 - **P**ast illnesses/Pregnancy
 - **L**ast meal
 - **E**vents leading up to accident

H = head – to – toe assessment

Head, skull and face

- Look for lacerations, ecchymosis, deformities, contusions, bleeding, drainage from nose and ears, and check pupil size and reactivity, ocular bleeding, swelling and crepitus
- Feel for tenderness, note bony crepitus, bony step-offs and mid-face instability

Interventions

- Pain control
- Maintain airway patency
- Remove contact lenses
- Haemorrhage control

H = head – to – toe assessment

Cervical spine and Neck

- remove anterior portion of the cervical collar to inspect and palpate the neck. Maintain manual stabilisation of the cervical collar while collar is removed
- Look for wounds, ecchymosis, deformities, and distended neck veins
- Feel for tenderness, note bony crepitus, deformity, swelling, subcutaneous emphysema, and tracheal position

Interventions

- Maintain spinal immobilisation
- Ensure correctly fitting cervical collar, consider changing from extrication collar to Philadelphia collar
- Use direct pressure if haemorrhage control is required

H = head – to – toe assessment

Chest

- Look for breathing rate and depth, wounds, deformities, ecchymosis, use of accessory muscles, paradoxical movement, expansion and symmetry
- Listen to breath and heart sounds
- Feel for tenderness, note bony crepitus, subcutaneous emphysema, and deformity including clavicles and shoulders

Interventions

- Prepare for needle decompression to relieve tension pneumothorax
- Prepare for chest tube insertion to follow needle decompression or for pneumothorax or haemothorax
- Prepare for pericardiocentesis as needle relief of pericardial tamponade

H = head – to – toe assessment

Abdomen and flanks

- Look for signs, distension, ecchymosis or seat belt sign and scars
- Listen for bowel sounds in each quadrant
- Feel four quadrants for tenderness, rigidity, guarding, masses and femoral pulses

Intervention

- Anticipate FAST (focussed sonography in trauma) or Assist with DPL (diagnostic peritoneal lavage)
- Insert gastric tube and urinary catheter
- Anticipate transport to CT scanner
- Maintain high index of suspicion of lumbar spine fracture or hollow viscus injury if seat belt sign present

H = head – to – toe assessment

Pelvis and perineum

- Look for wounds, deformities, and lacerations. Ecchymosis, priapism, blood at the urinary meatus or in perineal area
- Feel the pelvis for instability or crepitus and anal sphincter tone, prostate position, rectal wall integrity or vaginal wall integrity

Intervention

- Apply external pelvic immobilisation (i.e. pelvic sling or sheet) if not already done in patient with suspected pelvic fracture
- Assist with urethrogram if bladder trauma suspected

H = head – to – toe assessment

Extremities

- All four limbs and hands and feet should be examined
- Look for deformity, open wounds, ecchymosis and swelling, rotation, shortening
- Feel for abnormal bony movement, joint instability, wounds, and deformities
- Assess motor and sensory deficits, circulation and capillary refill
- Consider compartment syndrome :- pulses, pain, paralysis, paresthesia, pallor

Interventions

- Check pulses in all limbs
- Apply splints to extremity fractures
- Administer analgesia followed by pain assessment
- Assist with radiographic studies
- Dress all wounds with sterile dressings
- Check tetanus immunization status
- Administer antibiotics as required

H = head – to – toe assessment

Inspect posterior surfaces

- Maintain cervical spine stabilisation and support injured extremities while patient is log rolled
- Look at posterior surface for wounds, deformities, ecchymosis
- Feel posterior surfaces for tenderness and deformities, pain, anal sphincter tone (if not previously performed)

Interventions

- Maintain spinal precautions
- Control external haemorrhage

Tertiary Survey

- A tertiary survey should be conducted on, or soon after arrival at definitive care such as ICU.
- The purpose of this third survey is to identify injuries that have not yet been detected, assess the initial response to treatment and plan assessment and management strategies for future care

Tertiary Survey

- It consists of another head-to-toe physical examination, assessment of the patient's condition in the context of his/her earlier condition and treatment that has been administered, a full review of all diagnostic information gained so far, and acquisition of the patient's past health history.
- A systematic approach will minimise the number of injuries that are not identified during the first 24 hours.
- It is also important to repeat the tertiary survey after a patient regains consciousness and begins to mobilise. Joint injuries may only become apparent during weight-bearing movements.

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