


Shock





Shock affects all body systems. It may develop rapidly or slowly, depending on the underlying cause. During shock, the body struggles to survive, calling on all its homeostatic mechanisms to restore blood flow and tissue perfusion. Any insult to the body can create a cascade of events resulting in poor tissue perfusion. Therefore, almost any patient with any disease state may be at risk for developing shock.

Introduction

Shock is a complex condition which systemic blood pressure is inadequate to deliver oxygen and nutrients to support vital organs and cellular function.

Definition of Shock

Adequate tissue perfusion depends on three factors:

- 1) Blood volume.
- 2) Capacity of the blood vessels.
- 3) Pumping action of the heart.

❖ Etiology of Shock:

1) Initial Stage:

Vital organs depended on aerobic metabolism for energy generation due to the presence of an adequate amount of oxygen in normal conditions. But when the level of oxygen is lower the vital organ depended on anaerobic metabolism leads to lactic acid and tissue perfusion, caused metabolic acidosis.


Stages of Shock:

Occurs stimulation to sympathetic nerves system and release of catechol amines (epinephrine & norepinephrine), leads to vasoconstriction, increased heart rate, which the body shunts blood from organs as skin, kidney, GIT to the brain & heart to ensure adequate blood supply to these vital organs.

*Hemodynamic States:

- Blood pressure → Normal.
- Heart Rate → Tachycardia.
- Respiratory Rate → Tachypnea
- Skin → Cold & Clammy.
- Urinary output → Decrease.
- Mental Status → Confusion.
- Acid base balance → Respiratory Alkalosis.

2) Compensatory Stages:




When the second stage fails to compensate, the body is unable to compensate for the lack of oxygen, therefore increased lactic acid, increased metabolic acidosis and fluid outside of the capillaries to intercellular space leads to decreased movement of blood in the capillaries. This result severs lack of oxygen and nutrients in the vital organs.

3)Progressive Stage:

- Blood pressure → Systolic<80:90.
- Heart Rate →Tachycardia.
- Respiratory Rate → Rapid, Shallow, crackles.
- Skin → Cold & Mottled.
- Urinary output → Decrease.
- Mental Status → Lethargy.
- Acid base balance → Metabolic acidosis.
- Acid base balance → Respiratory Alkalosis.

***Hemodynamic States:**



Because of the lack of oxygen and energy, occurs defect in any vital organ leads to death of vital organ and death of a person.

*Hemodynamic States:

- Blood pressure → Requires mechanical or pharmacologic support.
- Heart Rate → Erratic.
- Respiratory Rate → Requires intubation.
- Skin → Jaundice.
- Urinary output → Anuric, requires dialysis.
- Mental Status → Unconscious.
- Acid base balance → Profound acidosis.

4) Irreversible Stage:

1) Hypovolemic Shock:

The most common types of shock, is characterized by a decreased intracellular volume.

◆ Pathophysiology of hypovolemic shock:

Hypovolemic shock begins with a decrease in the intravascular volume. This results in decrease venous return of blood to the heart and decrease ventricular filling. Decreased ventricular filling results in decreased stroke volume and decreased cardiac output, lead to blood pressure drops and tissue inadequately perfused.

Decreased blood volume → Decreased venous return → Decreased stroke Volume → Decreased cardiac output → → Decreased tissue perfusion & blood pressure drops.

Types & Categories of Shock:

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*** External Fluid loss:**

1. Trauma.
2. Diarrhea.
3. Surgery.
4. Diuresis.
5. Vomiting.
6. Diabetes insipidus.

*** Internal Fluid loss:**

1. Hemorrhage.
2. Peritonitis.
3. Burns.
4. Dehydration.
5. Ascites.

Causes of hypovolemic shock

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- | | |
|---------------------------|-----------------------------------|
| 1) Tachycardia | 2) Tachypnea. |
| 3) Decrease urine output | 4) Hypotension. |
| 5) Cold extremities. | 6) Pale skin. |
| 7) Weak pulse. | 8) Delayed capillary refill time. |
| 9) Decreased skin turgor. | 6) Dry mucous membranes |

Signs & Symptoms:

Laboratory findings; ↑potassium, serum lactate and blood urea nitrogen.


1. Urine characteristics; ↑urine specific gravity and urine osmolality.
2. ABG; ↑CO₂, ↓O₂ and Ph.

Diagnosis of hypovolemic Shock:

* **Medical management:**

- 1) Correct for underlying cause of fluid loss.
- 2) Fluid & blood replacement.
- 3) Pharmacological therapy.
- 4) Antiemetic medication for vomiting, anti-diarrheal for diarrhea.
- 5) Insulin is administered if dehydration is secondary to hyperglycemia.
- 6) Desmopressin is administered for diabetes insipidus.

❖ **Management for hypovolemic shock:**

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- 1) Assess for CAB.
 - 2) Assess vital signs (BIP, HR, RBS).
 - 3) Assess airway patent.
 - 4) Assess breathing (retherm, rate, depth, chest movement).
 - 5) Monitoring the patient for clinical manifestation of fluid overload related to fluid and blood administration.
 - 6) Monitor daily Weight for sudden decreased especially in the presence of decreasing urine output or active fluid loss.
 - 7) Insert two large intravenous lines for fluid administration.
 - 8) Insert urinary catheter to monitor urine output.
 - 9) Minimizing fluid loss, administering volume replacement.

**Nursing
management:**

Occurs when the heart's ability to contract and to pump blood is impaired and the supply of oxygen is inadequate for the heart and tissue.

2) Cardiogenic Shock:

In cardiogenic shock occurs decrease of stroke volume, heart rate, blood pressure and tissues perfusion impaired, leads to inadequate blood supply to the organs and the heart muscles. The tissue perfusion leads to weakness and impaired of heart muscles to pump blood forward, the ventricles don't fully eject its volume of blood at systole, as result fluid accumulates in the lungs.

Decreased cardiac contractility→ Decreased stroke volume and cardiac output→ (Decreased systemic tissue perfusion, pulmonary congestion, Decreased coronary artery perfusion).


Pathophysiology of Cardiogenic Shock:

1- Coronary Causes:(Myocardial infarction)

2- Non-Coronary Causes: -

- Cardiomyopathies.
- Heart valve failure.
- Cardiac tamponade.
- Dysrhythmias.

Causes of Cardiogenic Shock:

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- 1) Tachycardia.
 - 2) Cold extremities.
 - 3) Delayed capillary refill time.
 - 4) Hypotension.
 - 5) Oliguria and concentrated urine.
 - 6) Elevated jugular venous distention.
 - 7) Hypoxemia

Signs & Symptoms of Cardiogenic Shock:

Medical Management:

- 1) Supplying Supplemental oxygen is administered by nasal cannula at a rate of 2:6 L/min to achieve oxygen saturation.
- 2) If patient experience chest pain, administered intravenously morphine for pain relief.
- 3) Administering Vaso-active medication to improve oxygen delivery to the heart muscles, decreased work load on the heart and enhanced blood flow to the heart, as Dobutrex, nitroglycerin, dopamine.

Management of Cardiogenic Shock:

4) Diuretics administered as Lasix may be used to reduce the workload of the

heart by reducing fluid accumulation.


5) Anti-arrhythmic medication to stabilize the heart rate.

6) Fluid administered to improving cardiac output, but not allowed to give

fluid bolus quickly to prevent acute pulmonary edema and overload on the

heart.

7) Intubation and mechanical ventilation are usually to support oxygenation.

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- 1) Monitor arterial blood gases values and pulse oximetry values.
 - 2) Monitor heart rate, respiratory rate and blood pressure.
 - 3) Administration of medication and fluid to support blood pressure,
reduce
chest pain and pulmonary edema if present
 - 4) Monitor closely to adverse effect of medication and signs of fluid
overload
 - 5) Insert urinary catheter to monitor urine output.
 - 6) Oxygen administration to increase the amount of oxygen carried by
available hemoglobin in the blood.

Nursing Management:

Characterized by vasodilatation and redistribution of blood volume.

Pathophysiology of Circulatory shock:

Occurs when blood volume is abnormally displaced in the vasculature. The displacement of blood volume pools in the peripheral blood vessels. Pooling of blood in the periphery results in decreased venous return leading to decreased stroke volume and decreased cardiac output, which cardiac output causes decreased blood

3) Circulatory Shock:



pressure and tissue perfusion.

Vasodilation→ Maldistribution of blood volume→ Decreased venous return→
Decreased stroke volume→ Decreased cardiac output→ Decreased tissue perfusion.

The varied mechanisms leading to the initial vasodilation in circulatory shock
further subdivide this classification of shock into three types:

- ❖ Septic Shock.
 - ❖ Neurogenic Shock.
 - ❖ Anaphylactic Shock.
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(1) Septic Shock:

Occurs when a microorganism invades body tissue, the patient exhibits an immune response. This immune response provokes the activation of biochemical mediators associated with an inflammatory response and produces a variety of effects leading to shock.

❖ Septic shock occurs in 4 phases: -

- The first phase: referred to the hyperdynamic
 - progressive phase is characterized by increasing cardiac output with systemic vasodilation, blood pressure may remain within normal limits.
 - The later phase: referred to as the hypo-dynamic
- irreversible phase is characterized by low cardiac output with vasoconstriction
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1) Tachycardia

2) Tachypnea.

3) Nausea, vomiting, diarrhea

4) Urine output

within normal or decrease.

5) Confusion.

6) Hyperthermia.

7) Decreased bowel

sound.

8) Flushed skin and bounding pulse.

Sign & Symptoms of Septic Shock:

4) Diuretics administered as Lasix may be used to reduce the workload of the heart by reducing fluid accumulation.

5) Anti-arrhythmic medication to stabilize the heart rate.


6) Fluid administered to improving cardiac output, but not allowed to give fluid bolus quickly to prevent acute pulmonary edema and overload on the heart.

7) Intubation and mechanical ventilation are usually to support oxygenation.

Medical Management:

- Identifying and eliminating the cause of infection.
- Blood, urine, sputum, wound drainage and catheter tips are collected for culture and using aseptic technique.
- If the infection organism is unknown use broad spectrum antibiotic agents until culture and sensitivity reports are received.
- Nutritional supplementation should be initiated within the first 24 hours of the onset of shock because malnutrition further impairs the patient's resistance to infection

Management of Septic Shock:



Nursing interventions pertaining to sepsis should be done timely and appropriate to maximize its affectivity.


- Assess physiologic status; the nurse should assess the patient's hemodynamic status, fluid intake, output and nutritional status.
- Monitor blood levels; the nurse must monitor antibiotic toxicity, BUN, Create, WBCs, hemoglobin, hematocrit, platelet levels and coagulation studies.
- Infection control; all invasive procedures must be carried out with aseptic technique after careful hand hygiene.
- Management of fever; the nurse must monitor the patient closely for shivering.

Nursing Management:


Any factor that stimulates parasympathetic activity or inhibits sympathetic activity of vascular smooth muscles can cause neurogenic shock, which results in widespread and massive vasodilation.

Imbalance between sympathetic and parasympathetic stimulation→ Massive vasodilation→ Decreased vascular tone→ Decreased systemic vascular resistance→ Inadequate cardiac output→ Decreased tissue perfusion→ Impaired cellular metabolism.

(2)-Neurogenic Shock:

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- 1) Spinal cord injury.
 - 2) Spinal anesthesia.
 - 3) Vasomotor center depression (sever pain, drugs and hypoglycemia).

Causes of Neurogenic Shock:

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- 1) Hypotension.
 - 2) Tachycardia.
 - 3) Bowel and bladder dysfunction.
 - 4) Tachypnea.
 - 5) Bradycardia
 - 6) poikilothermia.
 - 7) Numbness.

Signs & Symptoms of Neurogenic Shock:

Medical Management:

- Anticoagulation to prevent DVT, pulmonary embolism.
- Atropine to manage severe bradycardia.
- Insert urinary catheter.
- IV fluid.
- CT scan or MRI to know impact of the injury.

Management of Neurogenic Shock:

- Monitor the patient closely for signs of internal bleeding that could lead to hypovolemic shock.
- Check the patient closely for any redness, tenderness and warmth of calves.
- Elevating the foot of the bed to improve blood supply to the brain.
- Elastic socks.

Nursing Management:

An acute systemic allergic reaction, the result of a re-exposure to an antigen that elicits an IgE mediated response. It is usually caused by a common environmental protein that isn't medication, foods and insect stings.

(3)-Anaphylactic Shock:

1) Hypotension.

3) Tachypnea.

5) Hypothermia.

7) Rash & Itching.

2) Tachycardia

4) Cold sweat.


6) Pale & cyanosis.

8) Pupil.

Signs & Symptoms of Anaphylactic Shock:

- ✓ Administer oxygen at high flow rate.
- ✓ Epinephrine to all patients with clinical signs of shock, airway swelling and difficult breathing.
- ✓ Closely monitor for a patent airway and respiratory drive
- ✓ Monitor blood pressure and heart rate.
- ✓ Notify provider immediately with worsening respiratory status.

✓ **Management of Anaphylactic Shock**



Assist provider with intubation if needed.

- ✓ Focus breathing; instruct the client to breathing slowly and deeply.
 - ✓ Activity; encourage adequate rest and limit activities and limit activities to within client's tolerance.
 - ✓ Monitor urine output.
 - ✓ Position the client upright as this position provides oxygenation by promoting maximum chest expansion and is the position of choice during respiratory distress.
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