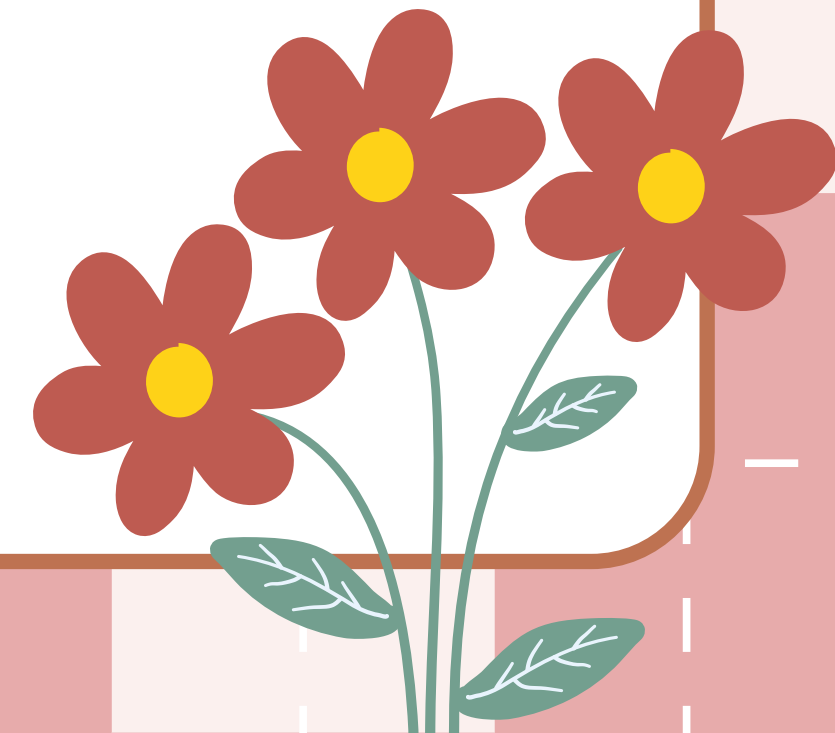
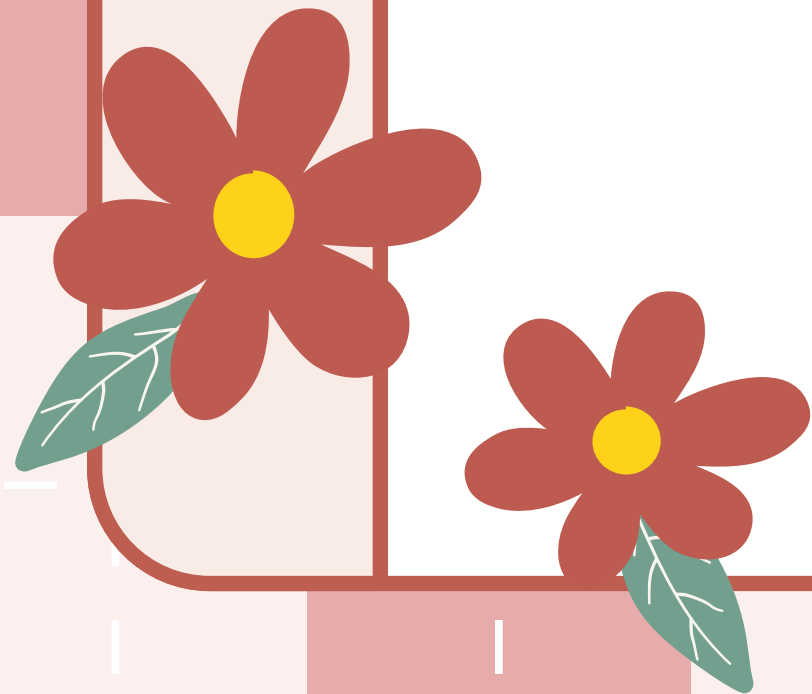


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# SHOKE

Presented by:

- Amena Al-dhmour
- Sura Maaitah
- Majd Al\_zayadneh
- \_Ibtihal Al\_khwaldeh
- \_Farah Al\_daradkeh
- \_Salma nobani



# CONTENTS:

1

**DEFINITION**

2

**STAGES &  
COMMON FEATURES**

3

**DIAGNOSTIC FACTOR &  
INVESTIGATION**

4

**TYPES**

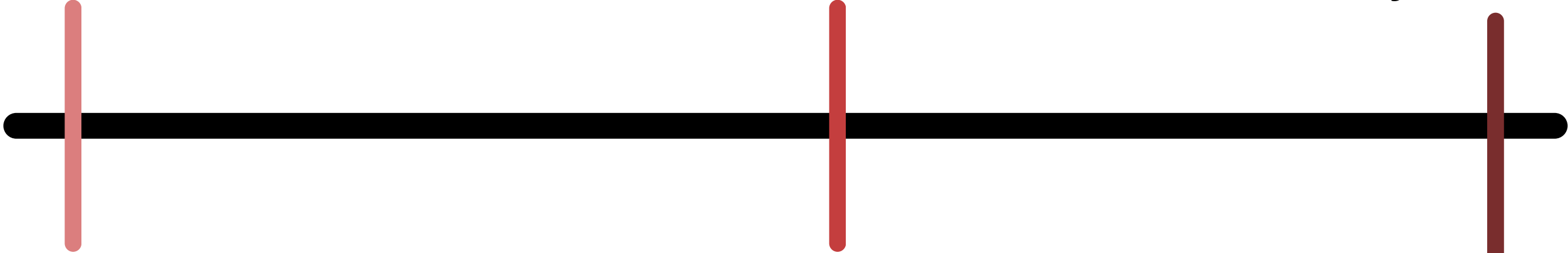
# Defnition

- Shock is a life-threatening manifestation of circulatory failure that leads to cellular and tissue hypoxia resulting in cellular death and dysfunction of vital organs.
- The effects of shock are initially reversible, but rapidly become irreversible, resulting in multi-organ failure (MOF) and death.



# STAGES OF SHOCK

## ▪ Pre-shock



-Early, compensated shock

-symptoms are absent or mild

## ▪ shock

-Compensatory mechanisms become overwhelmed

-symptoms of organ dysfunction begin to appear

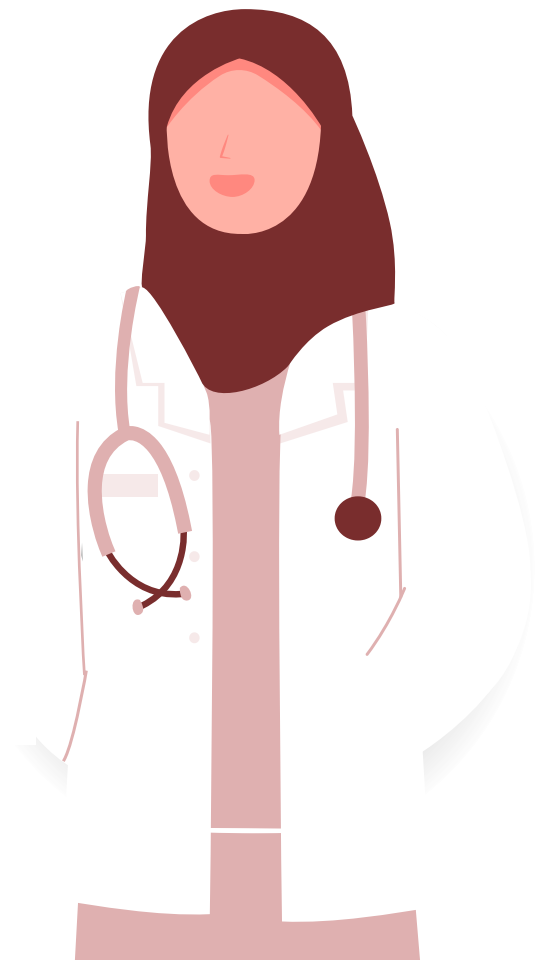
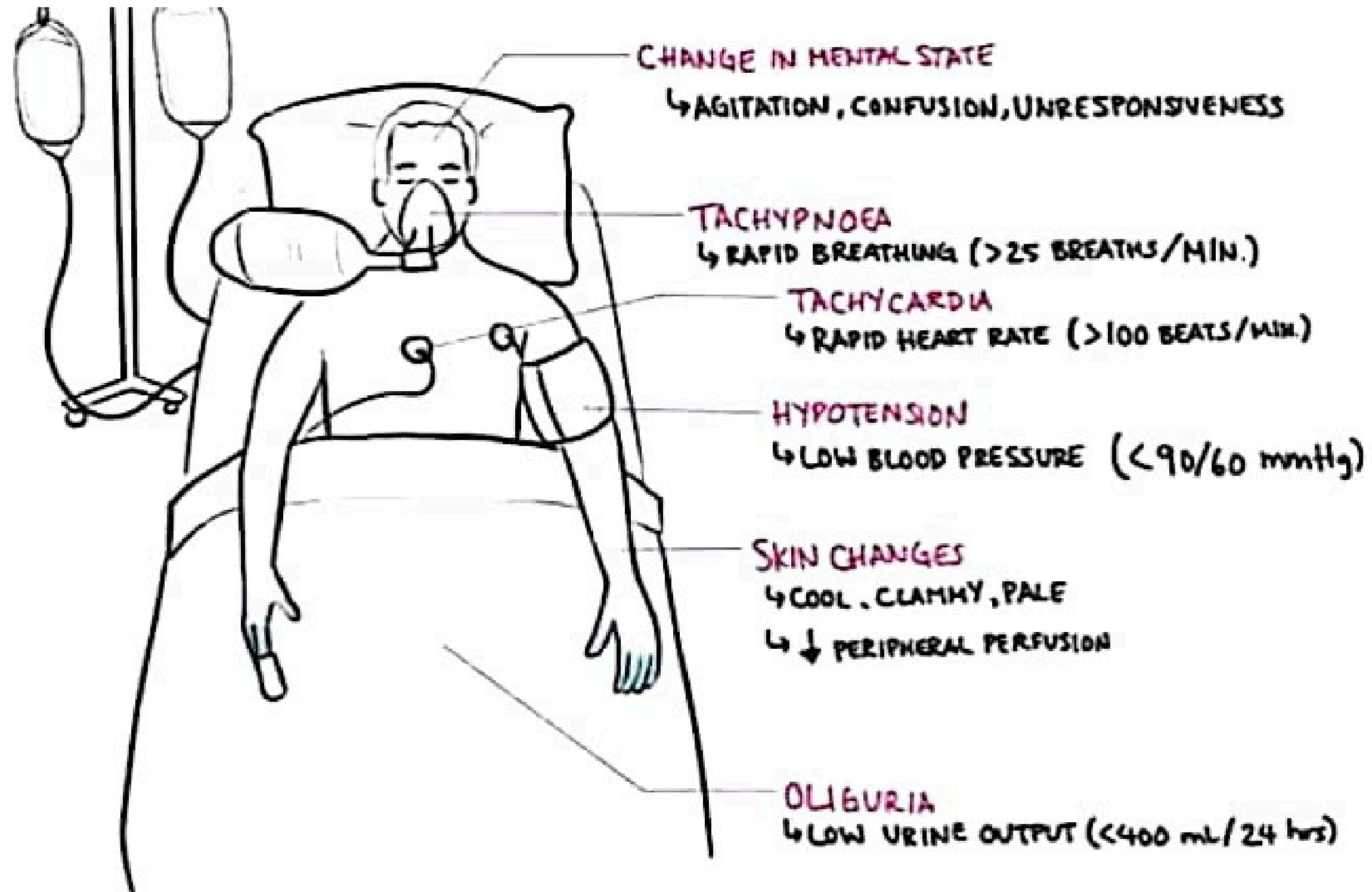
## ▪ End-organ dysfunction

-Progressive shock

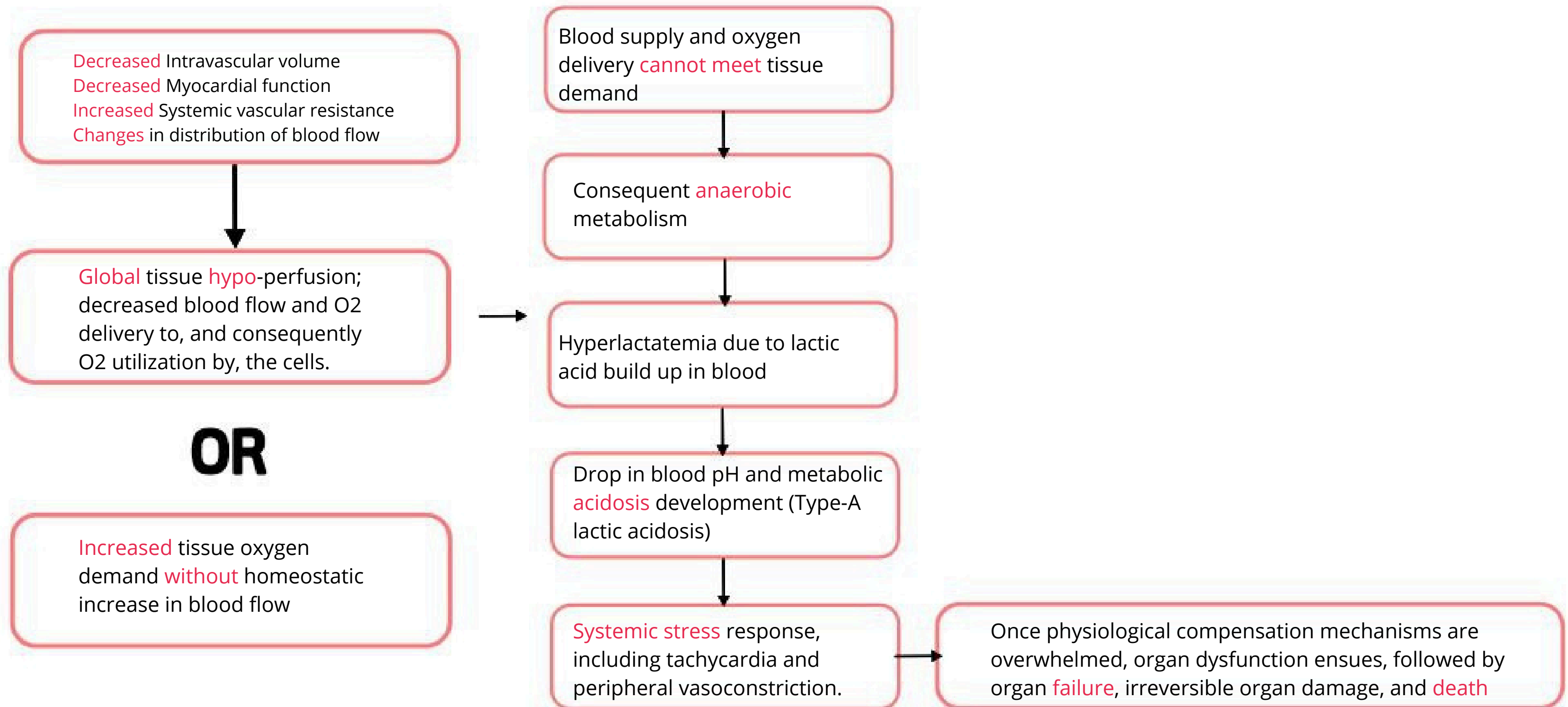
-Leads to irreversible organ damage and death

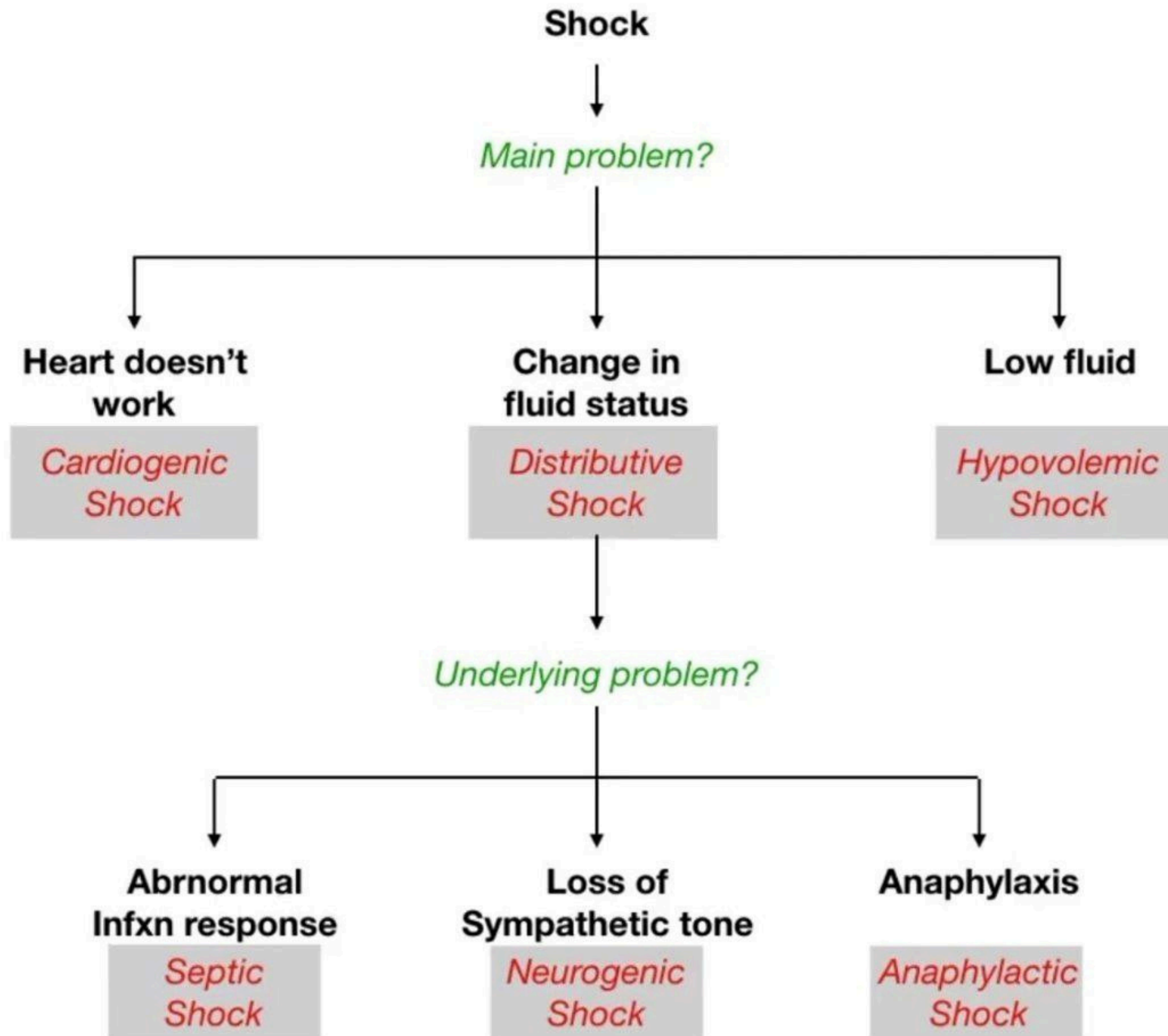


# Clinical features



# Pathophysiology





**Key  
diagnostic  
factor**



**1-Hypotension (defined as decrease of  $\geq 40$  mmhg from baseline ).**

**Occurs in most patients but a normal BP doesn't rule out shock.**

**2-Tachycardia (may be an earlier sign of shock than hypotension as compensatory mechanisms can maintain cardiac output ).**

**3-Skin (cold sweaty skin, clammy peripheries, mottled, ashen appearance, skin cyanosis (besides lips and tongue cyanosis))**

**4-oligourea(consider inserting a urinary catheter, oliguria is defined as  $< 0.5$  ml/kg/hr. )**

**5.Hypoxemia**

**6-mental state:(use GCS/Agitation, confusion, and distress occur early).  
Unresponsiveness indicates severe and advanced shock).**

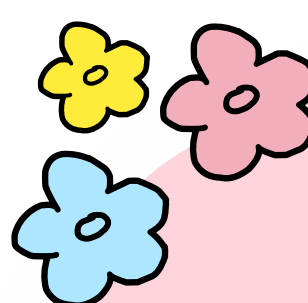
**7-positive risk factor (history of sepsis, recent MI, history of hemorrhage, trauma, surgery, exposure to known allergen, change in medications, significant co-morbidities)**

**8-Dyspnea (Respiratory rate may be increased because of hypoxia (e.g., in pneumonia) but will often remain elevated despite correction of PaO<sub>2</sub> due to the need of compensatory hyperventilation of the generated metabolic acidosis)**

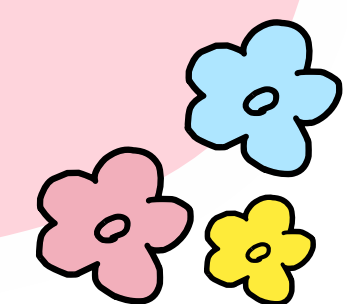
**9-Fever (suggests septic shock).**

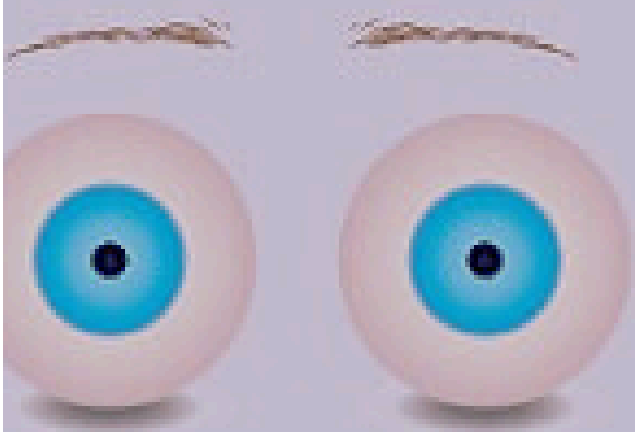
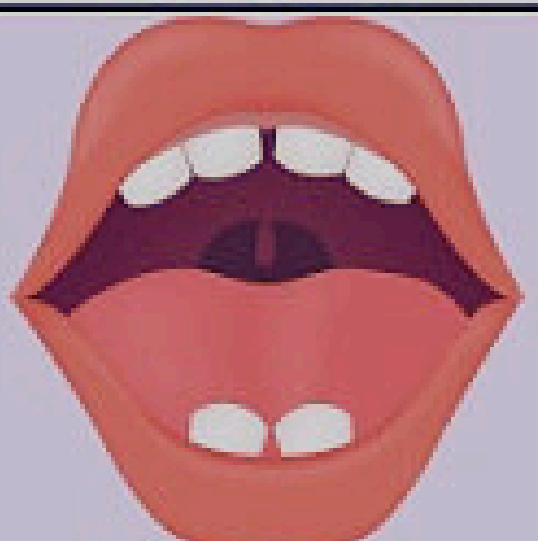
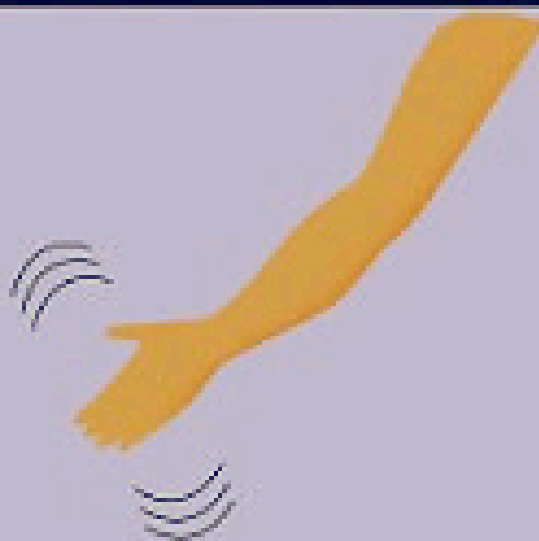
**10-Chest pain (suggest MI).**

**11-Hypothermia (it is the most obvious clinical sign of end-stage irreversible shock of any cause).**



# Glasgow coma scale



Behaviour	Response
 Eye Opening Response	<ol style="list-style-type: none"><li>4. Spontaneously</li><li>3. To speech</li><li>2. To pain</li><li>1. No response</li></ol>
 Verbal Response	<ol style="list-style-type: none"><li>5. Oriented to time, person and place</li><li>4. Confused</li><li>3. Inappropriate words</li><li>2. Incomprehensible sounds</li><li>1. No response</li></ol>
 Motor Response	<ol style="list-style-type: none"><li>6. Obeys command</li><li>5. Moves to localised pain</li><li>4. Flex to withdraw from pain</li><li>3. Abnormal flexion</li><li>2. Abnormal extension</li><li>1. No response</li></ol>

# Diagnostic investigations

- **1. Lactate** (From arterial blood gas) (result: >2mmol/L)
- **2. Arterial blood gas** or venous blood gas (result: Metabolic acidosis; pH < 7.35, bicarbonate <22)
- **3. Glucose** (result: > 7mmol/L or > 126mg/dL in non diabetic patient.)
- **4. Blood test:**
  - CBC (result: Hb < 10g/dL suggests hemorrhage, WBC >12 x 10<sup>3</sup>/ macro-liter if sepsis is present.)
  - Urea and electrolytes (evidence of renal impairment if kidney perfusion is compromised for example hypokalemia and hypernatremia with diarrhea and vomiting (hypovolemic shock))
  - Coagulation studies (result: PT, PTT, fibrinogen; prolonged with DIC in septic shock)
  - C-reactive protein (result: high values suggest sepsis)
- **5. ECG** (evidence of MI, arrhythmias, electrolyte abnormalities)
- **6. CXR:** look for pulmonary oedema, pneumonia, pneumothorax, widened mediastinum (e.g., due to aortic dissection).





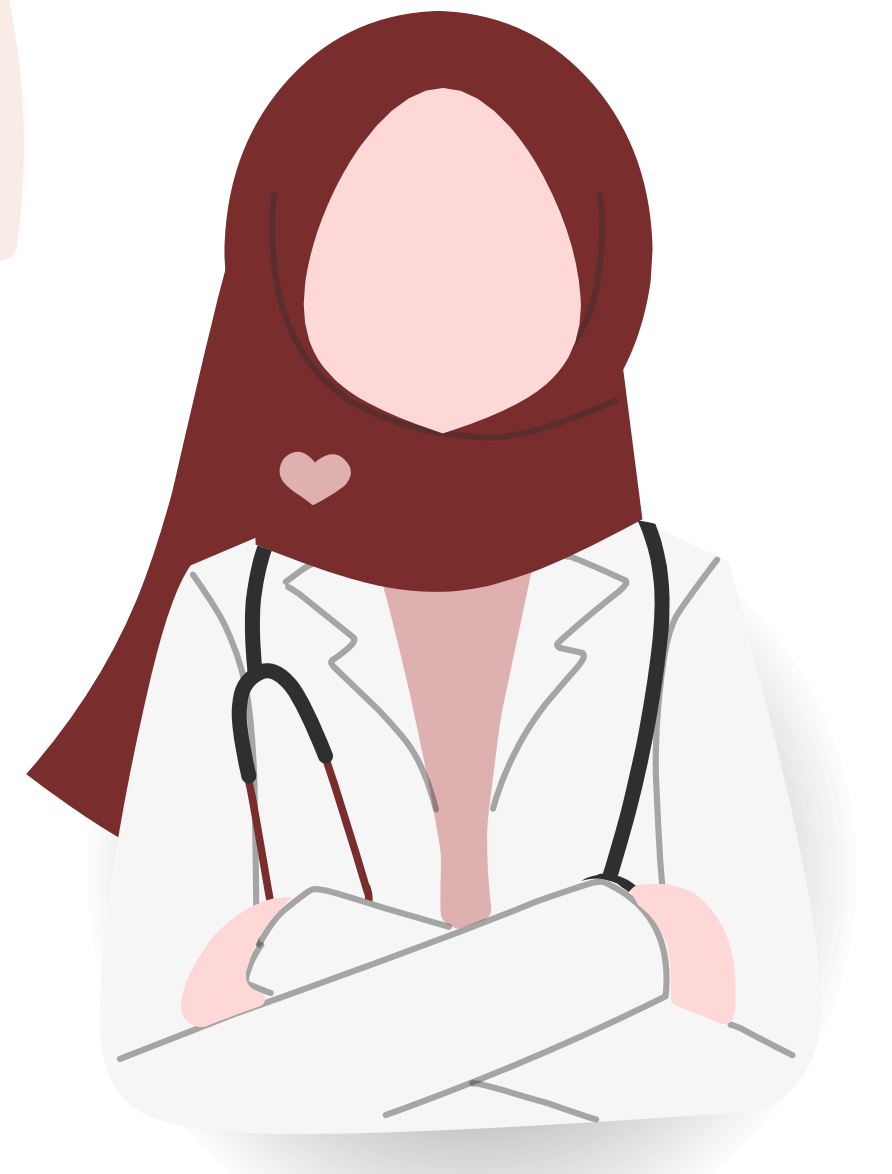
□ **NB:**

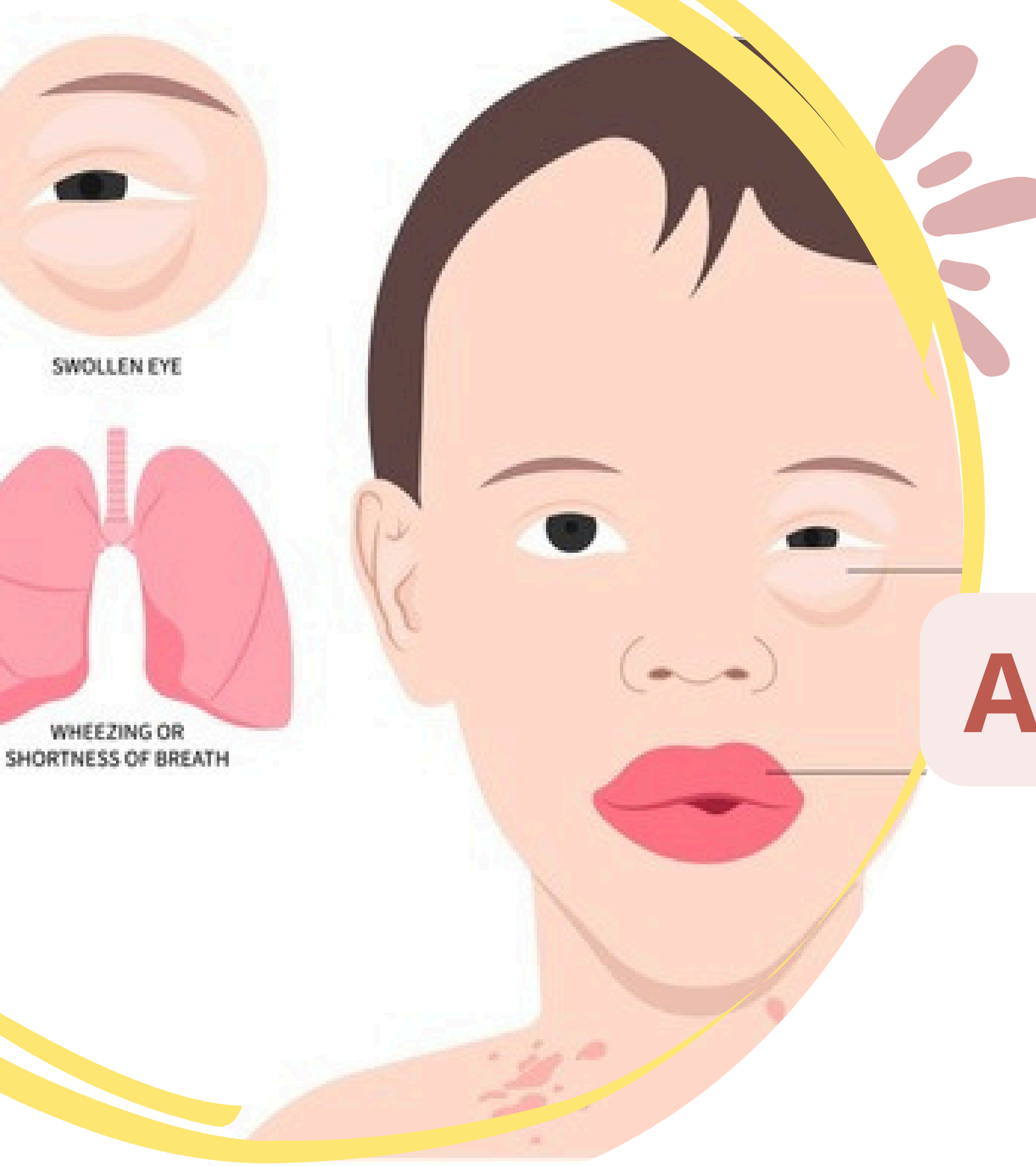
- **Resuscitation should not delay**
- **while investigating the etiology of**
- **undifferentiated**
- **shock. Use an ABCDE approach to**
- **manage shock empirically**

# Use an **ABCDE** approach to manage shock empirically

ABCDE	Assessment	Treatment
Airway	<ul style="list-style-type: none"> <li>• <b>Voice changes</b></li> <li>• <b>Breath sounds</b>(stridor,snores,increased breathing effort).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Airway opening manoeuvre</b></li> <li>• <b>Airway suction</b></li> <li>• Consider <b>inserting</b> an oropharyngeal or nasopharyngeal airway in deeply unconscious patients &lt;8 GCS .</li> </ul>
Breathing	<ul style="list-style-type: none"> <li>• <b>Respiratory rate</b></li> <li>• <b>Chest wall expansion</b></li> <li>• <b>Chest percussion</b></li> <li>• <b>Lung auscultation</b></li> <li>• <b>Pulse oximetry</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Seat comfortably</b></li> <li>• <b>Inhaled medications</b></li> <li>• <b>Bag –mask ventilation</b></li> <li>• <b>Decompress</b> tension pneumothorax (needle thoracentesis)</li> </ul>
Circulation	<ul style="list-style-type: none"> <li>• <b>Skin color</b> ,sweating</li> <li>• <b>Capillary refill time</b> (normally &lt;2s)</li> <li>• <b>Palpate pulse rate</b> (60-100/min )</li> <li>• <b>Heart auscultation</b></li> <li>• <b>Blood pressure</b> (systolic 100-140mmHg)</li> <li>• <b>ECG monitoring</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Stop bleeding</b></li> <li>• <b>Elevate legs</b></li> <li>• <b>Intravenous access with crystalloid fluid</b> administration</li> </ul>
Delivery of oxygen /Disability	<ul style="list-style-type: none"> <li>• Assess <b>arterial</b> oxygen saturation</li> <li>• Mixed <b>venous</b> oxygenation</li> <li>• <b>Cardiac index</b></li> <li>• For disability : assess <b>consciousness level ,mental status ,movement ,reflexes</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Decrease oxygen demands</b> (provide analgesia and anxiolytics to relax muscles and avoid shivering )</li> <li>• <b>Maintain arterial oxygen saturation</b> (give supplemental oxygen ,maintain hemoglobin &gt;10g/dl)</li> <li>• <b>Serial lactate levels</b> or <b>central venous oxygen saturations</b> to assess tissue oxygen extraction</li> </ul>
Exposure /End points of resuscitation	<ul style="list-style-type: none"> <li>• <b>Exposure and temperature</b> assessment</li> <li>• Assess <b>goal values</b></li> </ul>	<ul style="list-style-type: none"> <li>• Make sure your approach is goal –directed :            Urine output &gt;0.5ml/kg/hr            CVP 8-12 mmHg            MAP 65 to 90 mmHg            Central venous oxygen concentration &gt;70%</li> </ul>

TYPES





SWOLLEN EYE



WHEEZING OR SHORTNESS OF BREATH

# Anaphylactic Shock

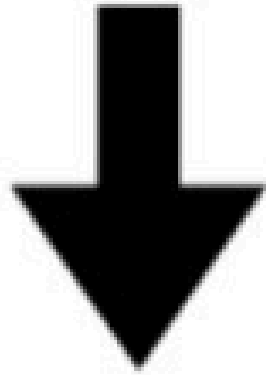




# Anaphylactic Shock

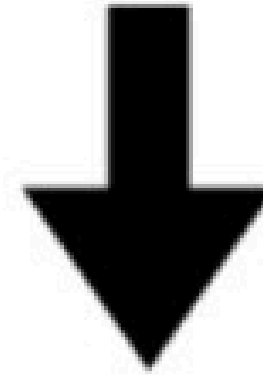
- Anaphylactic shock is a severe, generalized or systemic hypersensitivity reaction, characterized by rapidly developing **life-threatening airway** and/or **breathing and/or circulation** problems usually associated with skin and mucosal changes.

### IgE mediated



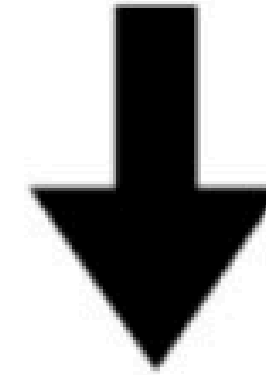
1. Allergen entry: ingestion, inhalation, parenteral, or skin contact.
2. Formation of immunoglobulin E (**IgE**) antibodies specific to the antigen presented on first exposure.
3. IgE antibodies attach to high-affinity Fc receptors on basophils and mast cells.
4. On subsequent exposure, binding of antigen to the IgE antibodies leads to bridging and triggers the degranulation of mast cells.

### Non IgE mediated



1. Activation of complement system
2. The **complement** peptides (anaphylatoxins) such as C3a and C5 directly act on mast cells and basophils leading to mediator release

### Idiopathic



1. Increased mast cell **sensitivity** and degranulation
2. **Unrecognised** allergens





## Possible causative agent

- **IgE mediated:** Food, Airborne allergens, Latex, Venom, insect sting, Medication, Semen
- **Immunologic non IgE mediated:** Immune aggregate, Intravenous immunoglobulin, Medication (NSAIDs), Radiocontrast media
- **Non immunologic:** Opiates, Physical factors (e.g., exercise, cold, heat)
- **Idiopathic**



# Anaphylaxis

- **Sudden** onset and **rapid** progression of symptoms.
- **Firstly**: Pruritus, flushing, urticaria (hives)
- **Next**: swelling, angioedema, trouble swallowing, trouble breathing/shortness of breath, wheezing, hoarse voice, stridor.
- **Finally**: Altered mental status, respiratory distress, bradycardia followed by **respiratory failure** and **cardiac arrest**.
- poorly **controlled asthma** and **previous anaphylaxis** are risk factors for **fatal anaphylaxis**









**B) Not in Cardiorespiratory arrest:**

**1. ABCDE principles**

**2. Position the patient and remove the trigger**

**3. IM adrenaline, repeat if not responding after 5min**

**4. High-concentration oxygen**

**5. IV crystalloid fluid to counteract fluid shifts associated with vasodilation**

**6. Vital signs monitor.**


**7. Consider the following:**

- **Nebulized adrenaline (if marked stridor)**

- **Nebulized short acting B2 agonist (if bronchoconstriction and wheezing)**

- **IV atropine (if bradycardic)**

- **IV glucagon (if pt is on B blocker and not responding to adrenaline)**



**Hypotension, tachycardia,** and adrenaline may cause **myocardial ischemia** by reducing perfusion during diastole.

The alpha-1 agonist action of adrenaline can lead to severe **hypertension/hypertensive crisis.**

**Biphasic reaction:** Potential **second reaction** that can occur between 4 and 12 hours after the initial reaction.

• **To prevent biphasic reaction:**

1. Antihistamine

2. Corticosteroids

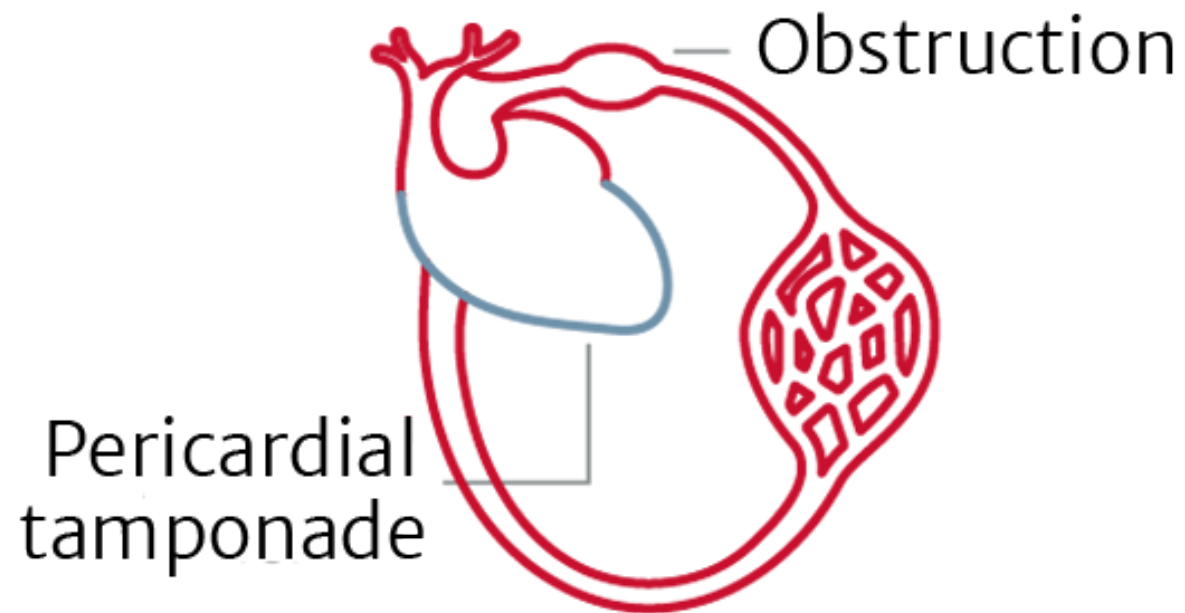
3. **If symptoms recur manage the pt as you would for an initial anaphylactic reaction.**

4. Review by a senior clinician.

**After all:** Before discharge from hospital, give clear instructions to patients to return to hospital if symptoms recur.



# Obstructive Shock

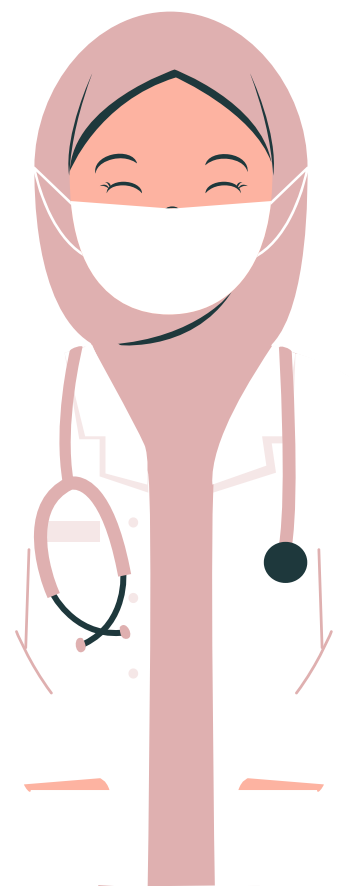
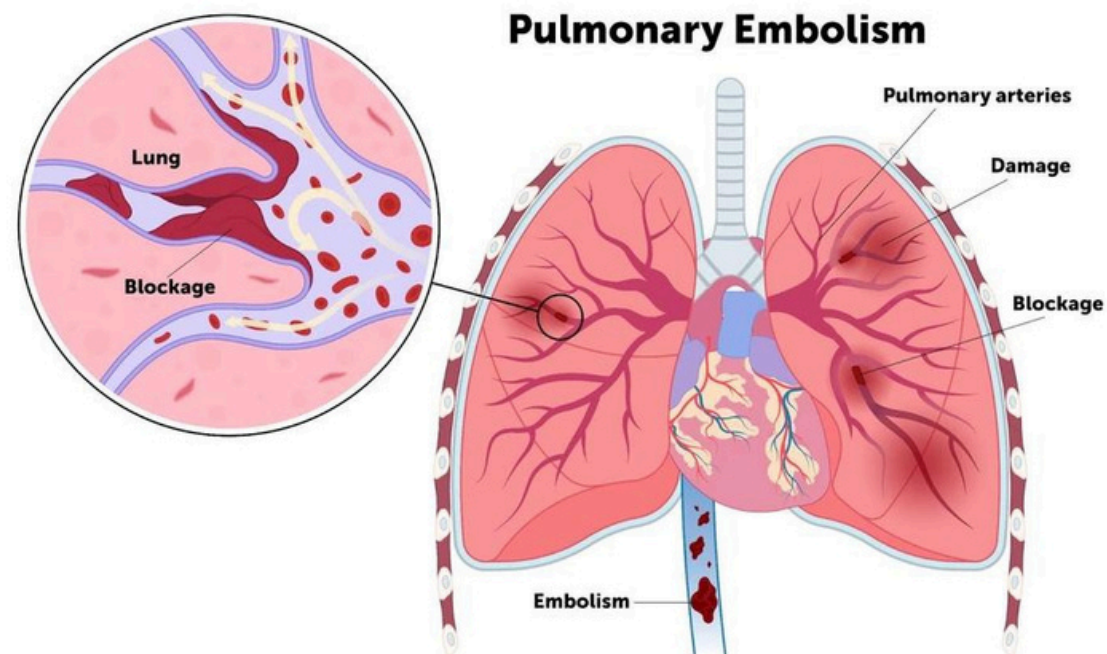
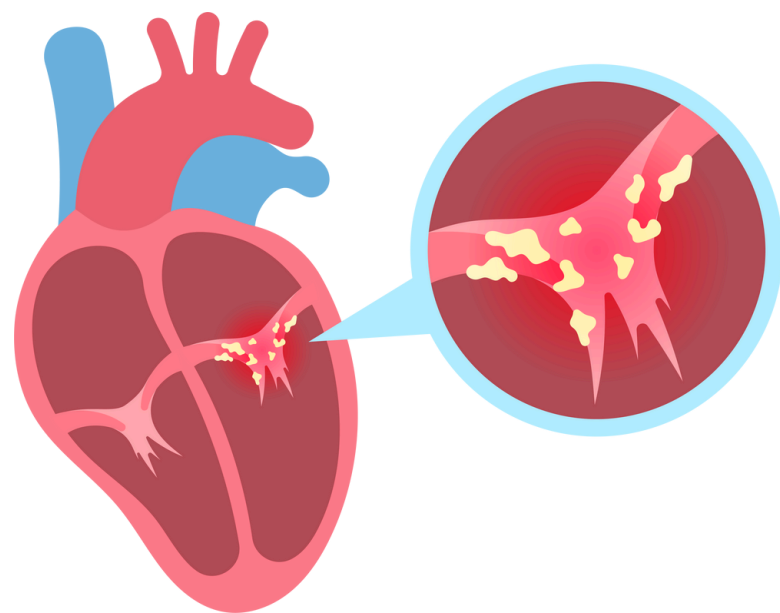


tension pneumothorax



\*Usually manifests with elevated JVP

2% Obstructive shock





Treatment requires diagnosis of underlying disease.

- **Supportive treatment** usually involves giving **fluid** and/or **vasopressors** to maintain **blood pressures** until definitive therapy can be given.

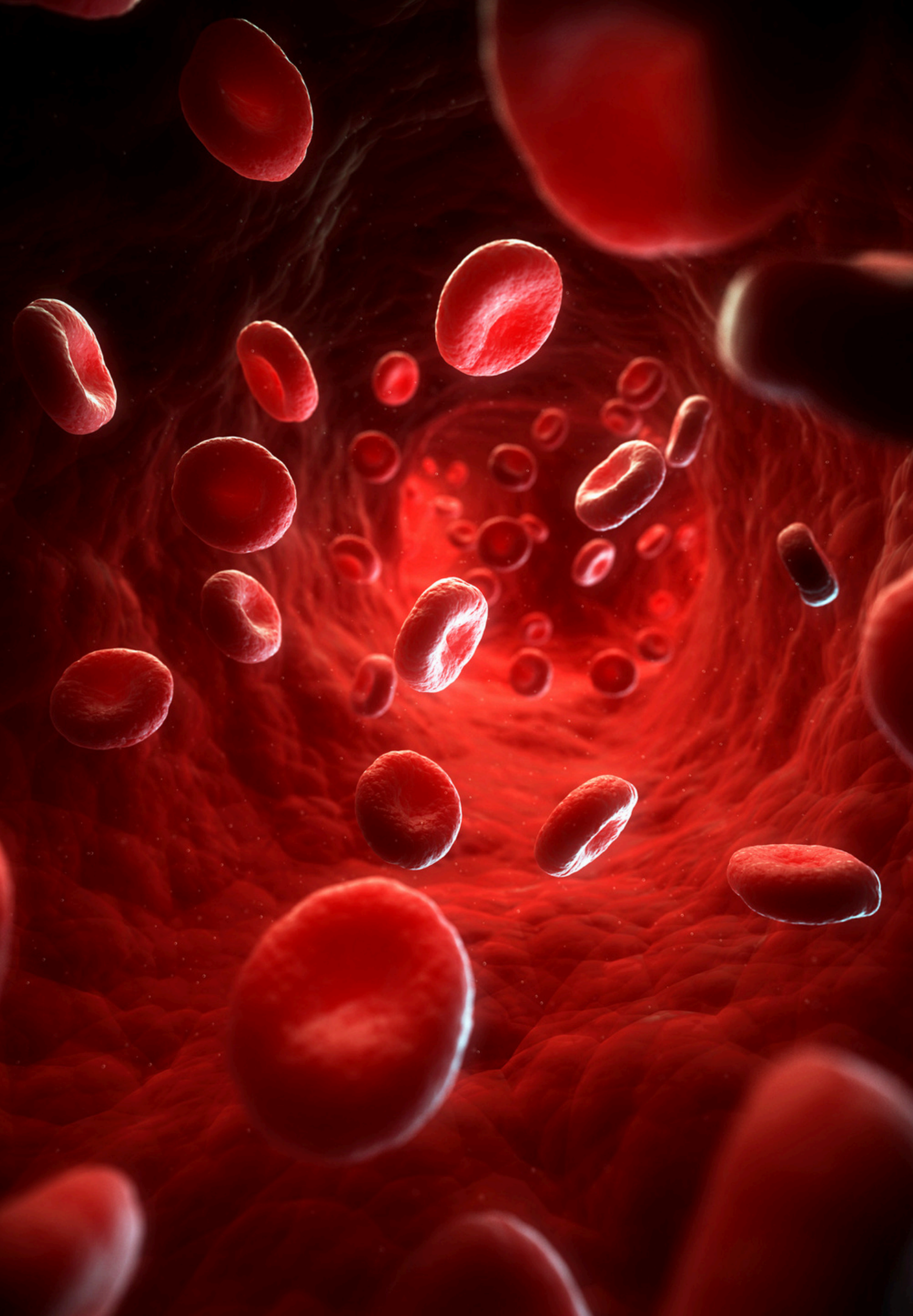
- **Treatment:**

1. **Cardiac tamponade:** Requires pericardiocentesis or pericardial window.

2. **Aortic stenosis:** valve replacement

3. **Massive PE:** Heparin, Apixaban, Rivaroxaban consider thrombolytic





# HYPOVOLEMIC Shock

Definition: Reduced circulating blood volume with secondary decreased cardiac output



# HYPOVOLEMIC Shock

\*Causes:

a) Non-hemorrhagic

❖ Vomiting

❖ Diarrhea

❖ Bowel obstruction

❖ Burns

❖ Dehydration

b) Hemorrhagic

❖ GI bleed

❖ Trauma

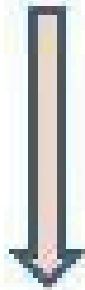
❖ Massive hemoptysis

❖ post-partum bleeding



# PATHOPHYSIOLOGY OF HYPOVOLEMIC SHOCK

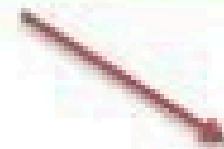
**HYPOVOLEMIA**



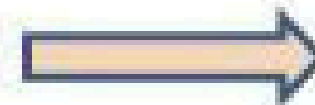
Decreased  
venous return



Decreased  
preload



**DECREASED CARDIAC  
OUT PUT**



**Hypotension**

**MULTIORGAN  
FAILURE**



Organ  
dysfunction



Perfusion  
failure and  
tissue hypoxia



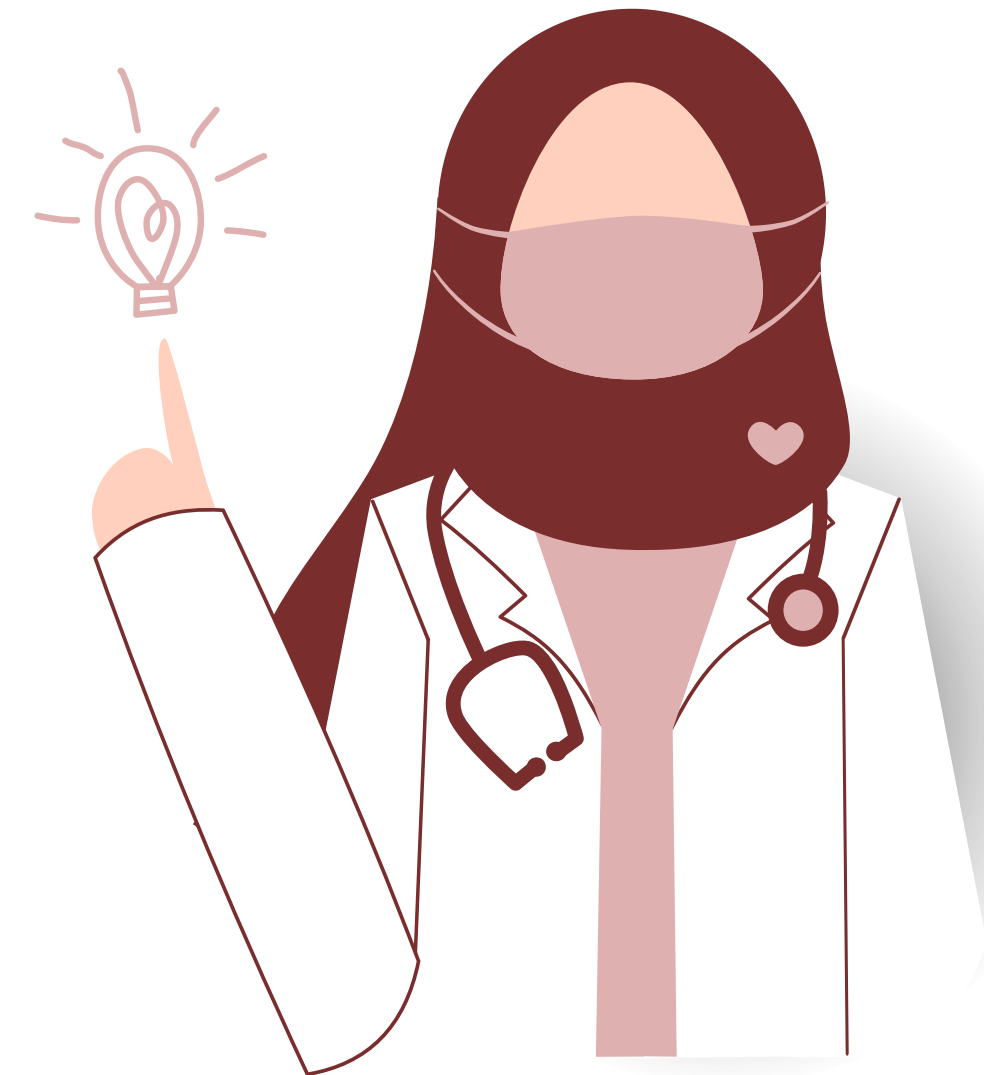
$$Bp = CO \times SVR$$
$$CO = HR \times SV$$





# Evaluation

- CBC
- ABG
- Electrolytes
- Coagulation studies
- Type and cross-match
  - As indicated: CXR, Pelvic x-ray, CT, GI endoscopy, Vascular radiology

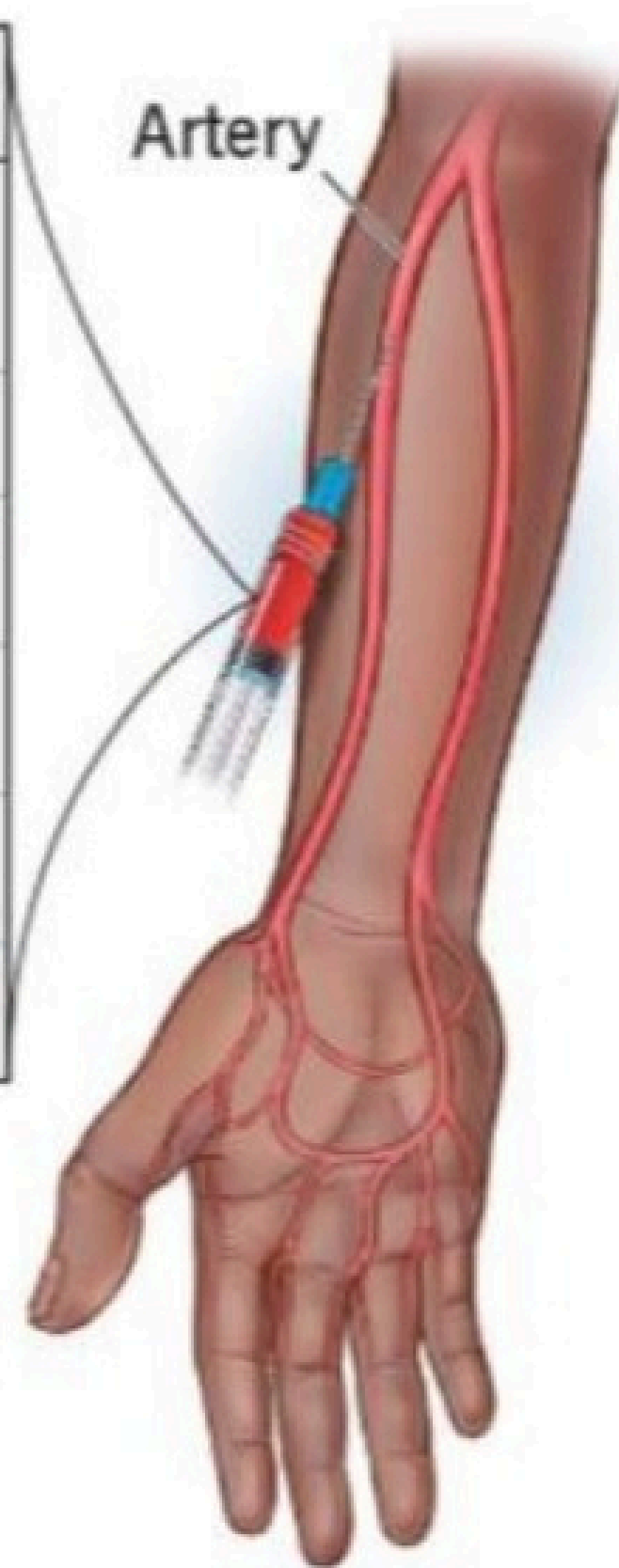


## Classes of Hypovolemic Shock

	Class I	Class II	Class III	Class IV
Blood Loss	< 750	750-1500	1500-2000	> 2000
Blood Vol. %	< 15%	15-30%	30-40%	> 40%
Pulse	< 100	> 100	> 120	> 140
Blood Pressure	Normal	Normal	Decreased	Decreased
Pulse Pressure	Normal	Decreased	Decreased	Decreased
Resp. Rate	14-20	20-30	30-40	> 40
UOP	> 30	20-30	5-15	negligible
Mental Status	sl. Anxious	mildly anx	confused	lethargic
Fluid	crystalloid	crystalloid	blood	blood

# Arterial Blood Gas (ABG)

ABG	Normal range
O <sub>2</sub> CT	15-23% per 100 mL of blood
pH	7.35-7.45
PaCO <sub>2</sub>	35-45 mmHg
PaO <sub>2</sub>	80-100 mmHg
HCO <sub>3</sub>	22-26 mEq/L
O <sub>2</sub> Sat	95-100%



## Complete Blood Count Normal Range\*

WBCs	3,500-11,000 cells/mcL
Hematocrit	34.9%-44.5% in women 38.8%-50% in men
Platelets	150,000-450,000/mcL
RBCs	4.3-5.7 million cells/mcL in men 3.9-5.1 million cells/mcL in women
Hemoglobin	13-17 g/dL in men 11.5-15.5g/dL in women

# Management

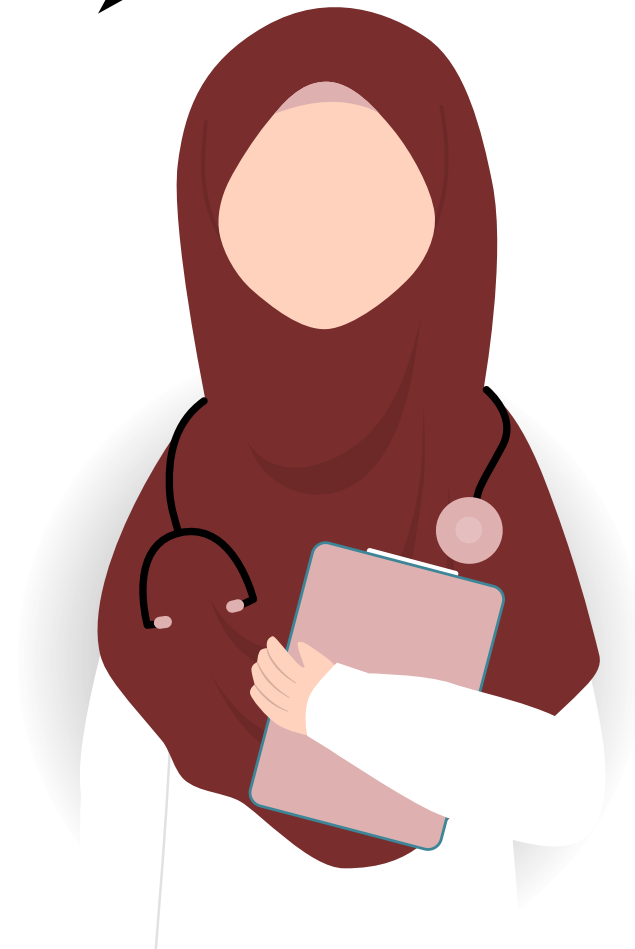
## ABCs

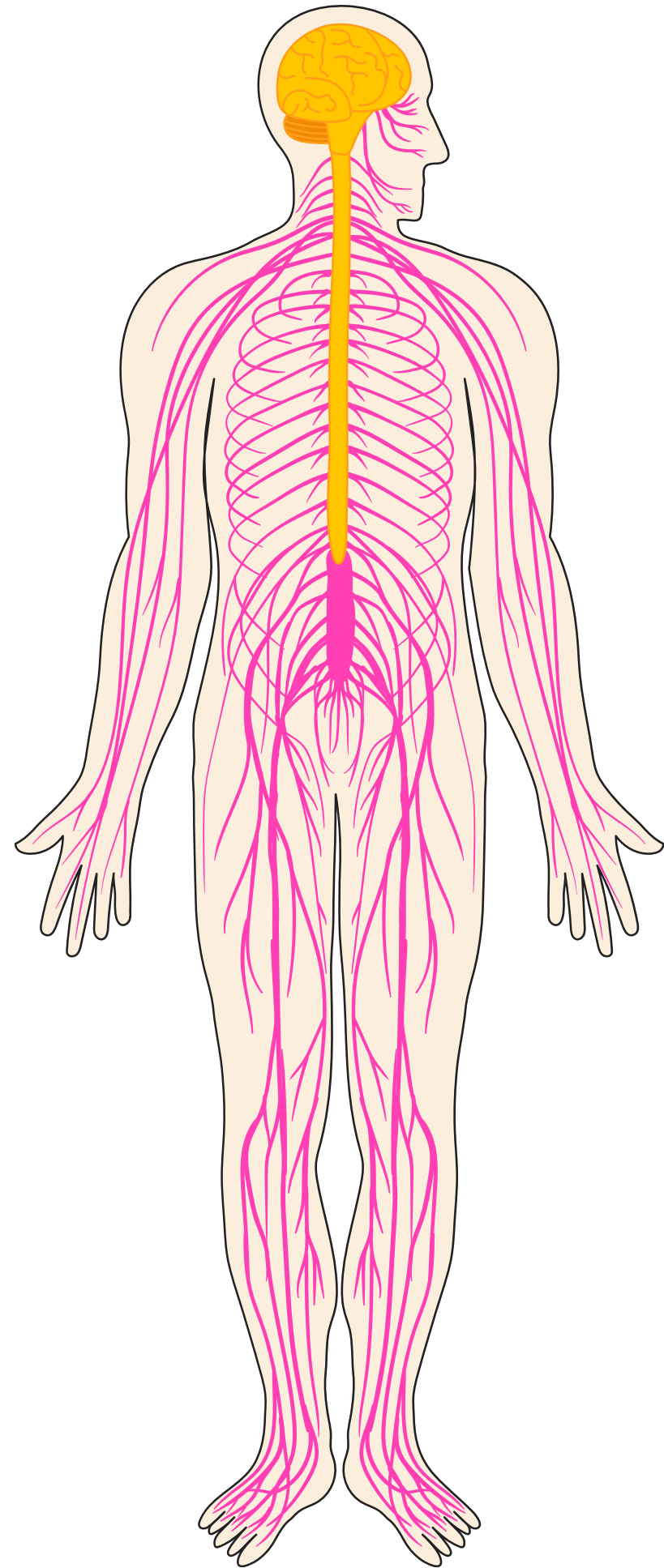
Establish 2 large bore IVs or a central line

Crystalloids: Normal Saline or Lactate Ringers: Up to 3 liters

PRBCs: O negative or cross matched

Control any bleeding





**NEUROGENIC  
SHOCK**

# General Characteristics:

- Neurogenic shock results from a **failure of the sympathetic** nervous system to maintain adequate vascular tone (sympathetic denervation)
- Causes include spinal cord injury, severe head injury, spinal anesthesia, pharmacologic sympathetic blockade, characterized by **peripheral vasodilation** with **decreased SVR**



## Clinical Features

- 1. Warm, well-perfused skin.**
- 2. Urine output low or normal**
- 3. Bradycardia and hypotension (but tachycardia can occur)**
- 4. Cardiac output is decreased, SVR low, PCWP low to normal**

# Treatment



Judicious use of IV fluids as the mainstay of treatment



Vasoconstrictors to restore venous tone, but **cautiously**





# Cardiogenic Shock



# Cardiogenic Shock

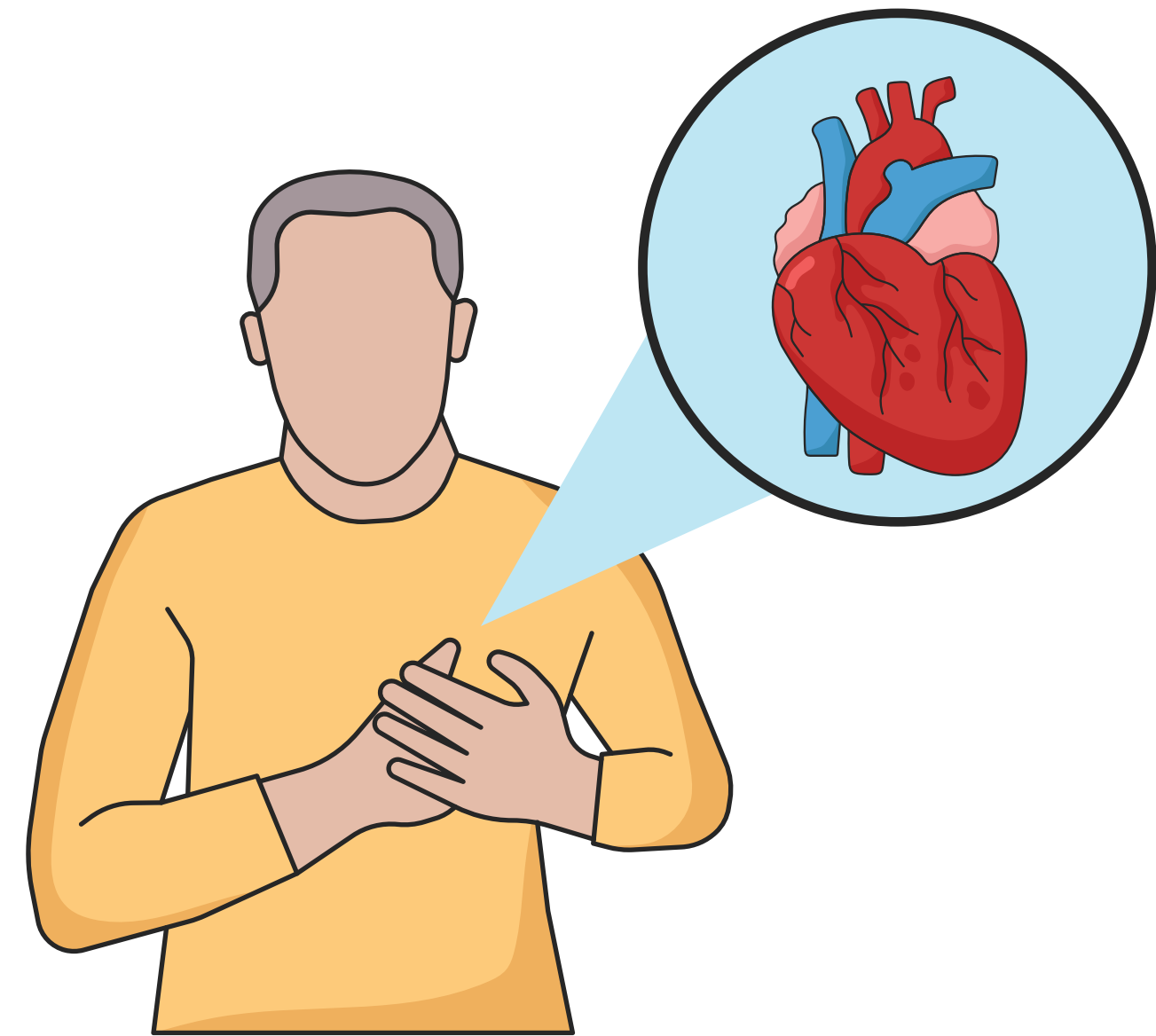
- **Cardiogenic shock is a life-threatening condition in which your heart suddenly can't pump enough blood to meet your body's needs.**
- **It may be caused by:**

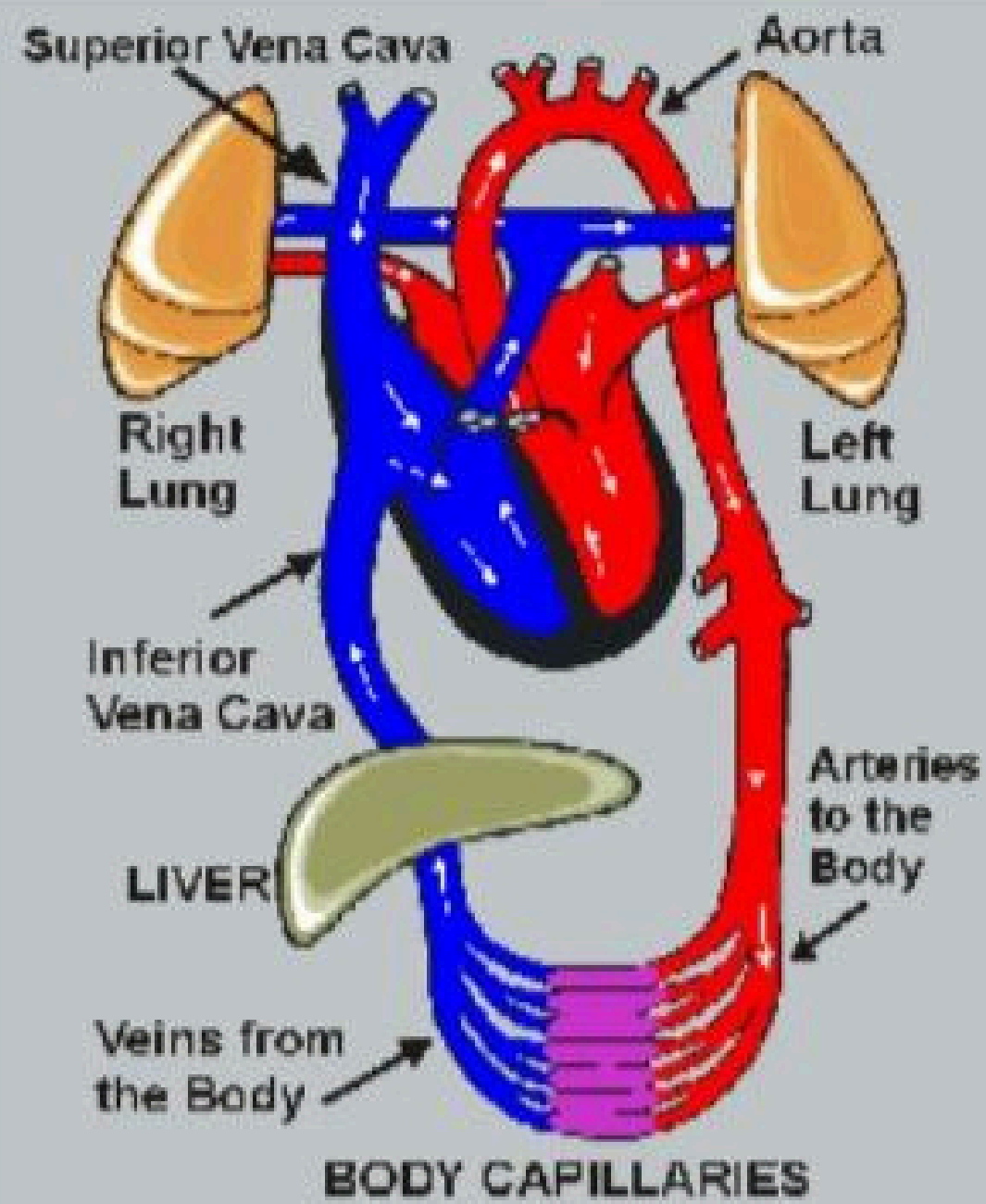
**myocardial damage  
(infarction).**

**extrinsic compression  
(cardiac tamponade).**

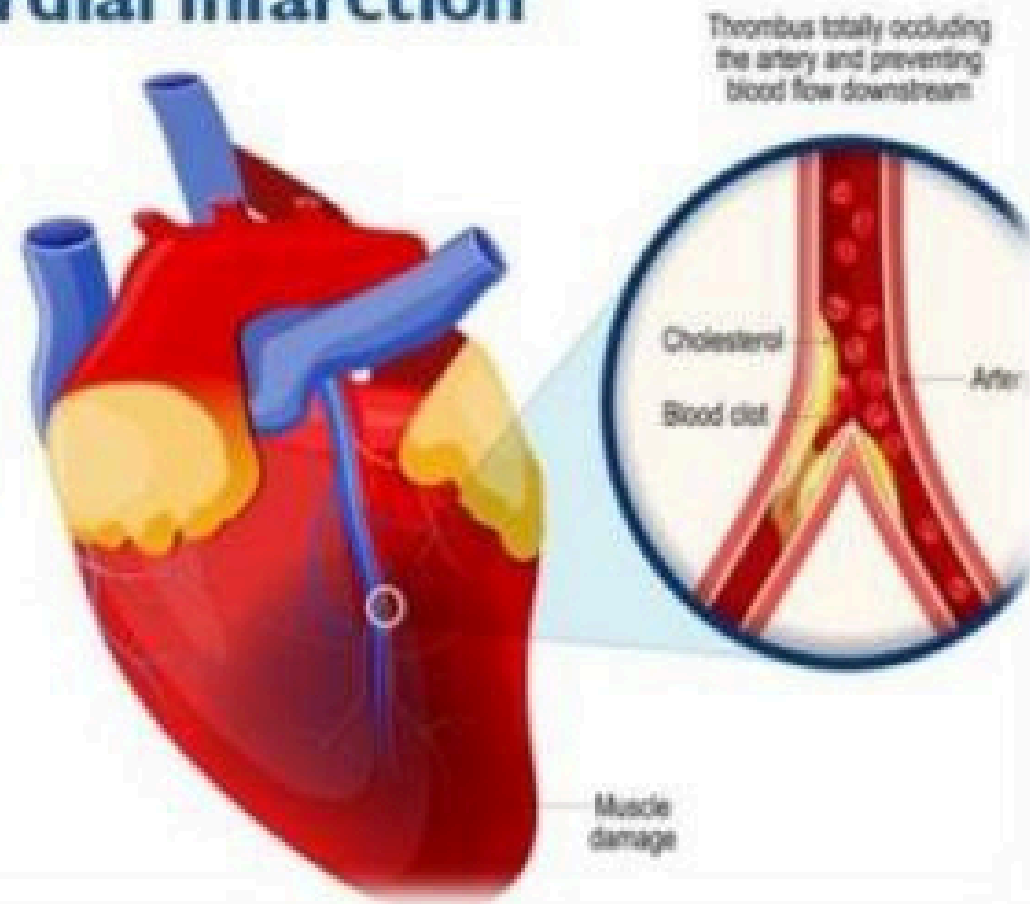
**ventricular  
arrhythmias.**

**outflow obstruction (e.g.,  
pulmonary embolism).**

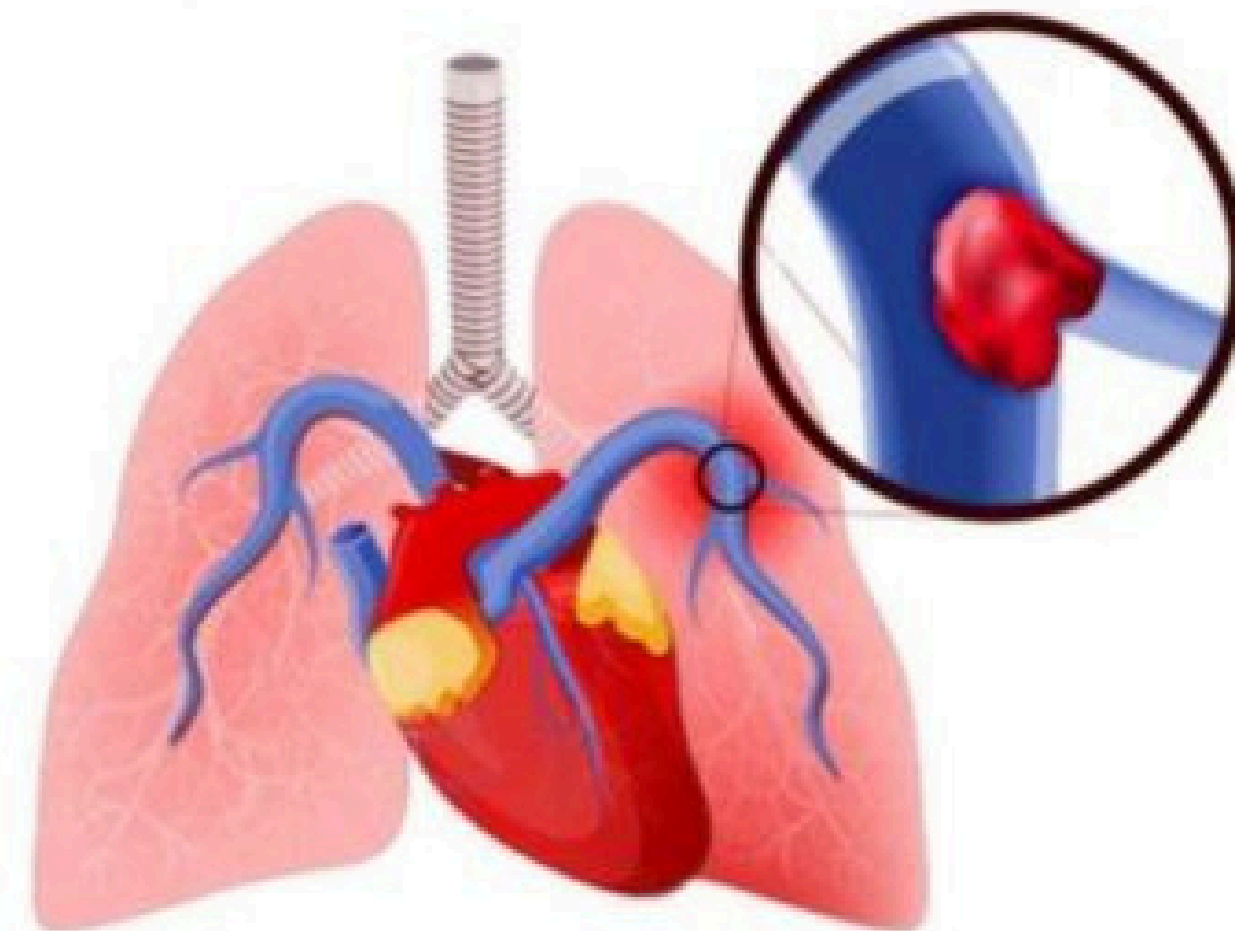




## Myocardial infarction

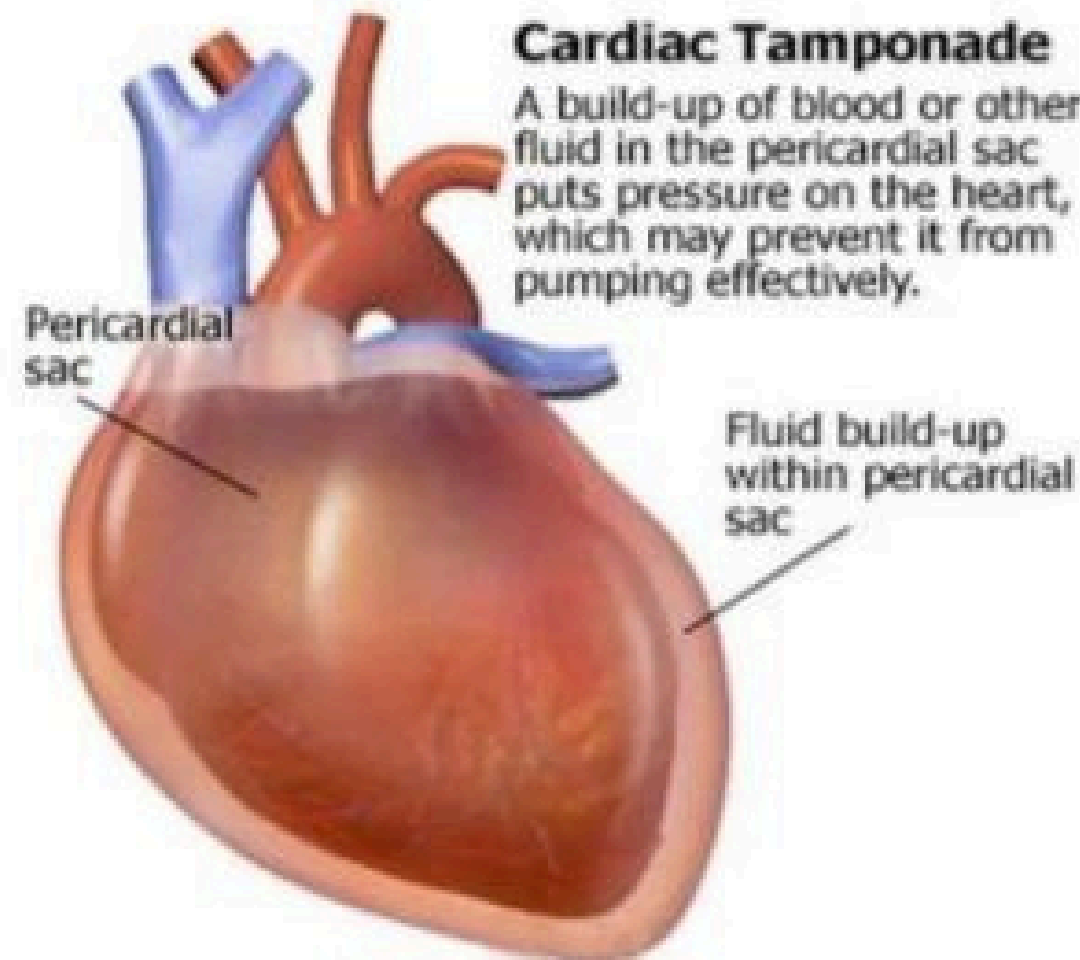


## Pulmonary embolism

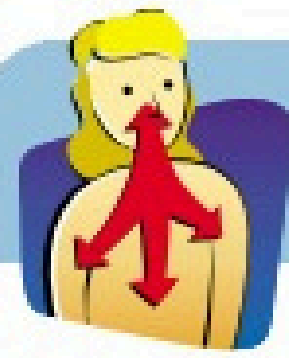


## Cardiac Tamponade

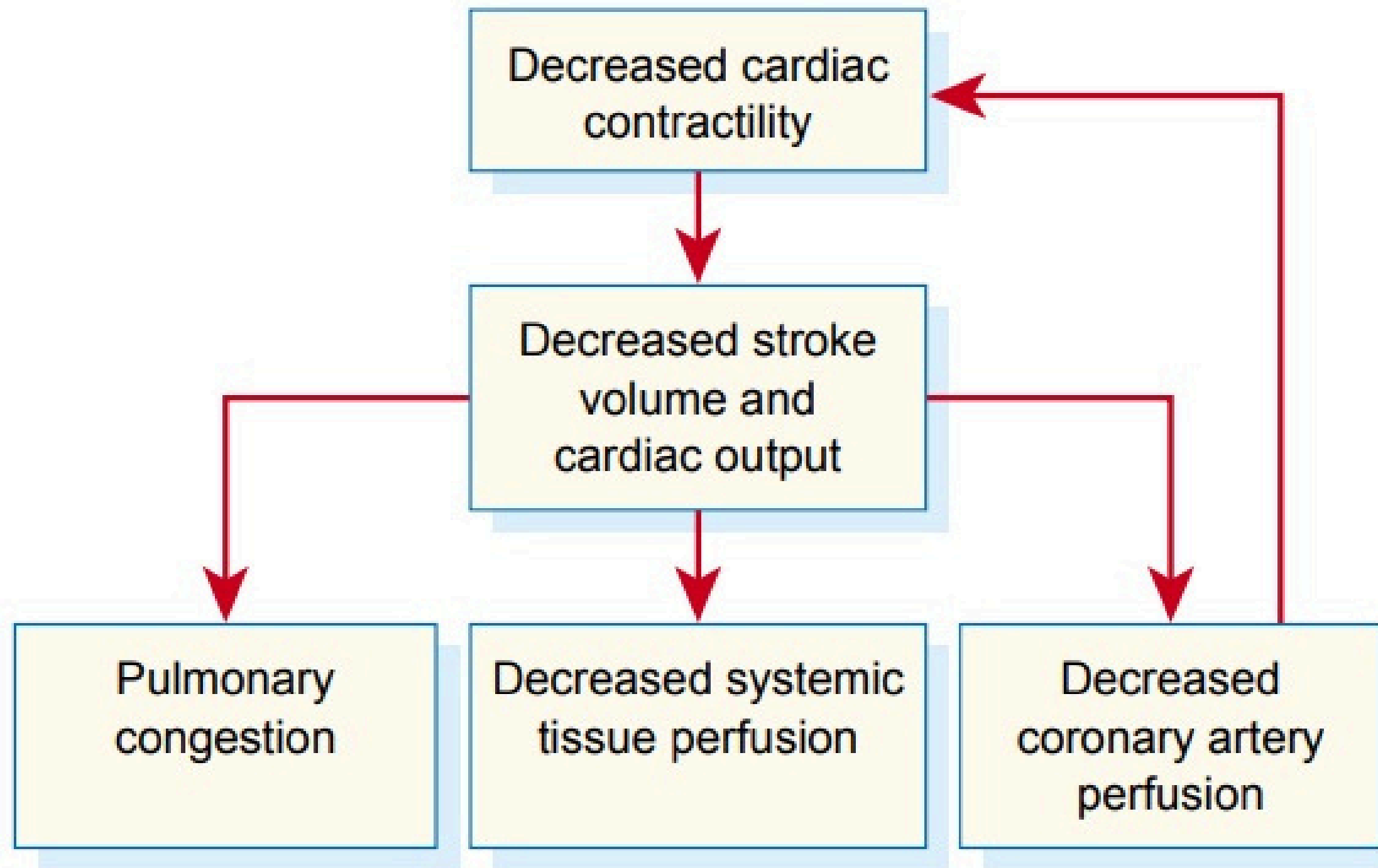
A build-up of blood or other fluid in the pericardial sac puts pressure on the heart, which may prevent it from pumping effectively.







## Physiology/Pathophysiology

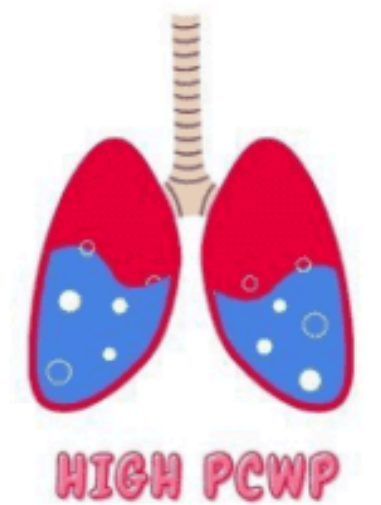


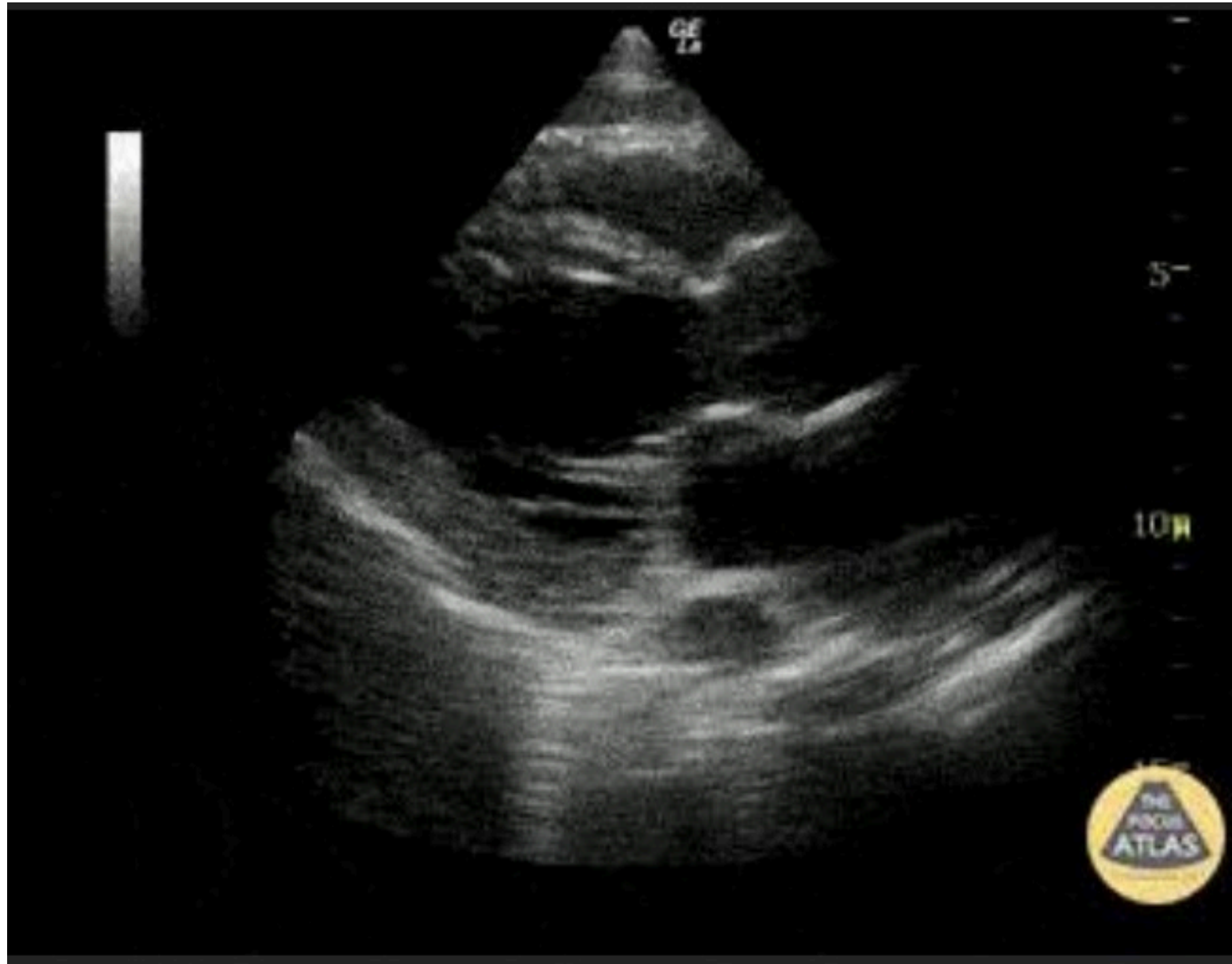
**FIGURE 15-5** Pathophysiologic sequence of events in cardiogenic shock.



# SYMPTOMS & SIGN

- 1• Cool, mottled skin
- 2•Tachypnea
- 3•Hypotension
- 4•Altered mental status
- 5•Murmur





### On Echo:

**.We notice frank LV systolic dysfunction**



### On ECG:

**Irregular heart rates (arrhythmias), such as ventricular tachycardia or ventricular fibrillation. These arrhythmias may be the cause of the cardiogenic shock.**



# Treatment

## Goals:

1. Airway stability
2. improving myocardial

**1. Cardiac monitor, pulse oximetry**

**2. Supplemental oxygen, IV access**

**3. Catheterization if ongoing ischemia**

**4. Preload augmentation:  
Consider Fluids**

**5. Contractility:  
Dopamine,  
dobutamine**

**6. Afterload reduction :  
Nitroglycerin,  
Dobutamine**

**7. intra-aortic balloon pump( if inotropes&vasopressors fail**



# Septic shock

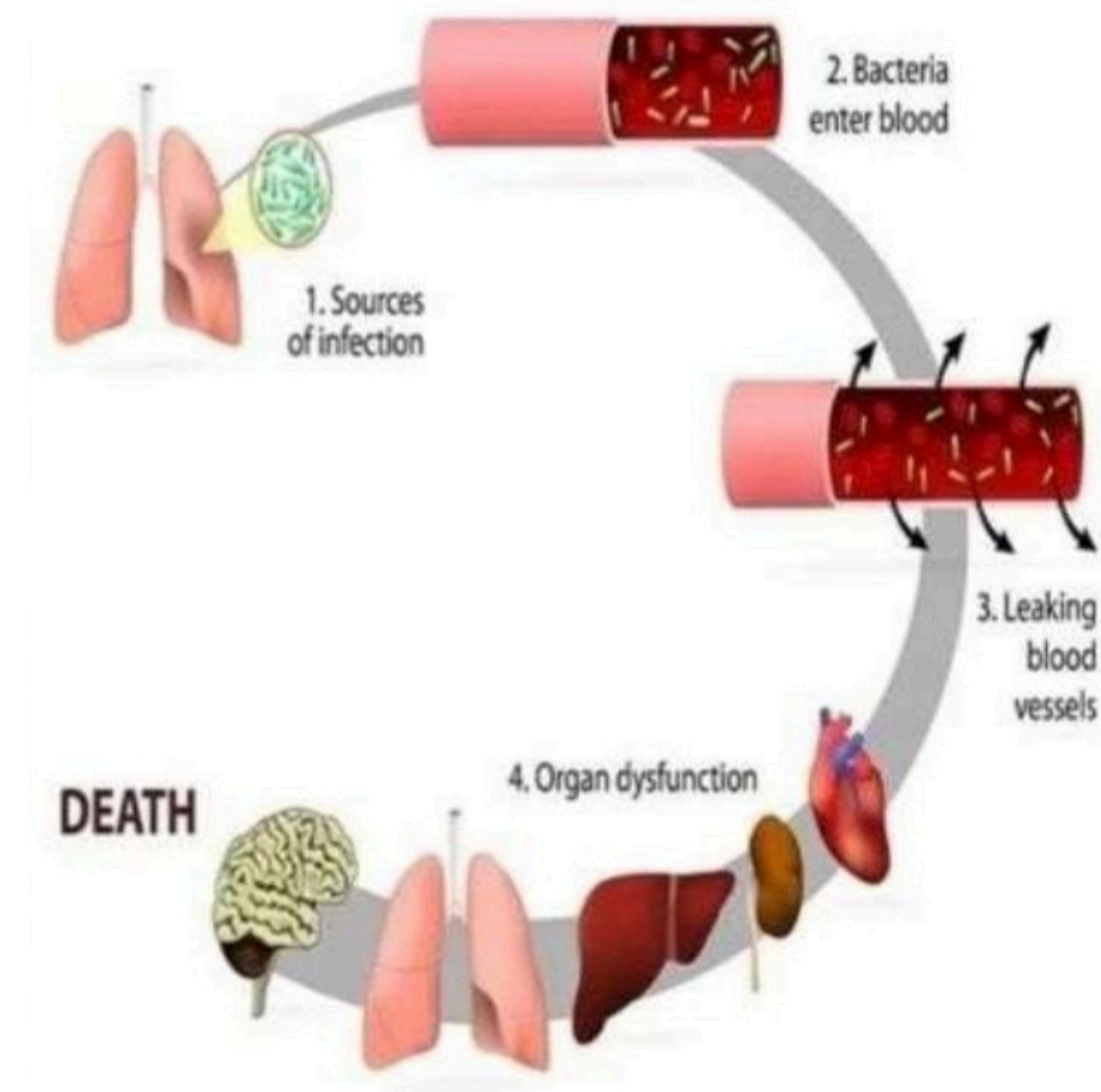


# Septic shock

- **Defined as:** hypotension induced by sepsis that persists despite adequate fluid resuscitation.

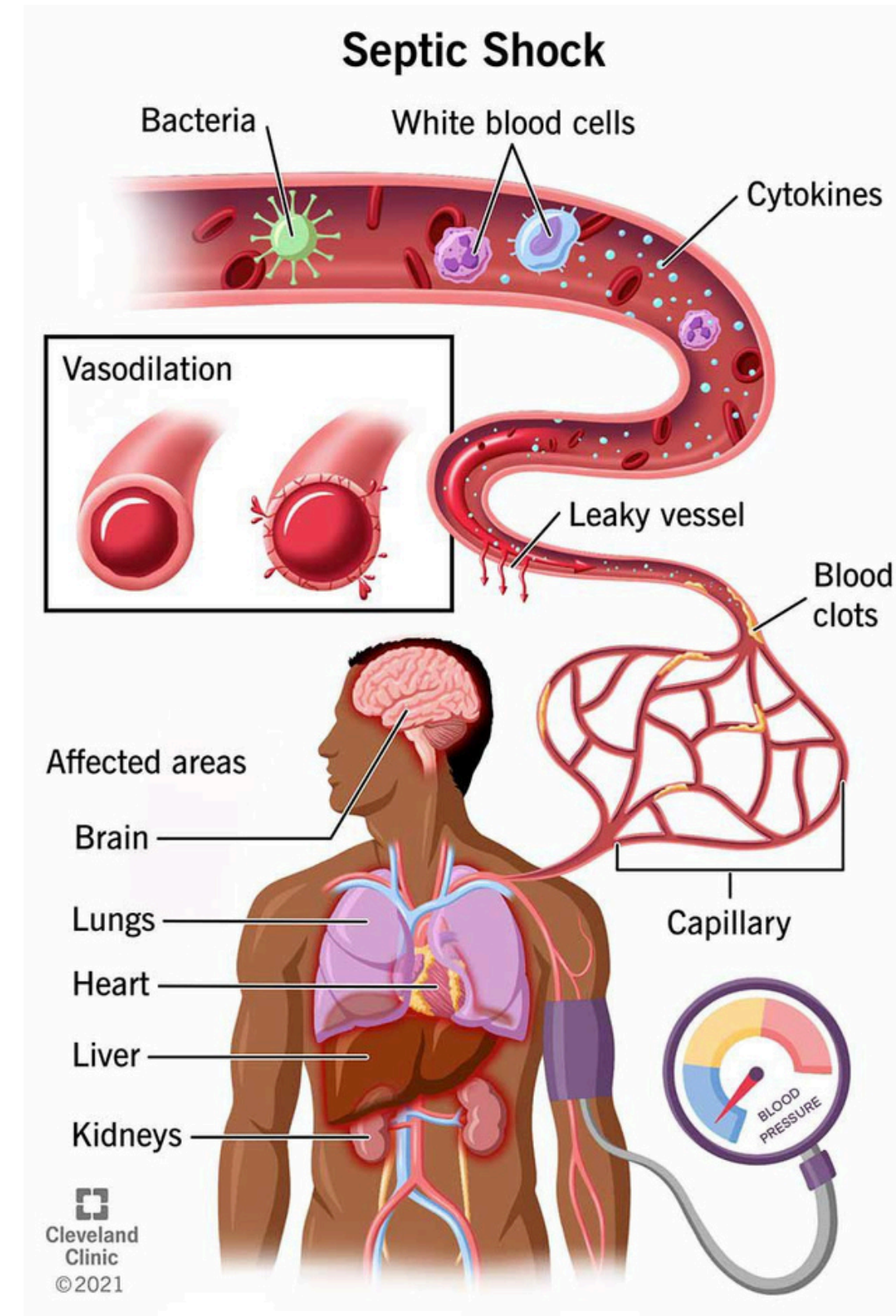
This results in hypoperfusion and can ultimately lead to multiple organ system failure and death.

- **Common causes:** include pneumonia, urinary tract infection, meningitis, abscess formation, cholangitis, cellulitis, and peritonitis.



# Pathophysiology

- There is a **severe decrease in SVR** secondary to **peripheral vasodilation**. Extremities are often **warm** due to vasodilation.
- Cardiac output is normal or increased (due to maintenance of stroke volume and tachycardia).
- **EF** is decreased secondary to a reduction in contractility







- **Clinical signs:**
- **Hyperthermia or hypothermia (hypothermia is more common in the very young, elderly, and immunocompromised)**
- **Tachycardia**
- **Wide pulse pressure**
- **Low blood pressure**
- **Mental status changes**
- **Diagnosis:**
- **Septic shock is essentially a clinical diagnosis.**
- **A source of infection can aid in diagnosis, but there may be no confirmed source in some cases.**





# Treatment:

1. **Fluid administration** to increase mean BP (Goal: MAP > 60)
2. Obtain **cultures** prior to starting antibiotics. Start IV antibiotics (broad spectrum) at maximum dosages. If cultures are positive, antibiotics can be narrowed based on sensitivity testing.
3. **Surgical drainage** if necessary.
4. **Vasopressors** (norepinephrine, vasopressin, phenylephrine) may be used if hypotension persists despite aggressive IV fluid resuscitation



«سُنُّرِيْرِيْمُ آيَاتِنَا»

«فِي الْآفَاقِ»

«وَفِي أَنْفُسِيْرِيْمُ»