

3101- Foundations of Professional Practice 3A

Content: Mechanism of injury, burns, drowning, triage, sepsis, shock, traumatic brain injury, spinal injury, fracture, disaster management, blood transfusion, organ donation, research application, law, culture and ethics.

Outcome 1- Discuss the pathophysiology, epidemiology, mechanism of injury and quality use of medicines principles relating to selected types of critical care scenarios.

Trauma

- Trauma is defined as injury to human tissues and organs resulting from the transfer of energy from the environment.

Components of trauma

- Host is the person or group at risk of injury.
- The mechanism is the source of the energy transmitted to the host.
- Most common mechanical source of injury is motor vehicle.
- Intention is a component, e.g. gunshot and stab wounds.
- Environment is a component, e.g. road is slippery after a storm, or, occupation (police officer, firefighter).

Types of trauma

- Minor trauma- injury to a single part or system. E.g. fracture, second-degree burn, laceration.
- Major/multiple trauma- serious single-system injury or multiple system injuries. E.g. amputation/ motor vehicle accident.
- Blunt trauma- no communication between damaged tissues and the outside environment. Caused by deceleration, acceleration, shearing, compressing and crushing forces. Causes multiple injuries that affects; head, spinal cord, bones, thorax and abdomen. Most commonly caused by motor vehicle crashes, falls and sport.
- Penetrating trauma- when a foreign object enters the body causing damage to body structures. E.g. gunshot and stab wounds.
- Other traumas- inhalation, burn or freezing, blast injuries from explosions.

Classification of trauma

- Class 1,2,3.
- Based on mechanism of injury, vehicle speed, height of fall and location of penetrating injuries.
- Class 3 is least severe.

ED care

- Diagnosis-

- Blood type and crossmatch.
- Blood alcohol level.
- Urine drug screen.
- Pregnancy test.
- Diagnostic peritoneal lavage- detects blood in the peritoneal area, may indicate abdominal injury.
- Computerised tomography- injury scan of brain, skull, spine, spinal cord, chest and abdomen.
- Magnetic resonance imaging- MRI.

Medications

- Blood components.
- Inotropic drugs- increases cardiac output and increases tissue perfusion.
- Vasopressors- fluid replacement.
- Opioids- pain.

Shock

- Shock is a clinical syndrome characterised by a systemic imbalance between oxygen supply and demand.

Pathophysiology of shock

- Stroke volume- amount of blood pumped into the aorta with each contraction of the left ventricle.
- Cardiac output- the amount of blood pumped per minute into the left ventricle.
 $CO = SV \times HR$.
- Mean arterial pressure (MAP)- is the average BP in an individual during a single cardiac cycle. Diastolic BP is doubled and added to the systolic BP and then divided by 3.
- Shock is triggered by a sustained drop in cellular perfusion.
- This drop can occur after a decrease in cardiac output, a decrease in the circulating blood volume or an increase in the size of vascular bed due to peripheral vasodilation.
- If intervention occurs in a timely fashion, shock is treatable, however, if not, shock can lead to death.

Stages of shock

- Stage 1- early, reversible and compensatory shock
 - Initial stage of shock starts when baroreceptors in the aortic arch and the carotid sinus detect a sustained drop in mean arterial pressure (MAP) of less than 10mmHg from normal levels. Circulating blood volume may drop, but not enough to cause serious effects.
 - Compensatory shock begins after MAP falls 10-15mmHg below normal levels. Blood volume is reduced by 25-35% (1000mls or more).