Al- Toosi University College

Nursing Department

Fourth Stage

2023-2024

lecturer. dr. Basim Hasson Hussein

# Introduction to Critical Care Nursing

# 4th stage

# lecture 1

# Outline of Lecture

- Introduction
- Description of an Intensive Care Unit
- Characteristics of Critical Care Units
- Critical Care Nursing Roles
- Classification of critically ill patients
- Process of Nursing Management

# Introduction

 **Critical Care Nursing**: It is the field of nursing with a focus on the utmost care of the critically ill (or) unstable patients.

**Critically Ill Patients** : critically ill patients are those who are at risk for actual (or) potential life threatening health problems.

**Critical Care Units**: **CCUs** or **Intensive care units** (**ICUs**) are designed to meet the special needs of acutely and critically ill patients.

# Definition of Intensive Care Unit (ICU)

**There are many definitions of ICU, such as the following:**

(a) A unit catering for the needs of patients who require constant individual nursing attention throughout 24 hours and the immediate availability of medical help.

(b) The delivers comprehensive care of a critically ill patient, who is **deemed recoverable**.

# Aim of the Critical Care

**1.** promote optimal delivery of safe and quality to the critically ill patients and their families.

**2.** care for the critically ill patients with a holistic approach, biological, psychological, cultural and spiritual dimension.

**3.** use appropriate and up – to –date knowledge, caring attitude and clinical skills, supported by advanced technology for prevention, early detection and treatment.

**4.** provide palliative care to the critically ill patients in situations.

# Description of an Intensive Care Unit (ICU)

**(a) A specialized unit that attends to all critically ill patients.**

**(b) Nurses need to be specially train to work effectively in this unit.**

**(c) A unique place to work - patients from different disciplines.**

**(d) A working unit where p'ts are attached to many technological gadgets.**

**(e) An isolated place and restricted to a few visitors.**

**(f) A very stressful place to work, sometimes also called critical care unit.**

# Features of the Intensive Care Unit ICU

In general, ICUs vary in size and design.

(a) Floor plans that minimize traffic but are accessible to diagnostic, monitoring and therapeutic facilities.

(b) Adequate supply and distribution of oxygen and medical air, a suction apparatus and electricity. Backup services in case of power failure. Air conditioning.

(c) Adequate space between each bed with easy access to the patients head.
(d) Separate „clean‰ and „dirty‰ work areas.

(e) Ability to separate or isolate an infected patient or patients at particular risk of infection.

(f) Facilities for hand washing in each room.

(g) Facilities for staff offices, call rooms, restrooms, washrooms and conference rooms.

(h) Provision for the waiting area of relatives.

(i) Mini laboratory areas and storage (arterial blood gases).

## What are the conditions considered as critical?

**Any person with life threatening condition. Patients with:**

- Acute respiratory failure
- Acute mycardial infarction
- Cardiac tamponate
- Severe shock
- Heart block
- Acute renal failure
- Poly trauma
- Multiple Organ failure and
- Organ Dysfunction
- Severe burns

# Roles and Responsibilities of Critical Care Nurses

The following are the roles of critical care nurses in fulfilling goals of care in the ICU:

(a) Nurses play an essential role in facilitating communication between critically ill patients and their families.

(b) Nurses must be proficient in communication skills in addition to clinical skills.

(c) Nurses can use evidence-based knowledge related to disease processes and prognosis to advocate effectively for patients and families.

(d) Nurses have an essential role as team members in establishing the goals of care in the ICU.

## Classification of Critical Care Patients:

- **Level 0** : Normal ward care.
- **Level 1**: At risk of deteriorating, support from critical care team.
- **Level 2** : More observation or intervention, single failing organ or post operative care
- **Level 3**: Advanced respiratory support or basic respiratory support ,multi-organ failure.

# PROCESS OF NURSING MANAGEMENT

- **Admission Quick Check Assessment In CCU**
- **A, B, C, D, E MODELS**

.

• **A**irway: Patency Position of artificial airway (if present)

• B**reathing**: Quantity and quality of respirations (rate, depth, pattern, symmetry, effort, use of accessory muscles) Breath sounds Presence of spontaneous breathing

. • **C**irculation and Cerebral Perfusion: ECG (rate, rhythm, and presence of ectopy) Blood pressure Peripheral pulses and capillary refill skin, color, temperature, moisture. Presence of bleeding Level of consciousness, responsiveness

- **D**isability: altered conscious level
- **E**xpose to examine: unseen hemorrhage, wound leakage

.

- **Past Medical History**
- Medical conditions, surgical procedures
- Psychiatric/emotional problems
- Hospitalizations
- Medications (prescription, over-the-counter, illicit drugs) and time of last medication dose.
- Allergies
- Review of body systems

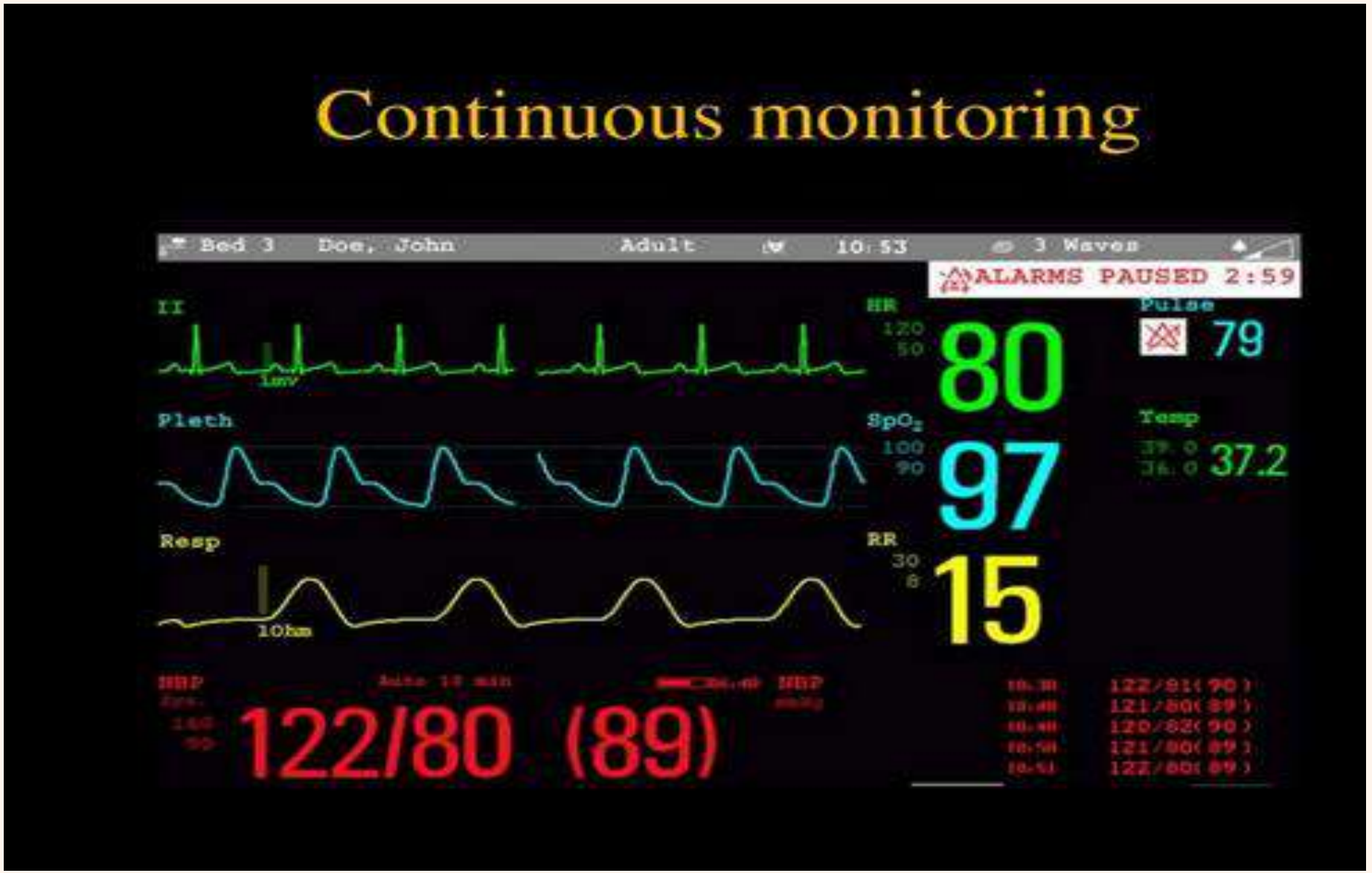
# Physical assessment in CCU/ICU

- **Nervous system**
- **Cardiovascular system**
- **Respiratory system**
- **Renal system**
- **Gastrointestinal system**
- **Endocrine, hematologic, and**
- **Immune systems**
- **Integumentary system**

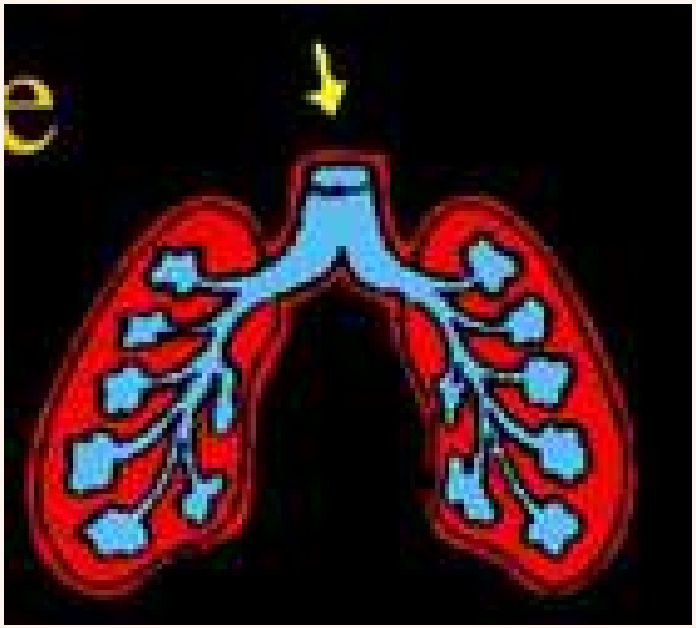
# Nursing Management of Critically Ill Patient

1. Continuous monitoring
2. Respiratory care
3. Cardio vascular care
4. Gastrointestinal
5. Nutritional care
6. Neuromuscular
7. Comfort and reassurance
8. Communication with the patient
9. Infection control, skin care, general hygiene & mouth care
10. Fluid, electrolyte and glucose balance
11. Bowel and Bladder care
12. Dressing and wound care
13. Communication with patient and relatives

# 1. Continuous monitoring

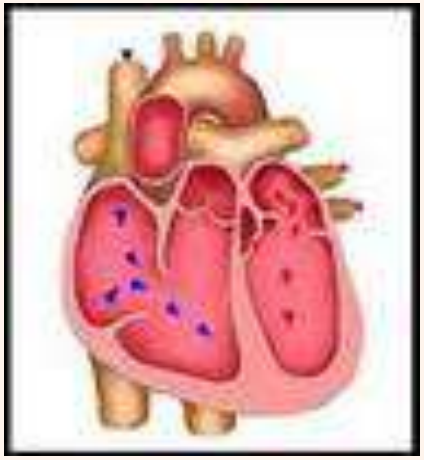


# 2. Respiratory care



- Improving Oxygenation
- Appropriate use of medication
- Monitoring of treatment efficacy
- Recognition of early warning signs of an exacerbation with rapid access to appropriate services (Ventilator, Crash trolley, Emergency drugs)
- Positioning (Fowlers position)
- Suctioning if necessary
- Tracheostomy care.

# 3. Cardio vascular care



- Continuous Cardiac Monitoring (dysrhythmia)
- Appropriate use of medication
- Monitoring of treatment efficacy
- Recognition of early warning signs of an exacerbation with rapid access to appropriate services (Defibrillator , ECG, Emergency drugs)
- Positioning

# 4.Gastro-intestinal/ Nutritional care

• The supine position predisposes to gastro- esophageal reflux and aspiration pneumonia Patients with 30 degree head up prevents this.

• Early enteral feeding reduces infection, stress ulceration and GI bleeding.

• Immobility is associated with gastric stasis and constipation, So, provide gastric stimulants and laxatives.

# 5. Neuromuscular care


• Immobility, prolonged neuromuscular blockage and sedation promotes atrophy, joint contractures and foot drops may occur.

• Physiotherapy and splints may be required.

# 6. Comfort and reassurance

• Anxiety, discomfort and pain must be recognized and relieved with reassurance, physical measures, analgesics and sedatives.

• In particular, endotracheal or nasogastric tubes, bladder or bowel distension, inflamed.

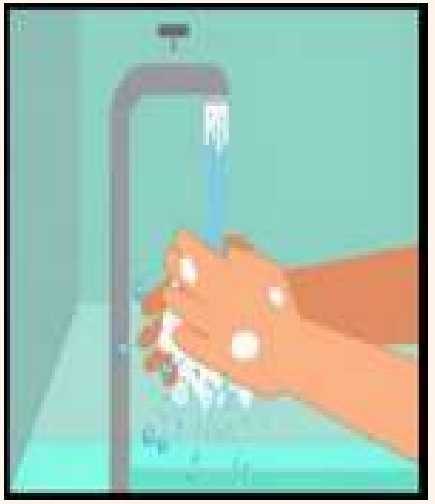
• Line sites ,painful joints and urinary catheters often causes discomfort, and are often overlooked.

# 7. Communication with the patient

- Assist interaction with appropriate communication .
- Tell the patient about the care prognosis.
- And if the patient is unconscious , communicate about their health status and care prognosis to their family members.

**Communication with the patient**

# 8. Infection control



• Hand washing is vital to prevent transmission of organisms between patients.

• Disposable aprons are recommended, sterile technique (e.g. gloves, masks, gowns, sterile field) is essential for all invasive procedures(e.g. line insertion).

• Isolation for transmissible infections (e.g. tuberculosis).

• Thorough cleaning of bed spaces(e.g. routinely and after patient discharge)

# 9.Skin care, general hygiene and mouth care

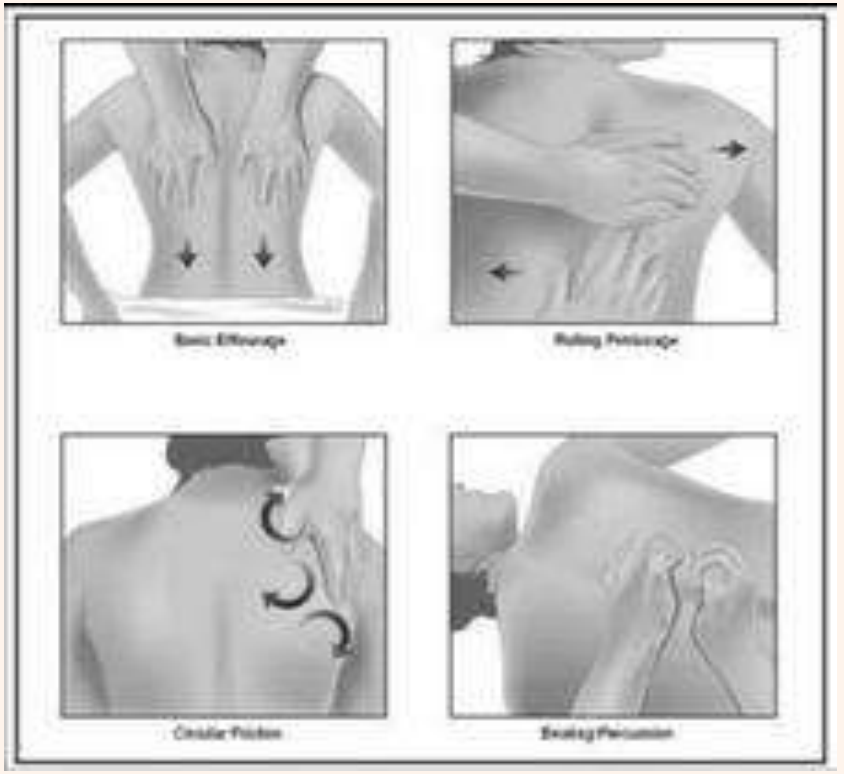
• Cutaneous pressure sores are due to local pressure (e.g. bony prominences). Friction malnutrition edema ischemia damaged related to moist or soiled skin.

• Provide sponge bath, mouth care and general hygiene to the patient.

## Pressure Points

• Turn patient every 2 hours and protect susceptible areas. Special beds relieves pressure and assist turning.

• Provide back care.



## 10.Fluid electrolytes and glucose balance

• Regularly assess fluid and electrolytes balance by maintaining I/O chart hourly.

• Insulin resistance and hyperglycemia are common but maintaining normo-glycemia improves outcomes.

## 11. Bowel & Bladder care

• Urinary catheters causes painful urethral ulcers and must be stabilized by providing urinary catheter care.

• Early removal reduces urinary tract infections.

# 12. Dressing and wound care

• Replace wound dressings as necessary.

• Change arterial and central venous catheter dressings every 48- 72 hours.

# 13. Communication with relatives

• Family members receive information from many care givers with different perspectives and knowledge.

• Critical care teams must aim to be consistent in their assessments and honest about uncertainties.

• All conversation should be documented.



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# SHOCK

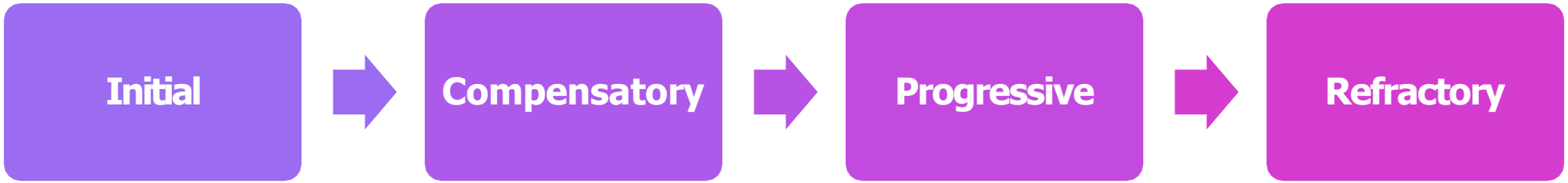
Critical care nursing
4th stage
Lecture 2

# Shock

- **Shock** is a syndrome that results from inadequate oxygen delivery to meet metabolic demands
- **Shock** is a condition in which tissue perfusion is inadequate to deliver oxygen and nutrients to support vital organ and cellular function.
- **Shock** is defined as a complex, life threatening condition or syndrome characterized by inadequate blood flow to the tissues and cells of the body
- The term "shock" may refer to a psychologic or a physiologic type of shock.

# Pathophysiology of Shock

- Shock is a condition of impaired tissue perfusion and oxygenation. The three basic etiologies of shock are **inadequate volume, inadequate pump function, and inadequate vessel tone**.
- There are four stages of shock:




# Stages of Shock

# Stage of shock

- **Stage 1: Initial Stage of Shock:**
- During the initial stage, hypoperfusion leads to a reduction in oxygen and the cells switch to an anaerobic metabolism.
- In this anaerobic state, lactic acid is produced

# Stage 2: Compensatory Stage of Shock

- **systems are compensating to maintain adequate cardiac output**
- During the compensatory state, the body tries to reverse the effects of the impaired tissue perfusion.
- The acidosis produced by lactic acid build up is moderated by **hyperventilation** to rid the body of carbon dioxide (CO2) to normalize the pH.
- As the vasoconstriction occurs, **blood is shunted away** from the skin, kidneys, and GIT to the major organs such as the brain, heart, and lungs

- The **vasoconstriction** that occurs as part of this compensatory process increases the diastolic pressure and narrows the pulse pressure. This increased vasoconstriction also results in cold, clammy skin and contributes to organ hypoperfusion
- The reduced blood flow to the kidneys stimulates the renin-angiotensin aldosterone system, leading to more **vasoconstriction and conservation** of water and sodium, maximizing the intravascular volume but further reducing the urine output

# Stage 3: Progressive Stage of Shock

- During this stage, cellular function continues to deteriorate, anaerobic metabolism continues increasing the **acidosis state**.
- The prolonged **vasoconstriction** leads to further tissue ischemia and organ damage.

# Stage 4: Refractory Stage of Shock

- Does not respond to treatment, cannot survive, death is imminent.
- Complete organ failure, BP remains low, mechanical ventilation not adequate enough
- Comfort measures, communicate with family, protect from injury, discuss living wills,.

# Causes of Shock

- Anything that affects the flow of blood through the body can cause shock. Some causes of shock include:

- severe allergic reaction
- significant blood loss
- heart failure
- blood infections
- dehydration
- poisoning
- burns

# Signs and symptoms of shock

1. rapid, weak, or absent pulse
2. Irregular heartbeat
3. rapid, shallow breathing
4. lightheadedness
5. cool, clammy skin
6. dilated pupils
7. lackluster eyes

.8 Nausea

.9 Confusion

10 .Anxiety

11 .decrease in urine

12 . thirst and dry mouth

13 .low blood sugar

14 .loss of consciousness

# Types of Shock:

There are many types of shock. They fall under four main categories, based on what has affected the flow of blood.

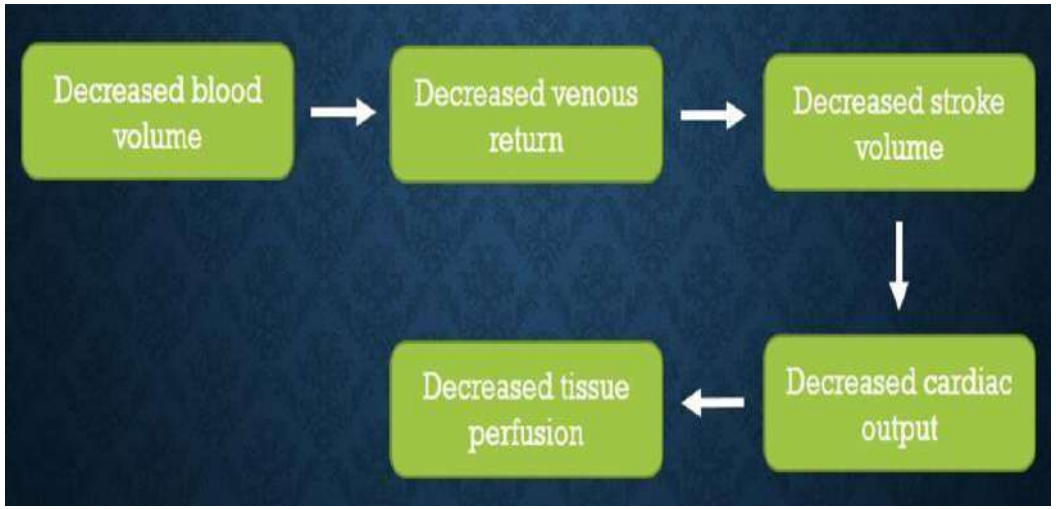
The four major types are:

- obstructive shock
- cardiogenic shock
- distributive shock
- hypovolemic shock

# Hypovolemic Shock

- **Hypovolemic, or low volume shock happens when the circulating blood volume is severely reduced. (common type)**
- **This can be caused by:**

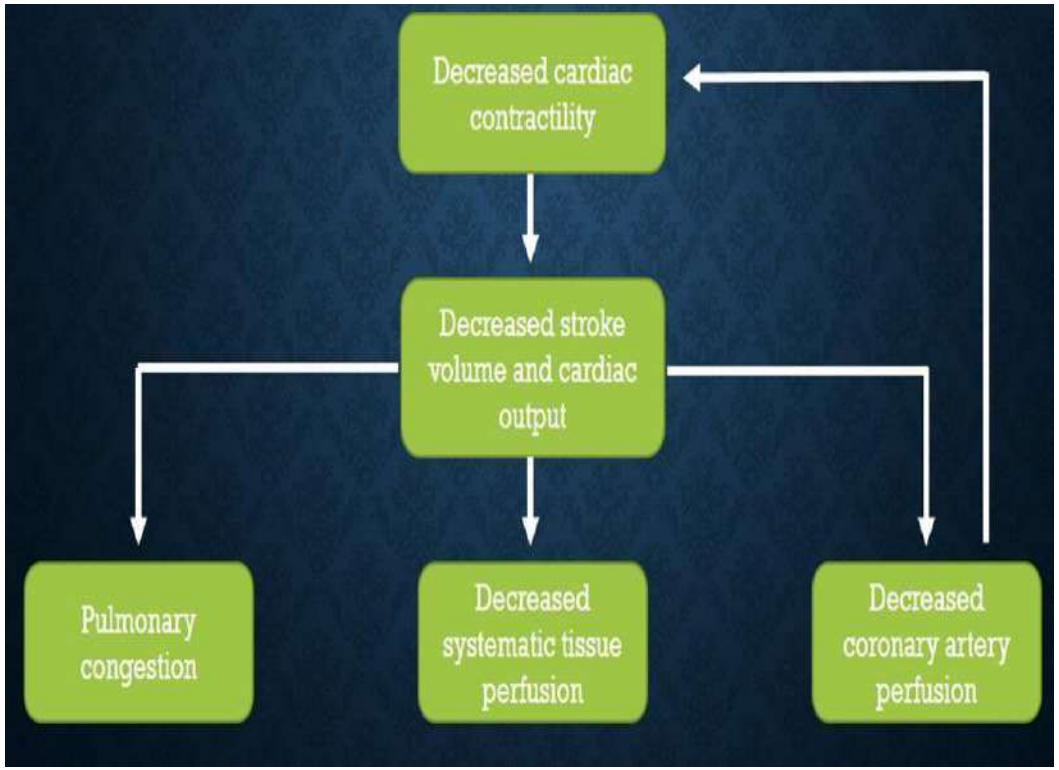
- External blood loss, such as after an injury
- Internal blood loss such as that results from a ruptured blood vessel, ruptured ectopic pregnancy, pancreatitis…
- fluid loss from major burns, excessive vomiting, diarrhea or urination.




-Loss of approximately **15% to 30%** or more of the normal blood volume can produce **hypovolemic shock**

Cardiogenic shock is a result of the heart's inability to deliver adequate circulation to the tissues due to cardiac pump failure. This occurs in the presence of adequate circulating volume

- damage to heart muscle
- irregular heart rhythm
- very slow heart rhythm



# Distributive shock

results from excessive dilation of blood vessels, or vasodilation, which decreases blood pressures.

- **sepsis**, the immune system is overwhelmed by an **infection** that gets out of control, and responds with a systemic cytokine release that causes vasodilation and fluid leakage from capillaries.
- **anaphylaxis**, the immune system overreacts to an allergen, releasing massive amounts of histamine, which has similar effects to cytokines. Peanut **allergy** is a common cause of anaphylaxis.
- **Neurogenic shock** typically occurs as a result of a spinal cord injury. **As the autonomic nervous system** is damaged, the sympathetic tone that normally keeps blood vessels constricted is lost, causing vasodilation and hypotension

# Obstructive shock:

- Occurs as a result of impairment in cardiac ventricular filling or impairment of ventricular emptying. etiologies as:
- **pneumothorax** (collapsed lung)
- **Hemothorax** (blood collects in the space between the chest wall and lung)
- **Cardiac tamponade** (blood or fluids fill the space between the sac that surrounds the heart and the heart muscle)

# Diagnosis of shock

- **First responders and  often recognize shock by its external symptoms. They may also check for:**
- low blood pressure
- weak pulse
- rapid heartbeat
- Imaging tests
- X-ray
- CT scan
- MRI scan
- Blood tests
- may use blood tests to look for signs of:
  - ✓ significant blood loss
  - ✓ infection in blood
  - ✓ drug or medication overdose

# Medical Management

- The major goals of therapy for the patient in hypovolemic shock are to correct the cause of the hypovolemia, restore tissue perfusion, and prevent complications. This approach includes:

- identifying and stopping the source of fluid loss
- administering fluid to replace circulating volume (a crystalloid solution, a colloid solution, blood products, or a combination of fluids.
- Aggressive fluid resuscitation in trauma and surgical patients is the subject of great examination. The benefit of limited or hypotensive.

# Nursing care of shock

- ✓ If patient is unconscious, check to see if patient still breathing and have a heartbeat.
- ✓ If don't detect breathing or a heart beat, begin CPR.
- ✓ If patient breathing:

A. Lay down on their back.

B. Elevate their feet at least 12 inches above the ground. This position, known as the shock position, helps direct blood to their vital organs where it's most needed.

C. Cover them with a blanket or extra clothing to help keep them warm.

D. Check their breathing and heart rate regularly for changes.

E. If suspect the person has injured their head, neck, or back, avoid moving the

# Nursing care of shock

- Apply first aid to any visible wounds..
- If they begin to vomit, turn their head sideways. This helps prevent choking.
- CABs: Circulation, Airway, breathing, and Focused assessment of tissue perfusion
- Vital signs

# Nursing care of shock

- Level of consciousness
- Skin (e.g., temperature, color, moisture)
- Urine output
- Brief history Taking
- Onset and duration of symptoms
- Allergies
- Check for a response.

# Nursing care of shock

- Do not raise the feet or move the legs if hip or leg bones are broken. Keep the person lying flat.
- Keep the person warm and comfortable. Loosen belt (s) and tight clothing and cover the person with a blanket.
- NPO: Even if the person complains of thirst give nothing by mouth. If the person wants water, moisten the lips.
- Reassure the person. Make him or her as comfortable.
- Fluid and blood replacement: Open IV line on both hands with two wide bore cannulas and start fluid rapidly as advised.
- Administer oxygen via face mask. Identify the cause and treat accordingly.
- Vasoactive medications to improve cardiac contractility ie. Dopamine, Dobutamine, Noradrenaline



# Al- Toosi University College

## Nursing Department

## Fourth Stage

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# Sepsis and septic shock

Stage 4th

Critical care nursing

Lecture 3



# Sepsis

- Sepsis: is a systemic response to infection. It is manifested by two or more of the SIRS (Systemic Inflammatory Response Syndrome) criteria as a consequence of documented or presumed infection.

- Sepsis can occur if don't treat a bacterial, parasitic, or fungal infection.

- Sepsis used to be called septicemia or blood poisoning

## Causes of sepsis

# Sepsis occurs most often when have one of these infections:

I. lung infection, like pneumonia
II. kidney infection, like a urinary tract infection
III. skin infection, like cellulitis
IV. gut infection, like from .....(cholecystitis)
V. some germs that more often lead to sepsis than others: Staphylococcus aureus, coli (E. coli) ,Streptococcus
VI. is most often caused by bacterial infections, but almost any infection can cause sepsis if left untreated.

## Symptoms of sepsis

- Sepsis symptoms at first may resemble a cold or the flu. These symptoms include:

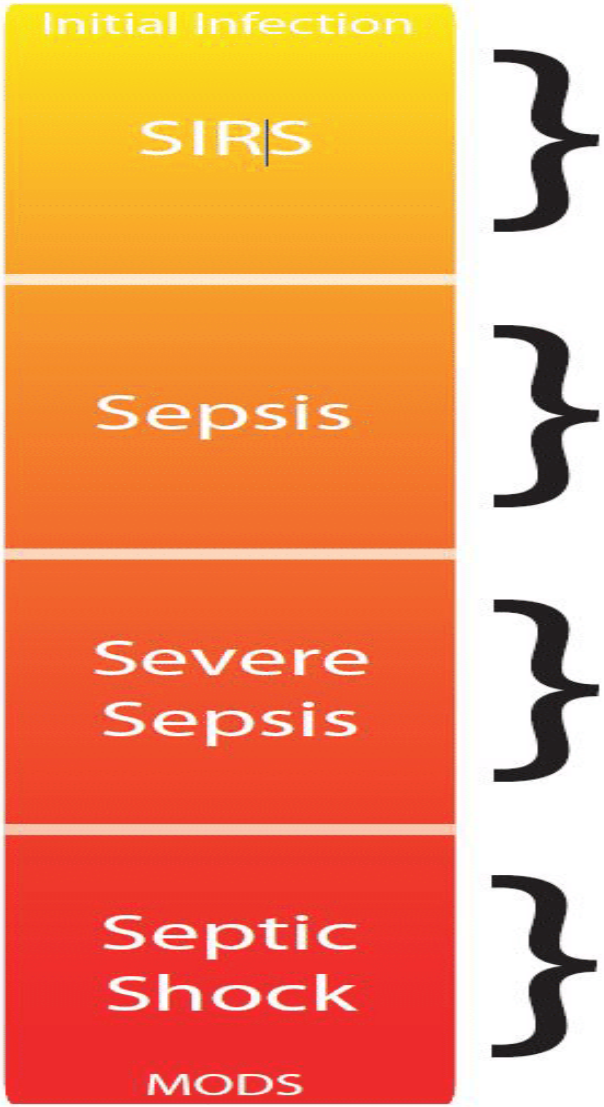
✓ Fever and chills
✓ Pale, clammy skin
✓ Shortness of breath
✓ Elevated heart rate
✓ Confusion

# Septic shock

- Septic shock: is a severe complication of sepsis that can include very low blood pressure , hypo perfusion, altered mental state, and organ dysfunction, that making it very dangerous if not treated quickly.

- Both sepsis and septic shock can happen to anyone.

# Stage of septic shock




Two or more of the following conditions:
- Temperature > 38°C or <36°C
- Heart rate > 90 beats per min
- Respiratory rate > 20 breaths per min
- White blood count > 12,000 / $mm^3$ or < 4,000 / $mm^3$

Systemic response to infection:
- SIRS
- Documented or highly suspected Infection

Sepsis associated abnormalities:
- Sepsis
- Evidence of organ dysfunction, hypoperfusion, or hypotension

Sepsis induced hypotension:
- Systolic BP < 90 mmHg despite adequate fluid resuscitation
- Evidence of organ dysfunction, hypoperfusion, or hypotension

# Causes of septic shock

**There are several factors that can put the patient at risk for septic shock, and these include:**

- Patients with **immunosuppression** have greater chances of acquiring septic shock because they have decreased immune system, making it easier for microorganisms to invade the body tissues.

- **Extremes of age:** Elderly people and infants are more prone to septic shock because of their weak immune system.

- **Malnourishment:** Malnourishment can lower the body's defenses, making it susceptible to the invasion of pathogens.

- **Chronic illness:** Patients with a longstanding illness are put at risk for sepsis because the body's immune system is already weakened by the existing pathogens.
- **Invasive procedures :**Invasive procedures can introduce microorganisms inside the body that could lead to sepsis.

- **Infection :**( lung infection, digestive system infection, urinary tract infection, and reproductive infection).

# Clinical Manifestations of septic shock:

Ability of the body to provide oxygen and nutrients is interrupted, the heart compensates by pumping faster.

- Hypotension occurs because of vasodilation.
- To compensate for the decreased oxygen concentration, the patient tends to breathe faster, and also to eliminate more carbon dioxide from the body.
- The inflammatory response is activated because of the invasion of pathogens.
- Decreased urine output. The body conserves water to avoid undergoing to the kidney.

- dehydration because of the inflammatory process.
- Changes in mentation. As the body slowly becomes acidotic, the patient's mental status also deteriorates.
- Elevated lactate level. The lactate level is elevated because there is maldistribution of blood.
- high fever or chills
- rash

# Assessment and Diagnostic Findings

- **Early assessment and diagnosis of the infection must be established to avoid its progression.**

☐ Blood culture.
☐ Liver function test.
☐ Blood studies
☐ X-ray
☐ CT scan
☐ MRI

# Medical Management

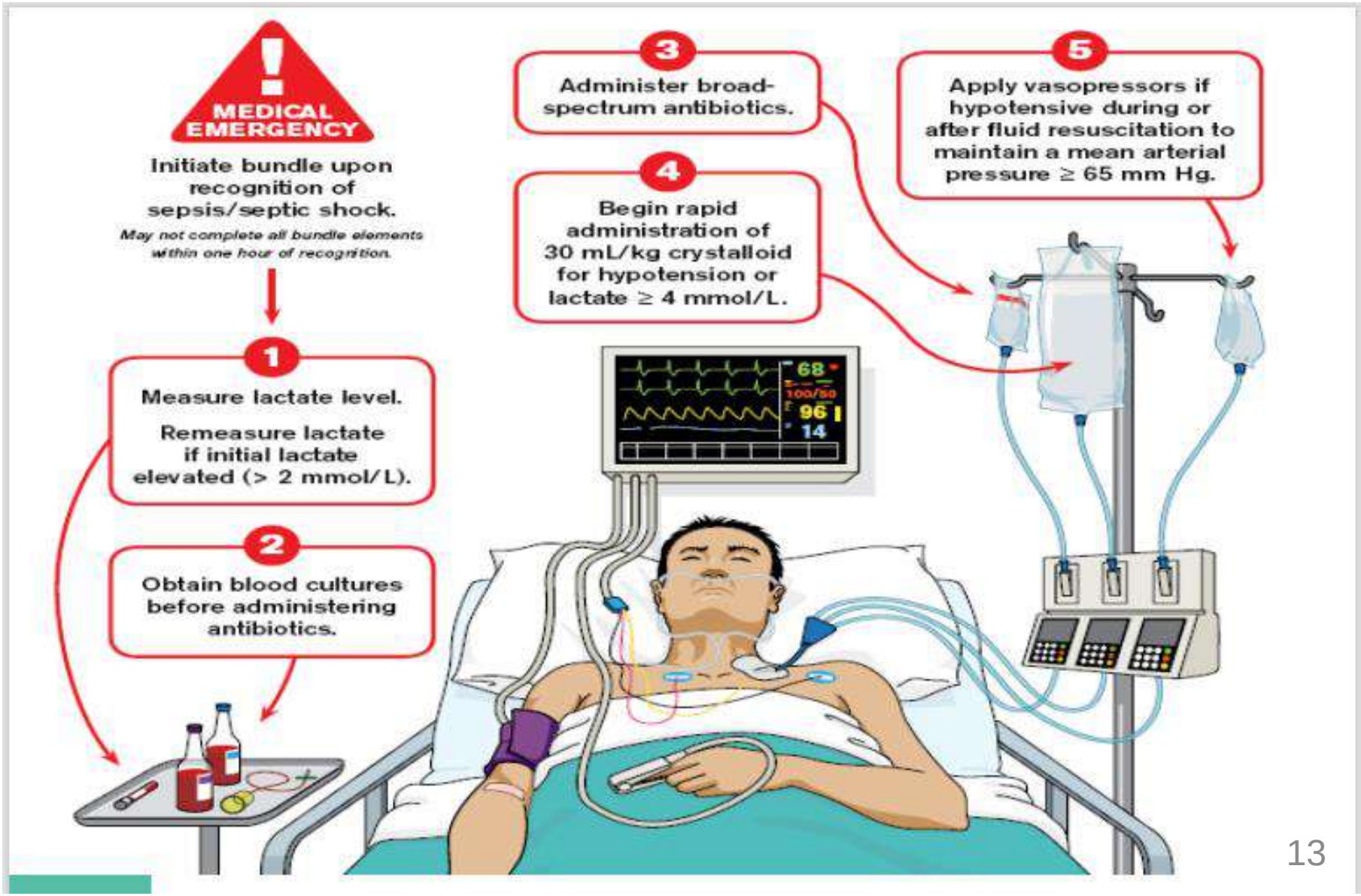
- The current treatment of septic shock and sepsis include identification and elimination of the cause of infection:

☐ Fluid replacement therapy: The therapy is done to correct the tissue hypo perfusion, so aggressive fluid resuscitation must be implemented.

☐ Medications therapy (intravenous antibiotics to fight infection, insulin, vasopressor).

☐ Nutritional therapy: Aggressive nutritional supplementation is critical in the management of septic shock because malnutrition further impairs the patient's resistance to infection.

# Sepsis Resuscitation Bundle



# Nursing Management of septic shock:

- Nurses must keep in mind that the risks of sepsis and the high mortality rate associated with sepsis, severe sepsis, and septic shock.

## I. Nursing Assessment

1. Assessment is one of the nurse's primary responsibilities, and this must be done exactly and carefully.
2. Signs and symptoms. Assess if the patient has positive blood culture, currently receiving antibiotics, had an examination or chest x-ray, or has a suspected infected wound.
3. Signs of acute organ dysfunction. Assess for presence of hypotension, tachypnea, tachycardia, decreased urine output, clotting disorder, and hepatic abnormalities

# II. Nursing Diagnosis

Sepsis can affect a lot of body systems and even cause their failure, so diagnosis is an important part of the process to establish the presence of sepsis.

1. Risk for deficient fluid volume related to massive vasodilation.
2. Risk for decreased cardiac output related to decreased preload.
3. Impaired gas exchange related to interference with oxygen delivery.
4. Risk for shock related to infection.
5. deficient knowledge related to disease process

# III. Planning & Goals

Healthcare team members should be prepared with a care plan for the patient for a more systematic and detailed achievement of the goals.

1. Patient will display hemodynamic stability.
2. Patient will verbalize understanding of the disease process.
3. Patient will achieve timely wound healing

# Nursing Interventions

1. Infection control: all invasive procedures must be carried out with aseptic technique after careful hand hygiene.
2. Collaboration: the nurse must collaborate with the other members of the healthcare team to identify the site and source of sepsis and specific organisms involved.
3. Management of fever : the nurse must monitor the patient closely for shivering.
4. Pharmacologic therapy :the nurse should administer prescribed IV fluids and medications including antibiotic agents and vasoactive

5.Monitor blood levels: The nurse must monitor antibiotic toxicity, BUN, creatinine, WBC, hemoglobin, hematocrit, platelet levels, and coagulation studies.

6. Assess physiologic status: The nurse should assess the patient's

8.hemodynamic status : fluid intake and output, and nutritional status.

# Evaluation

1. Patient displayed hemodynamic stability.
2. Patient verbalized understanding of the disease process.
3. Patient achieved timely wound healing.

# Multiple organ dysfunction syndrome

- **Multiple organ dysfunction syndrome** (MODS) is a systemic, dysfunctional inflammatory response that requires long intensive care unit (ICU) stay.
- It is characterized with high mortality rate depending on the number of organs involved
- Organs may be affected:
  - ✓ Heart: heart failure
  - ✓ Blood: abnormal blood clotting
  - ✓ Kidneys: kidney failure
  - ✓ Lungs: respiratory failure
  - ✓ Brain: stroke
  - ✓ Liver: liver failure

## Symptoms of Multiple organ dysfunction syndrome

- The patient may display some of the following symptoms depending on which organs are affected:

1. An altered mental state
2. A decrease in renal perfusion (decrease in urine output).
3. Respiratory deterioration
4. A decrease in cardiac function
5. Deranged metabolic status
6. A compromised fluid balance
7. Pale, clammy, peripherally cool skin and faint pedal pulses
8. A decrease in cardiac output (e.g. low blood pressure, arrhythmia).

# Management and treatment may include:

1. Identifying and treating the underlying causes, comorbidities or complications.
2. Fluid resuscitation to increase perfusion.
3. Support care and monitoring:
4. Multi-organ support.
5. Mechanical or non-invasive ventilation.
6. Maintaining fluid homeostasis.
7. Renal replacement therapy.