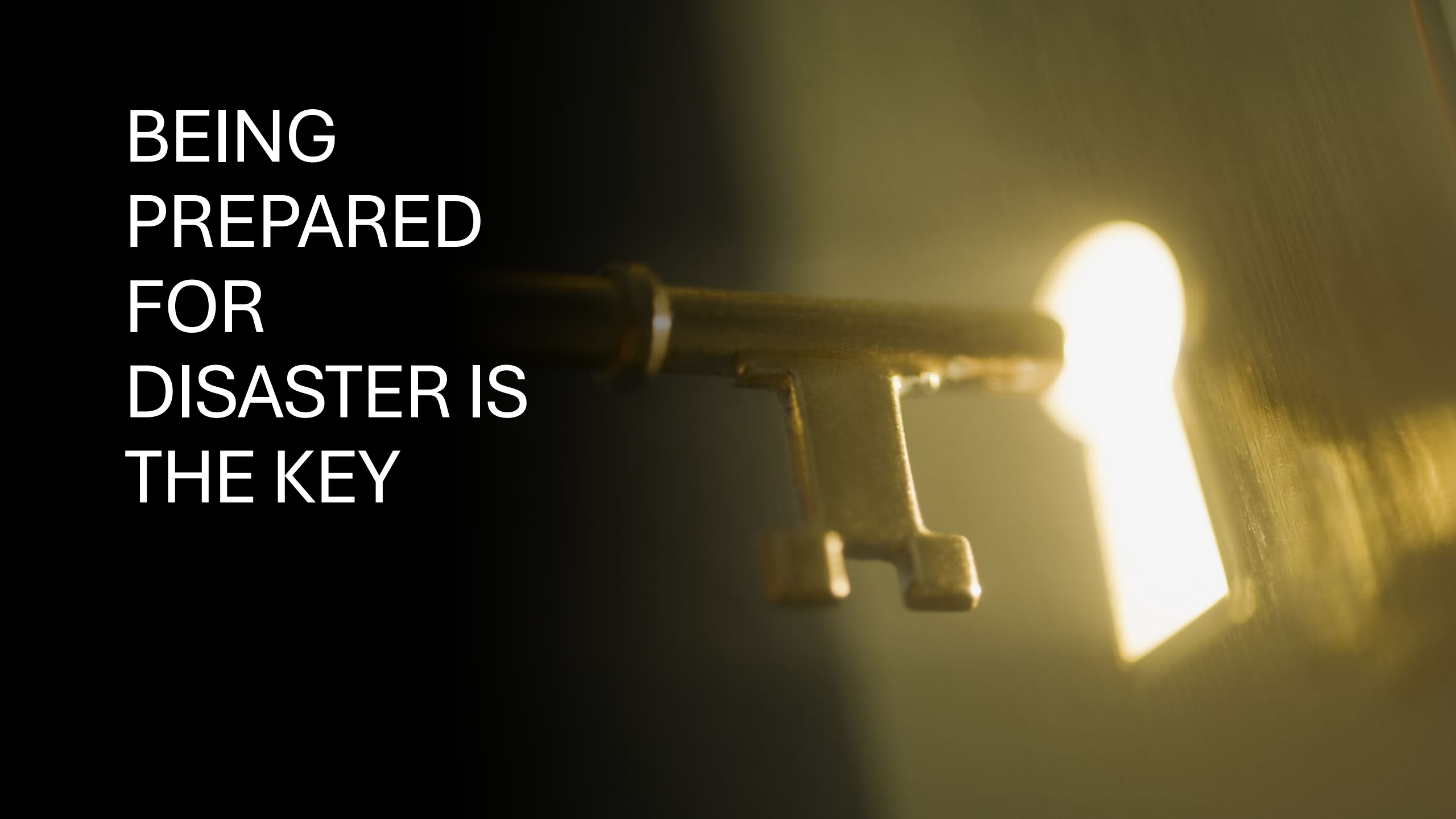
RECOGNIZING SHOCK

NATURE'S LAST DEFENSE MECHANISM

Presented by Loren Hughes MD

BEING PREPARED FOR DISASTER IS THE KEY



Death Risk in North Carolina Natural Disasters

Hurricanes & flooding

Severe storms

Winter weather (ice)

Tornado

Wildfires

Drought

Death Risk in North Carolina Man-Made Disasters

1. **Chemical Spills & Industrial Accidents**
2. **Nuclear Power Plant Incidents (Very Low Probability)**
3. **Dam Failures**
4. **Transportation Accidents**

Hurricanes

The most common cause of death in a hurricane is drowning, primarily due to storm surge and inland flooding.

Wind-related injuries from flying debris

Building collapse

Carbon monoxide poisoning from improper generator use

Post-storm accidents and medical emergencies

Storms and Tornadoes

- Blunt force trauma from debris
- Wood, metal, glass, trees, poles
- Crushing injuries
- Drowning

Most Preventable Deaths

Floods. Avoid the water and low lying areas

Tornadoes. Protect head, upper extremities and torso

Trauma of all types. Stop the hemorrhaging.

Uncontrolled blood loss can cause death within minutes

Many hemorrhage deaths occur before reaching a hospital

PEOPLE DO NOT USUALLY DIE THE WAY HEADLINES MAKE YOU THINK THEY WILL

- TWO WAVES OF DEATH

✓Within an hour

✓Days to weeks later

- KIDS MAY FOOL YOU

✓Crash suddenly

✓Cannot always say what is happening

THE ELDERLY ARE MORE PRONE TO INJURY

- ✓ Underlying medical issues
- ✓ Not as flexible
- ✓ May be on blood thinning medications

HOW DO PEOPLE DIE FROM TRAUMA?:

Airway obstruction / breathing failure

Immediate/early trauma deaths: hemorrhage

Hemorrhage - most common early preventable cause

Traumatic brain injury (TBI) - most common overall cause

Sepsis and multi-organ failure (later deaths)

DEATH TOLLS ARE NOTORIOUSLY LOW INITIALLY

- Usually Underestimated By 30%
- Heart Attacks, Strokes, And Mental Health Issues Not Counted
- Lack Of Medical Care, Required Equipment, Or Medications Not Counted

OTHER HIDDEN DANGERS

- Where Are You In The Home?
- Chaos In Escaping.
- Socioeconomic Factors: Trailer Parks Vs Well Built Homes.
- Clean Up Can Be Just As Dangerous As The Event.

The A B C's of Patient Evaluation in Trauma

A is for AIRWAY

B is for BREATHING

C is for CIRCULATION

D is for DISABILITY

E is for EXPOSURE

CIRCULATION Measured by Heart rate, Pulse and Tissue Perfusion

Let’s focus on Circulation

Once AIRWAY and BREATHING ARE ESTABLISHED, we can look at CIRCULATION.

What is the purpose of CIRCULATION?

What does good CIRCULATION look like?

GIVE ME THE BLOODY FACTS

- Adults Have About 5 Liters Of Blood In The Body
- A Unit Of Blood Is About A Pint
- 55% is Plasma
- 45% is Red Blood Cells
- 15 to 20% Blood Loss before Symptoms
- 20 to 40% Blood Loss Shows Signs of Shock
- >40% Blood Loss Usually Leads to Death

What is SHOCK?

A LIFE-THREATENING CONDITION WHEN THERE IS NOT ENOUGH BLOOD FLOW TO THE ORGANS AND TISSUES OF THE BODY FOR NORMAL FUNCTION. USUALLY SEEN WITH LOW BLOOD PRESSURE

RESULTS IN A LACK OF OXYGEN, NUTRIENTS, and ABILITY TO CARRY AWAY THE WASTE PRODUCTS FROM CELL METABOLISM.

NATURES LAST DEFENSE MECHANISM

MUST BE RECOGNIZED IMMEDIATELY TO BE REVERSED.

20% DIE EVEN WITH RAPID TREATMENT.

What Three Things Effect Blood Pressure And Perfusion?

1. **Blood Volume**
2. **Heart Rate**
3. **Artery Wall Tension (vascular resistance)**

A SIMPLE FORMULA TO EXPLAIN IT ALL:

Volume X Heart Rate X Vascular Resistance = BP

COMMON CAUSES OF SHOCK

Internal or external bleeding	Burns	Heart conditions	Dehydration
Spinal injuries	Infection	GI loss	Anaphylaxis

Volume X Heart Rate X Vascular Resistance = BP

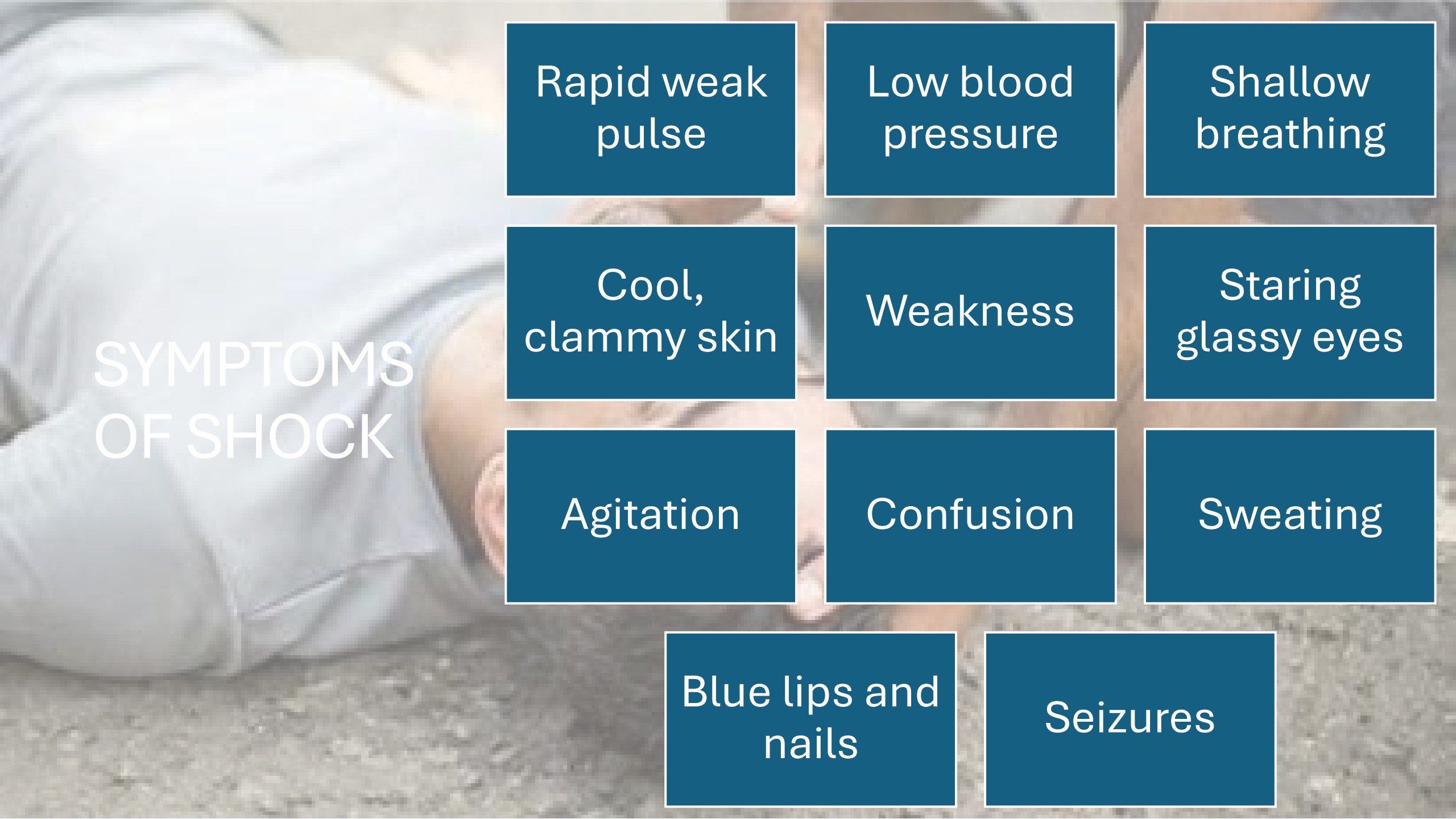
5 TYPES OF SHOCK

1. Hypovolemic- Severe blood or fluid loss from trauma (VOLUME)
2. Cardiogenic- Heart damaged with decreased pumping (HR)
3. Neurologic- Spinal cord injury (VASCULAR RESTANCE)
4. Anaphylactic- severe allergic reaction (VASCULAR RESISTANCE)
5. Septic- infections release toxins into bloodstream (VASCULAR RESISTANCE)

Volume X Heart Rate X Vascular Resistance = Blood Pressure

WHAT PARTS OF THE BODY FEEL EFFECTS OF SHOCK FIRST?

- BRAIN
- HEART
- LUNGS
- SKIN
- KIDNEYS



SYMPTOMS OF SHOCK

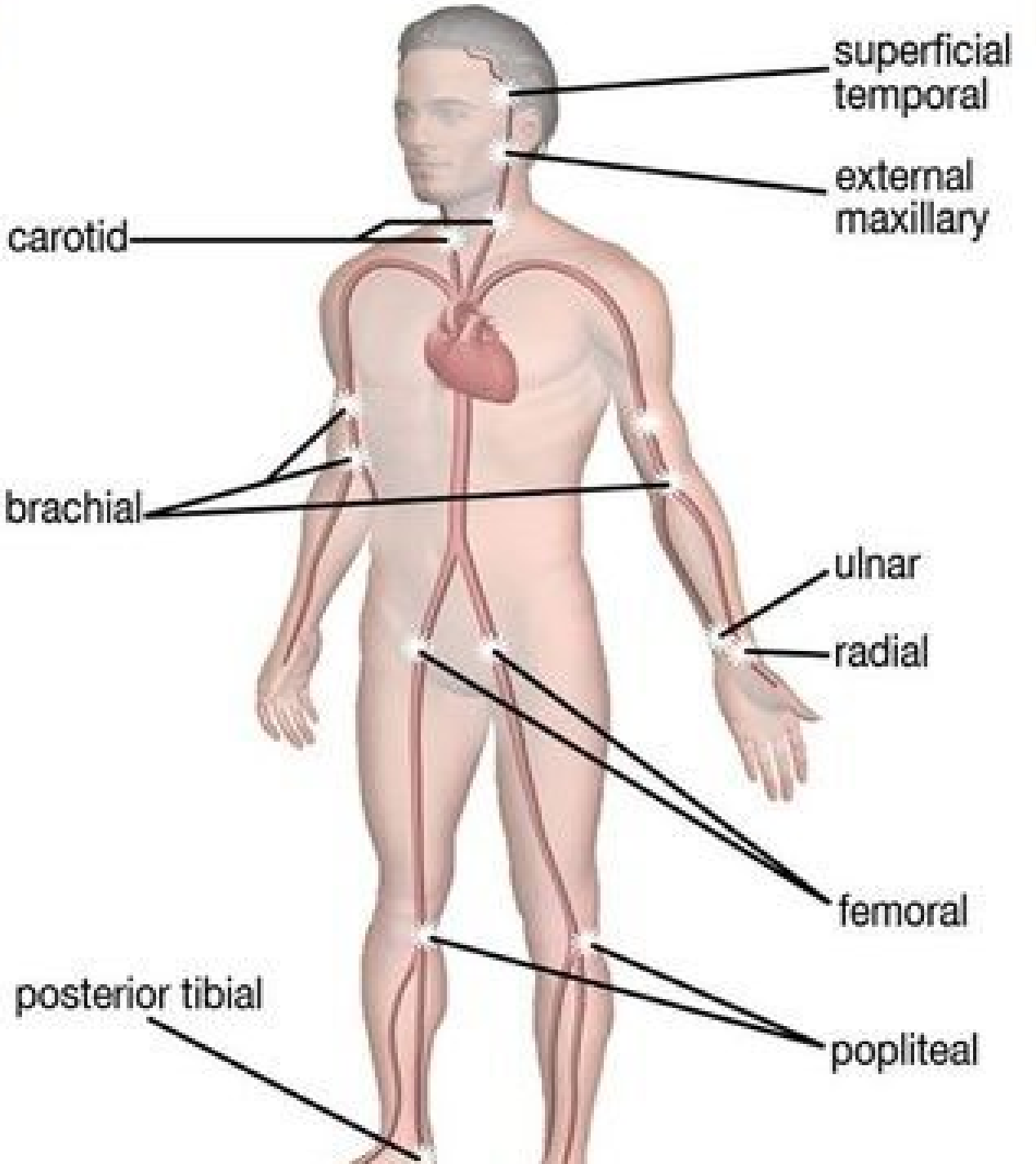
- Rapid weak pulse
- Low blood pressure
- Shallow breathing
- Cool, clammy skin
- Weakness
- Staring glassy eyes
- Agitation
- Confusion
- Sweating
- Blue lips and nails
- Seizures

BLOOD LOSS AND DEATH

Artery Location	Typical Blood Loss Rate	Estimated Survival Without Control	Notes
Carotid (neck)	Very fast	3–5 minutes	Can lead to rapid exsanguination and cerebral hypoxia.
Subclavian / Axillary (upper chest/arm)	Very fast	3–7 minutes	Hard to compress externally; risk of sh high.
Brachial (arm)	Fast	5–10 minutes	Can often be contr with direct pressure tourniquet.
Femoral (thigh)	Very fast	3–5 minutes	Major cause of prehospital death; tourniquet can be lifesaving.
Popliteal (behind knee)	Fast	5–10 minutes	Difficult to control, threatening if not stopped.
Radial / Ulnar (forearm)	Moderate	10–15 minutes	Often manageable direct pressure; rar fatal quickly.
Smaller arteries (hands, feet)	Moderate/Slow	15+ minutes	Usually less immed life-threatening.

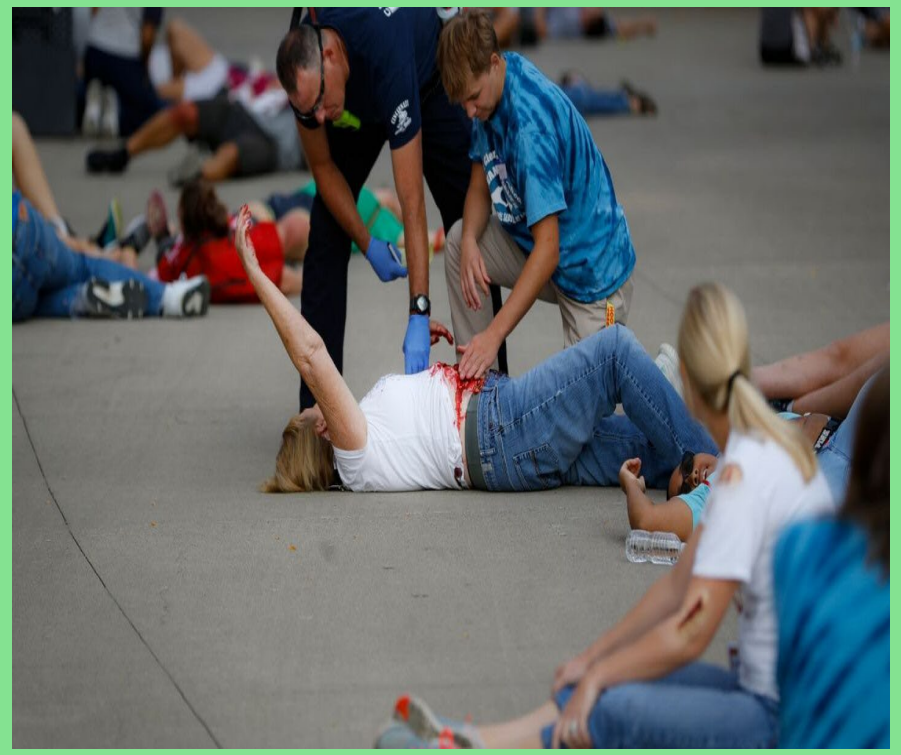
Pulse Points

- Areas where can easily feel pulse
- Also act as *pressure points.*
  - Compressing these points will reduce downstream blood flow
  - useful when dealing with major wounds.



WHAT HAPPENS WHEN YOU BLEED TO DEATH?

- Major Arterial Bleeding Most Often
- May Be Multiple Locations
- Immediate Arterial Spasm Of Injured Site
- May Deny That Anything Is Wrong
- Skin Begins to become Pasty, Cool, And Pale.



BLEEDING TO DEATH

- WITHIN A MINUTE: RELEASE OF ADRENALIN. Alpha and Beta receptors stimulated:

✓Constrict Arteries to skin and internal organs.

✓ Shunt Blood To The Central Core Of Body (Brain and Heart)

✓Breathing Increases.

✓Heartrate increases.

✓ Sweating.

✓Agitation.

BLEEDING TO DEATH

Within Two Minutes (Or about 20% Of Blood Lost)

- Will Begin To Feel Very Cold.
- Brain Will Create A Feeling Of Agitation Followed By Glassy Calm
- The Spleen And Liver Will Squeeze Down To Auto-transfuse The Body. About 1 Unit Of Blood Total.
- Kidneys And Other Internal Organs Shut Down
- Heart Weakens From Lack Of Oxygen. Leads To Rhythm Issues And Weakened Muscle Function.
- Brain Becomes Hypoxic And Delerium Begins Until Unresponsive

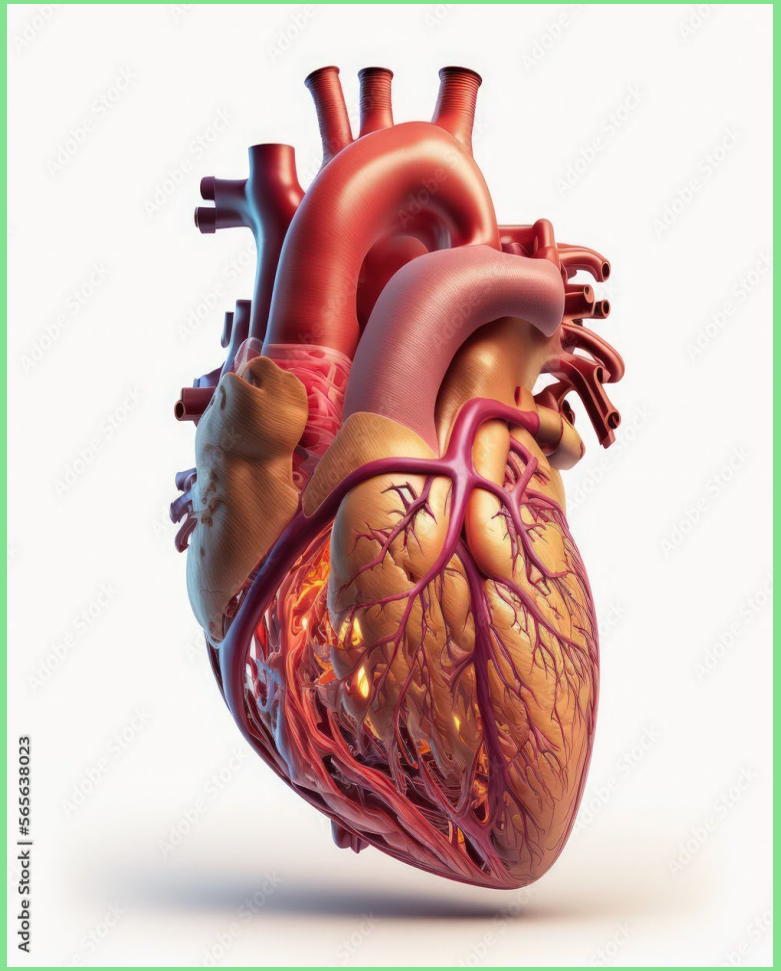
BLEEDING TO DEATH

- At 40% Of Blood Loss, Death Will Generally Occur. Heart And Brain May Function For Another 4 To 8 Minutes, But Damage Is Usually Irreparable.
- Early Intervention Is The Key To Survival In A Trauma Victim.
- If In A Multiple Victim Situation, “Do The Most Good For The Most People”, Which Means Do Not Take Time On A Patient Who Is Dead Or Has No Chance Of Survival. You May Be Able To Save Others Who Are Not As Far Gone.

CARDIOGENIC SHOCK

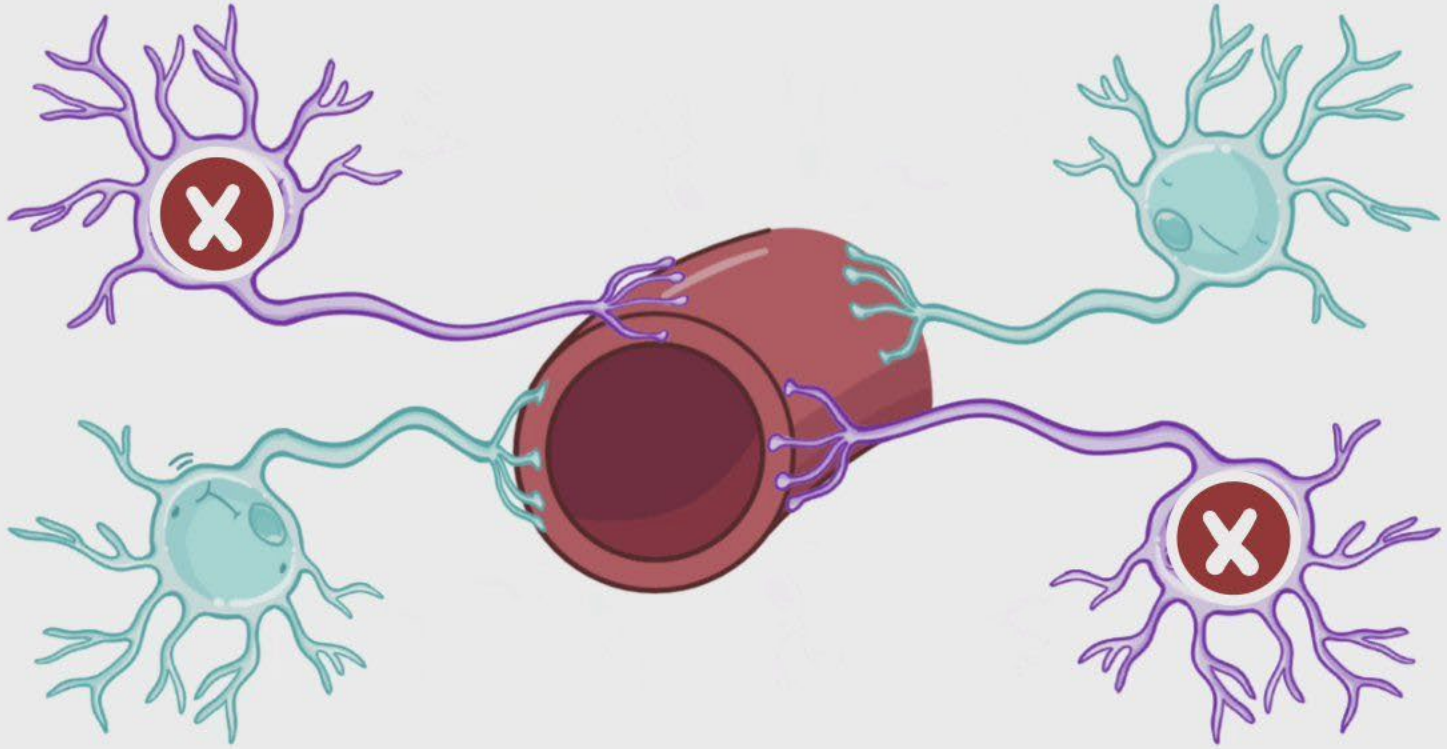
- PUMP FAILURE:

✓Weak Cardiac Muscle Function
✓Low Oxygen Levels
✓Decreased Perfusion Of Coronary Arteries
✓Cardiac Rhythm Issues: Too Slow Or Too Fast
✓Lung Damage May Be The Cause

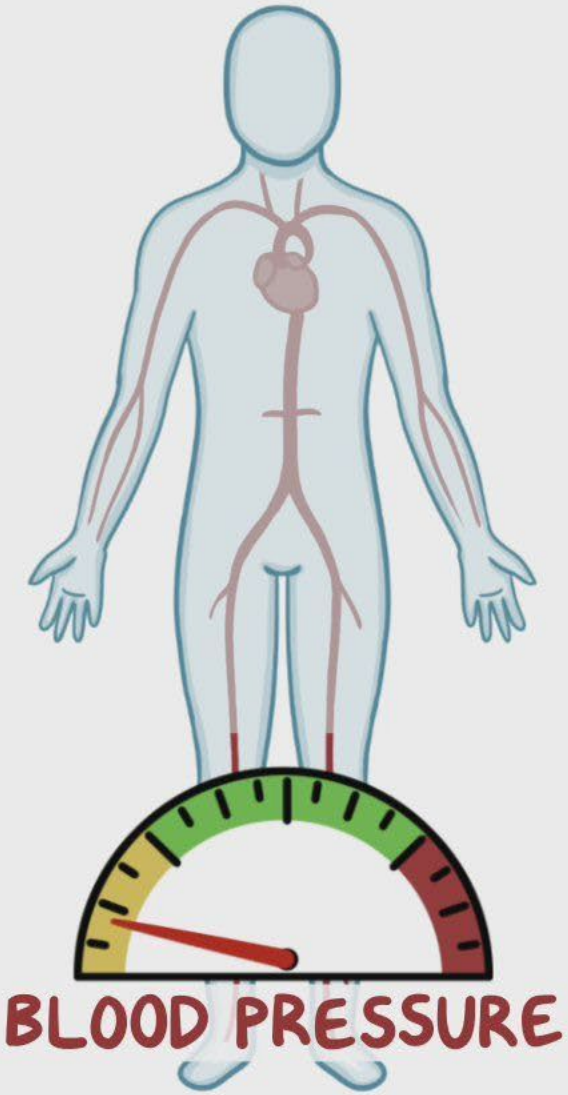


NEUROGENIC SHOCK

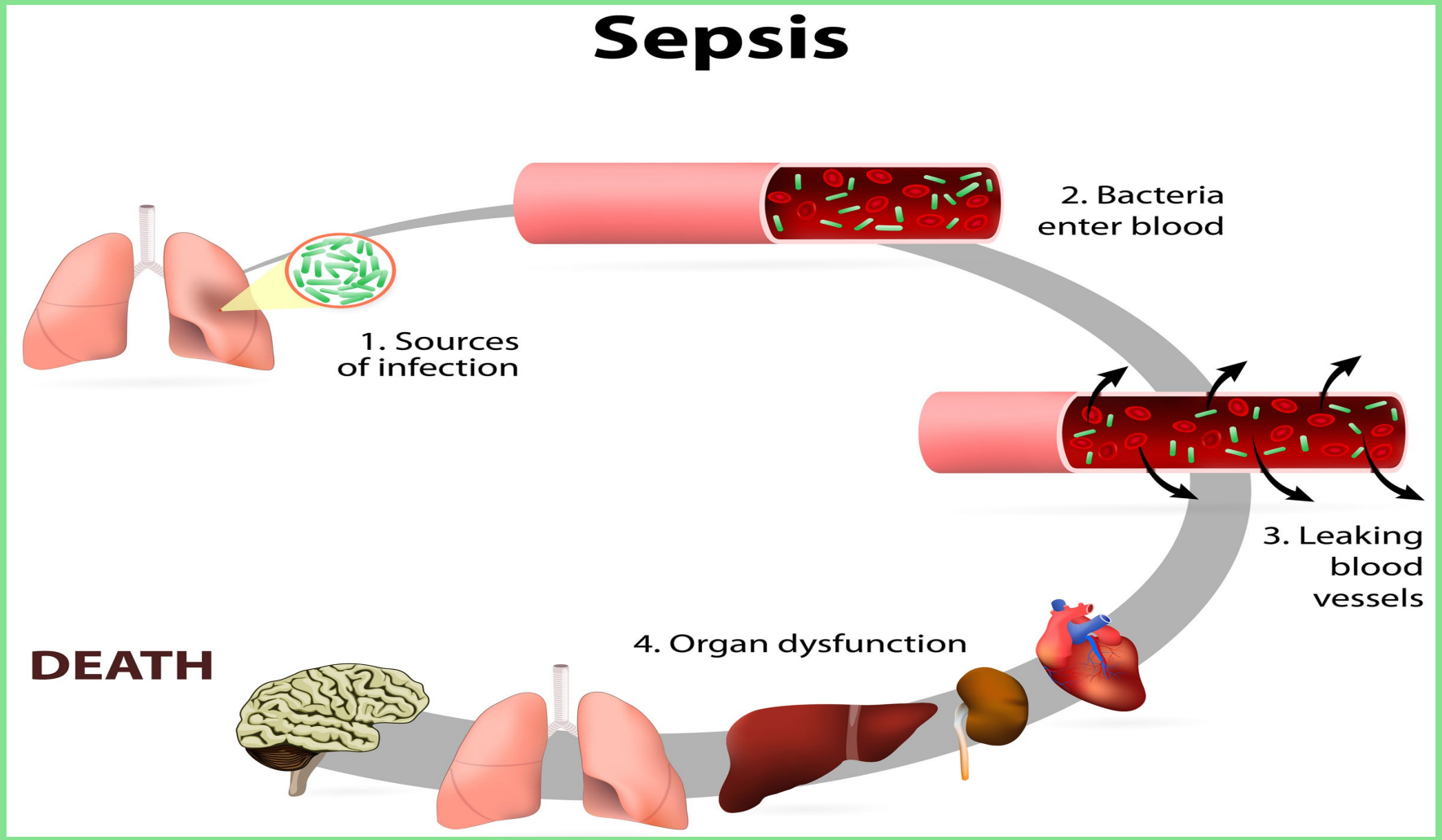
LOSS of VASCULAR SYMPATHETIC TONE



UNOPPOSED PARASYMPATHETIC RESPONSE



SEPTIC SHOCK



ANAPHYLAXIC SHOCK

- **Vasodilation**: Blood Vessels Widen, Causing A Drop In Blood Pressure.
- **Bronchoconstriction**: The Airways Narrow, Making It Difficult To Breathe.
- **Increased Vascular Permeability**: Fluids Leak From Blood Vessels Into Surrounding Tissues, Leading To Swelling And Hives.

EVALUATION OF A PATIENT FOUND DOWN

Determine if patient is alert. If yes, identify yourself and purpose.

Check surrounding are for personal safety.

Do ABCDE evaluation. STOP BLEEDING IF PRESENT! CPR if no pulse and adequate resources. Call 911 if abnormal.

Place on back and elevate legs if suspecting shock. Nothing by mouth. Warm the patient with blankets.

SHOCK POSITION

THANK YOU FOR ALL YOU DO!!!