TYPES OF SHOCK	Hypovolemic	Cardiogenic	Distributive	Obstructive	Neurogenic or Spinal
Assessment findings	- **Trauma**: MOI -> internal / external loss of blood (hemorrhage) - **Medical**: - Hx of fluid loss, i.e. vomiting, diarrhea, dehydration… - Bleeding from mouth or rectum - bright or dark red - coffee-ground emesis (vomiting) - melena (black tarry stools) s/s: - dizziness or syncope w/sitting or standing - orthostatic changes in vital signs	Caused by inadequate function of the heart or pump failure. The backup of blood into the lungs (pulmonary edema) is a major effect leading to impaired ventilation. - **Chief complain of**: - chest discomfort - dyspnea - syncope/near syncope associated w/altered HR. - **Abnormal hearth rhythms/rate**: - bradycardia - excessive Tachycardia - dysrhythmias - **Signs of acute CHF**: - pulmonary edema - jugular venous distention - orthopnea	Occurs with any medication suggesting vasodilation & "leaky" vessels. Examples: - Anaphylaxis - Septic or infection - Certain drug overdose s/s: - signs of a sympathetic nervous system response: - ↑ HR - ↑ RR - clammy or diaphoretic skin - warm, flushed skin, specially in dependent areas - systemic swelling & brochoconstriction - hives	Physical obstruction of blood flow or ventilation. Insufficient O_2 in the blood will produce shock. Examples: - Significant chest wall trauma: - Rib or sternal fractures - Tension pneumothorax - Pericardial tamponade - Medical cause: - Pulmonary embolus s/s: - mechanism of injury - signs of poor perfusion/shock - sympathetic nervous system response (↑ HR + ↑ RR) - dyspnea (SOB) and/or chest discomfort	- Associated specifically with spinal trauma, vessels below the spinal injury dilate. - Rare occurrence - MOI - Falls: landing feet-first or head-first - Penetrating trauma to the back with neurological deficits. s/s: Loss of function below the site of spinal cord injury: - flaccid paralysis distal to injury site - loss of sympathetic NS function: - relative bradycardia - hypotension - vasodilation: warm, pink, dry skin - loss of bladder control - priapism (persistent, and often painful, penile erection)
Dysfunctions in perfusion	- Loss of plasma/fluid - Loss of red blood cells (=> inability to deliver enough O_2 to the cells)	- **Altered HR** - Reduced preload in tachycardia - Reduction in timely cardiac output - **Myocardial trauma** - Damage to contractile & electrical cells - Ineffective pumping - **CHF or severe AMI** - Damage to contractile cells - Fluid & pressure backs up into the lungs (=> SOB)	Slow movement of red blood cells to the tissues: - dilated vessels are unable to move fluid as effectively to the cells - "leaky" vessels encourage fluid to move out of the vascular system (=> pulmonary edema, pedal edema)	- **Chest wall trauma** - Inability to ventilate adequately - **Tension pneumothorax** - Compression of lung tissue & kinking of vena cava - **Cardiac tamponade** - Pressure against ventricles that ↓ cardiac output. - **Pulmonary embolus** - Obstruction of the pulmonary artery - Inefficient loading of red blood cells at the lungs	- Similar to distribute shock - Loss of sympathetic tone -↓ HR, -↓ cardiac output -↓ peripheral vascular resistance. Parasympathetic nervous system kicks in.
Treatment	- High flow O_2 - Secure & maintain an airway & provide respiratory support as needed. - Minimize the loss of red blood cells in uncontrolled bleeding - Increase the amount of circulating fluid. - Splint any bone & joint injuries - If no fracture extremities, raise legs 6" to 12". - Conserve body heat w/blankets - Rapid Transport	Base treatment on the particular dysfunction: - **Symptomatic Bradycardia**: Atropine - **Tachycardia**: - vagal maneuver - O_2 - fluid bolus if no signs of pulmonary edema (keep in mind that by given fluids you will increase the workload of a sick heart) - **Myocardial trauma**: - High flow O_2 - fluid bolus is no signs of pulmonary edema - **MI/CHF**: - O_2 - other drugs if BP allows for their admin. - Rapid Transport	- High flow O_2 - Secure & maintain an airway & provide respiratory support as needed. - Fluid boluses – septic shock - Specific treatments for: - anaphylaxis: - Epi 1:1,000 - 0.1-0.5mg - Benadryl - 10-50mg - overdose: - Narcan 0.4-2mg - Conserve body heat w/blankets - PASG - Rapid Transport	- Early recognition and transport to a trauma or critical care hospital. - Recognition is often difficult - Use of MOI or patient history may assist in recognition - Aggressive ventilation w/high flow O_2 - Fluid boluses - Rapid Transport	- High flow O_2 - Secure & maintain an airway & provide respiratory support as needed. - Large-bore IV with fluid boluses - Atropine with slow rates - PASG - Rapid Transport

STAGES OF SHOCK	Compensated	Decompensated	Irreversible

Assessment findings	- 15-25% of fluid loss from the vessels
	- Signs are subtle
	- Compensation by the sympathetic NS
	- Patient may show signs of an adrenaline rush: ↑ HR + ↑ RR (bcos the sympathetic nervous system kicks in)
	- Body cells begin to starve for O_2 , resulting in:
	  - Anxiousness
	  - Pale skin
	- Complain of thirst
	- Complain of weakness
		- 25-35% of fluid loss from the vessels
		- The body cells are profoundly hypoxic
		- The sympathetic NS can **NOT** maintain perfusion
		- Classic signs of shock
			- > 35% fluid loss from the vessels
			- Low blood volume ↓ cardiac preload:
			  - ↓ cardiac output
			  - loss of peripheral pulses
			  - very ↓ BP
			- Body cells die
			- All vital signs bottom out

HR	↑ HR (tachycardia), i.e. 120-ish	↑↑ HR (marked tachycardia), i.e. 140-ish	Slow
RR	Normal or ↑ RR (little change)	↑↑ RR: marked tachypnea	Slow / Agonal (shallow, slow (3-4 per minute), irregular inspirations followed by irregular pauses)
LOC	Anxiousness, restless	Confused, obvious alteration in mental status	Unconsciousness/Coma
SKIN	- Pale - Cool - Clammy - Peripheral sweating	- Very pale - Cold - Sweating (diaphoretic)	Very poor skin signs: - Mottled/ Waxen - Cold - No sweat
BP	Very little change (normal or high)	↓ BP	None or very↓ BP

Pathophysiology	- Baroreceptors sense a drop in pressure in the arteries
	- Medulla is stimulated
	- Sympathetic NS Response:
	  - Clammy and pale skin
	  - ↑ HR + ↑ RR
	- Cells receive less O_2 as a result of a loss of red blood cells by the loss of fluid
	- Pre-capillary sphincter closes in periphery (blood shunted to the core)
	
	<u>Next wave of compensated shock</u>:
	- Sympathetic NS Response continues (adrenal hormones released)
	- Chemoreceptors sense changes in CO2, and O2 concentrations
	- Medulla stimulated again:
	  - ↑ RR
	  - HR continues to ↑
		- Less blood flow and O2 delivery impact more of the body:
		  - Tissues in the core become hypoxic
		  - More shifts to anaerobic metabolism
		
		- Organ function slows
			- The medulla stops working
			  Sympathetic nervous system stimulation ceases
			
			- Heart function drops
			  Drop in heart rate and contractility
			
			- Vessels dilate
			  No more energy to constrict

Cellular Activities in Shock	**<u>Cellular Ischemic Phase</u>**
	  - ↓ O_2 delivery cause the cells transition from aerobic to anaerobic metabolism in the periphery:
	  - cells begins to build lactic acid
	  - cellular activity begins to slow
	
	- Elevated levels of acid stimulate chemoreceptor
	  - stimulation of the medulla
	  - ↑ HR
	
	- Closure of the pre-capillary sphincter causes stagnation of blood
	  - Blood begins to coagulate behind the closed pre-capillary sphincter
	
	  - Post-capillary sphincter closes
		<u>Capillary Stagnation Phase</u>
		- Loss of fluid and O_2 delivery begin to impact more of the body. Organs and cells in the core begin to transition to anaerobic metabolism.
		
		- Lactic acid build in the cells, and leak into the capillaries:
		  - stimulates opening of the pre-capillary sphincter
		  - stagnated and clotted blood moves into the capillaries
		
		- Cell function drops dramatically
		
		- Continued closure of post-capillary sphincters:
		  - pressure changes cause fluid shifts into the capillaries
		  - drop in circulating blood volume =>reduce preload:
		  - Cardiac output drops
		  - Blood pressure begins to fall
			<u>Capillary Washout Phase</u>
			- Cell functions cease and cells die from lack of O_2
			
			- Large accumulations of acid force the opening of the capillary sphincters, => sludge, clots and acid circulates throughout the entire body
			
			Organ function fails from profound acidosis and hypoxia.
			- ↓ HR
			- ↓ RR
			- Loss in vascular constriction