Shock

- Shock is the term used to describe acute circulatory failure with inadequate or inappropriately distributed tissue perfusion, resulting in generalized cellular hypoxia and/or an inability of the cells to utilize oxygen.

- It can result from,
  - failure of the heart to act as an effective pump
  - mechanical impediments to forward flow
  - loss of circulatory volume
  - abnormalities of the peripheral circulation.

Causes of shock

- Hypovolaemic

  Exogenous losses (e.g. haemorrhage, burns)

- Cardiogenic

  'Myocardial failure' (e.g. ischaemic myocardial injury)

- Obstructive

  Obstruction to cardiac outflow (e.g. pulmonary embolus)
  Restricted cardiac filling (e.g. cardiac tamponade, tension pneumothorax)

- Distributive

  - Vascular dilation (eg sepsis, anaphylaxis)
  - Sequestration
  - Arteriovenous shunting
  - Maldistribution of flow

Haemo-dynamic changes in shock

- Hypovolaemic shock – *Low central venous pressure (CVP) and pulmonary artery occlusion pressure (PAOP)*
  - Low cardiac output
  - Increased systemic vascular resistance

- Cardiogenic shock – *Signs of myocardial failure*
  - Increased systemic vascular resistance
  - CVP and PAOP high (except when hypovolaemic)

- Cardiac tamponade –*Parallel increases in CVP and PAOP*
  - Low cardiac output
  - Increased systemic vascular resistance
- Pulmonary embolism
- *Low cardiac output*
- High CVP, high pulmonary artery pressure but low PAOP

Haemo-dynamic changes in shock

- Pulmonary embolism ⁻*Low cardiac output*
  - High CVP, high pulmonary artery pressure but low PAOP
  - Increased systemic vascular resistance

- Anaphylaxis ⁻*Low systemic vascular resistance*
  - Low CVP and PAOP
  - High cardiac output

- Septic shock ⁻*Low systemic vascular resistance*
  - Low CVP and PAOP
  - Cardiac output usually high
  - Myocardial depression – low ejection fraction
  - Stroke volume maintained by ventricular dilation
  - Cardiac output maintained or increased by tachycardia