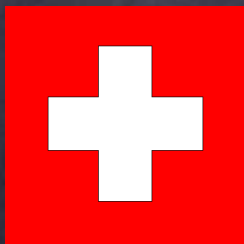




Lecture for general  
surgery  
Chorna I.O.

Poltava-



# TERMINAL STATE



# Syncope

## True Definition of Syncope:

**It is a sudden and brief loss of consciousness associated with a loss of postural tone, from which recovery is spontaneous.**

the medical term for fainting, is precisely defined as a transient loss of consciousness and postural tone, characterized by rapid onset, short duration, and spontaneous recovery, due to global cerebral hypoperfusion (low blood flow to the brain) that most often results from hypotension (low blood pressure).





**Recommended treatment** involves returning blood to the brain by positioning the person on the ground, with legs slightly elevated or leaning forward and the head between the knees for at least 10-15 minutes, preferably in a cool and quiet place.

As the dizziness and the momentary blindness passes, the person may experience a brief period of visual disturbances in the form of phosphenes, sudden sore throat, nausea, and general shakiness. For individuals who have problems with chronic fainting spells, therapy should focus on recognizing the triggers and learning techniques to keep from fainting.

At the appearance of warning signs such as lightheadedness, nausea, or cold and clammy skin, counter-pressure maneuvers that involve gripping fingers into a fist, tensing the arms, and crossing the legs or squeezing the thighs together can be used to ward off a fainting spell.

After the symptoms have passed, sleep is recommended. If fainting spells occur often without a triggering event, syncope may be a sign of an underlying heart disease.

# Low blood pressure (hypotension)

Optimal blood pressure is less than **120/80 (systolic/diastolic)**. In healthy people, low blood pressure without any symptoms is not usually a concern and does not need to be treated. But low blood pressure can be a sign of an underlying problem -- especially in the elderly -- where it may cause inadequate blood flow to the heart, brain, and other vital organs.

A blood pressure reading lower than **90 millimeters** of mercury (mm Hg) for the top number (systolic) or **60 mm Hg** for the bottom number (diastolic) is generally considered low blood pressure.

.



The causes of low blood pressure can range from dehydration to serious medical or surgical disorders. It's important to find out what's causing your low blood pressure so that it can be treated

## **Symptoms**

For some people, low blood pressure signals an underlying problem, especially when it drops suddenly or is accompanied by signs and symptoms such as:

# Low Pressure Symptoms



**Dizziness or lightheadedness**

**Nausea**

**Fainting (syncope)**

**Dehydration and unusual thirst**

Dehydration can sometimes cause blood pressure to drop. However, dehydration does not automatically signal low blood pressure. Fever, vomiting, severe diarrhea, overuse of diuretics and strenuous exercise can all lead to dehydration, a potentially serious condition in which your body loses more water than you take in. Even mild dehydration (a loss of as little as 1 percent to 2 percent of body weight) can cause weakness, dizziness and fatigue.

**Lack of concentration**

**Blurred vision**

**Cold, clammy, pale skin**

**Rapid, shallow breathing**

**Fatigue**

**Depression**



## **Conditions** that can cause low blood pressure

Medical conditions that can cause low blood pressure include:

**Pregnancy**. Because the circulatory system expands rapidly during pregnancy, blood pressure is likely to drop. This is normal, and blood pressure usually returns to your pre-pregnancy level after you've given birth.

**Heart problems**. Some heart conditions that can lead to low blood pressure include extremely low heart rate (bradycardia), heart valve problems, heart attack and heart failure.

**Endocrine problems**. Thyroid conditions such as parathyroid disease, adrenal insufficiency (Addison's disease), low blood sugar (hypoglycemia) and, in some cases, diabetes can trigger low blood pressure.

**Dehydration.** When your body loses more water than it takes in, it can cause weakness, dizziness and fatigue. Fever, vomiting, severe diarrhea, overuse of diuretics and strenuous exercise can lead to dehydration.

**Blood loss.** Losing a lot of blood, such as from a major injury or internal bleeding, reduces the amount of blood in your body, leading to a severe drop in blood pressure.

**Severe infection (septicemia).** When an infection in the body enters the bloodstream, it can lead to a life-threatening drop in blood pressure called septic shock.



- **Severe allergic reaction (anaphylaxis).** Common triggers of this severe and potentially life-threatening reaction include foods, certain medications, insect venoms and latex. Anaphylaxis can cause breathing problems, hives, itching, a swollen throat and a dangerous drop in blood pressure.
- **Lack of nutrients in your diet.** A lack of the vitamins B-12 and folate can keep your body from producing enough red blood cells (anemia), causing low blood pressure.

## • **What Causes a Sudden Drop in Blood Pressure?**

Sudden drops in blood pressure can be life-threatening. Causes of this type of hypotension include: Loss of blood from bleeding

- Low body temperature
- High body temperature
- Heart muscle disease causing heart failure
- Sepsis, a severe blood infection
- Severe dehydration from vomiting, diarrhea, or fever
- A reaction to medication or alcohol
- A severe allergic reaction called anaphylaxis that causes an irregular heartbeat



# What to Do for Low Blood Pressure

- Usually, low blood pressure with no symptoms requires little intervention.
- If low blood pressure is associated with chest pain, shortness of breath, or occurs because of active bleeding, treatment will occur at the same time as the diagnostic evaluation. These combinations may be truly life-threatening, and the healthcare provider may need to transfer the patient to an emergency department for further care. A patient with low blood pressure who is symptomatic may be considered to be in shock (a situation where organs can't function properly because of lack of blood supply).

- Intravenous fluids and oxygen may be given, and heart monitoring may be necessary. Based upon the underlying complaints and potential diagnosis, specific therapy may be started even without a firm diagnosis. Examples include antibiotics for a patient with an infection, adrenaline and an antihistamine for a patient with an allergic reaction, or blood transfusion for a patient who is bleeding.



# Orthostasis

**Postural (orthostatic) hypotension is diagnosed when, within two to five minutes of quiet standing, one or more of the following is present:**

**At least a 20 mmHg fall in systolic pressure**

**At least a 10 mmHg fall in diastolic pressure**

**Symptoms of cerebral hypoperfusion**

# Summary of specific interventions

- Narcotics → Narcan
  - Anaphylaxis → Epinephrine 0.5mL (1:1000) SQ q15-20 mins prn
  - Benadryl 50mg IV, Zantac 50mg IV
- Arrhythmia → appropriate ACLS algorithm
- Adrenal insufficiency → stress dose steroids  
(hydrocortisone 50mg IV q6h)
- Hemorrhage → pRBCs
- Tension PTX → 14-16 gauge angiocath into 2<sup>nd</sup> intercostal space  
midclavicular line. Call pulmonary fellow or surgery  
for chest tube.
- Tamponade → IVFs, call cards fellow for TTE and ?pericardiocentesis  
(check for pulsus and measure JVP first!)
- Sepsis → IVFs, draw cultures, antibiotics, ?start pressors
- MI → ACS protocol, call cardiology fellow



# Shock management



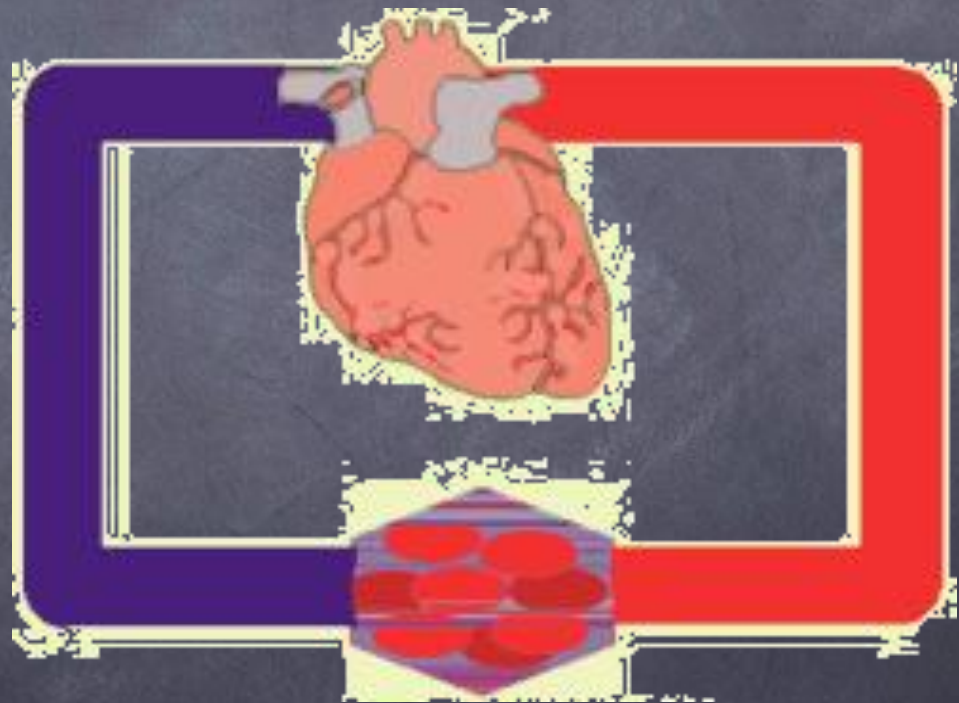
# What is Shock?

- ❖ Shock is a state of collapse and failure of the cardiovascular system
- ❖ Shock is caused by a disruption to the CVS and inadequate compensation to maintain tissue perfusion.
- ❖ Without adequate blood flow cells can not get rid of metabolic wastes
- ❖ Shock leads to inadequate tissue perfusion resulting in generalized cellular hypoxia and end organ injury

# The Cardiovascular System

Made up of three key components:

- ❖ **Pump** (Heart)
- ❖ **Tubing** (Blood Vessels)
- ❖ **Fluid** (Blood)





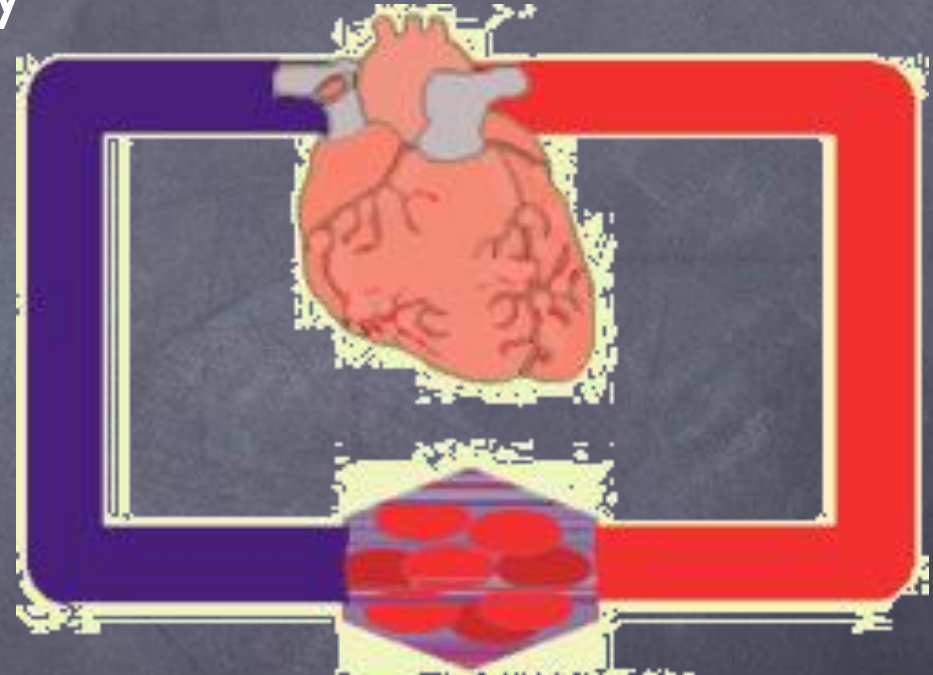
# Capillary Sphincters

(circular muscles in vessel walls that constrict and dilate)

- ❖ Regulate the blood flow through the capillary beds.
- ❖ Sphincters are under the control of the Autonomic Nervous System.
- ❖ Regulation of blood flow is determined by cellular need for nutrients and waste removal.
- ❖ Can be affected by heat and cold

# Perfusion

- ❖ Perfusion is accomplished by heart, vessels and blood working together.
- ❖ The components of the Cardiovascular System are **Interdependent**.
- ❖ If one component malfunctions, the other components compensate to return the blood pressure to normal.

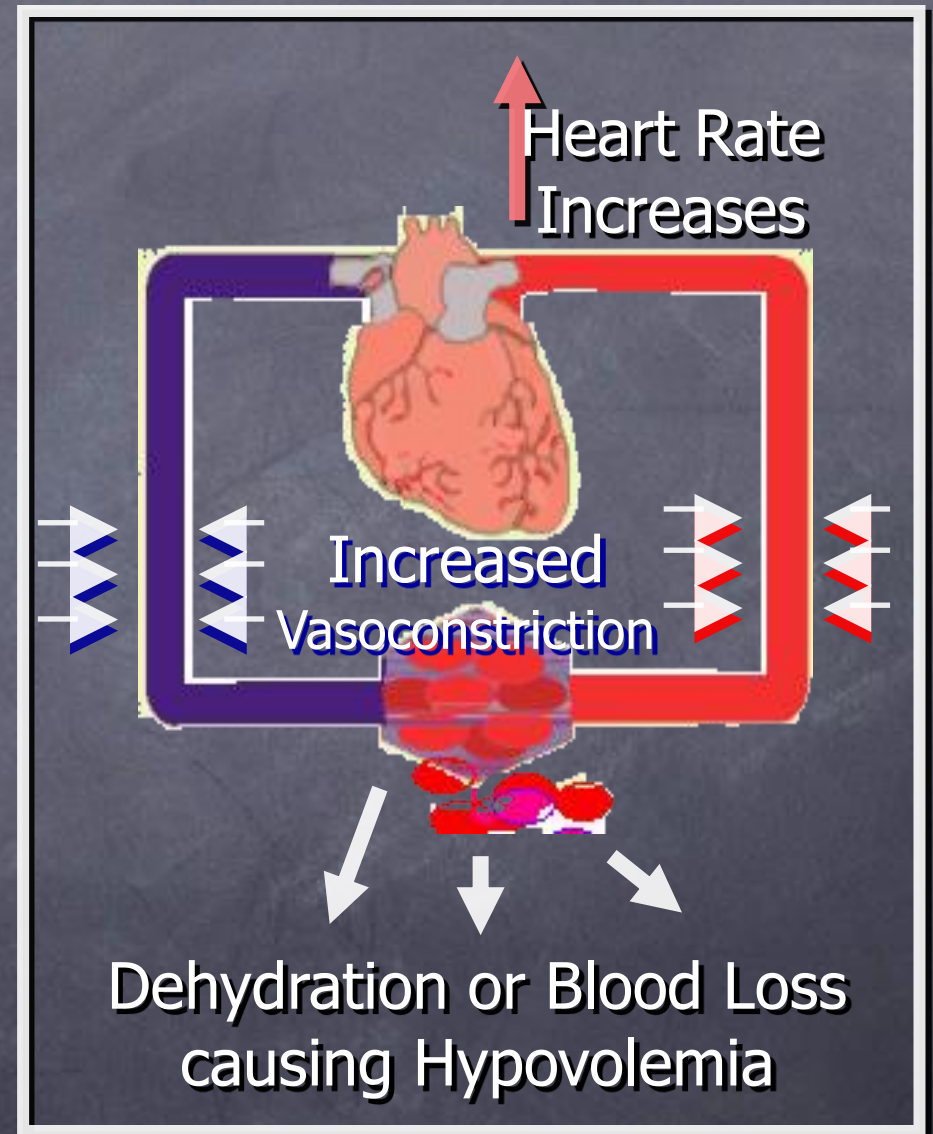


# Normal Compensation for Low Volume of Fluids (Hypovolemia)

During Bleeding or Dehydration (volume of fluid in vessels falls):

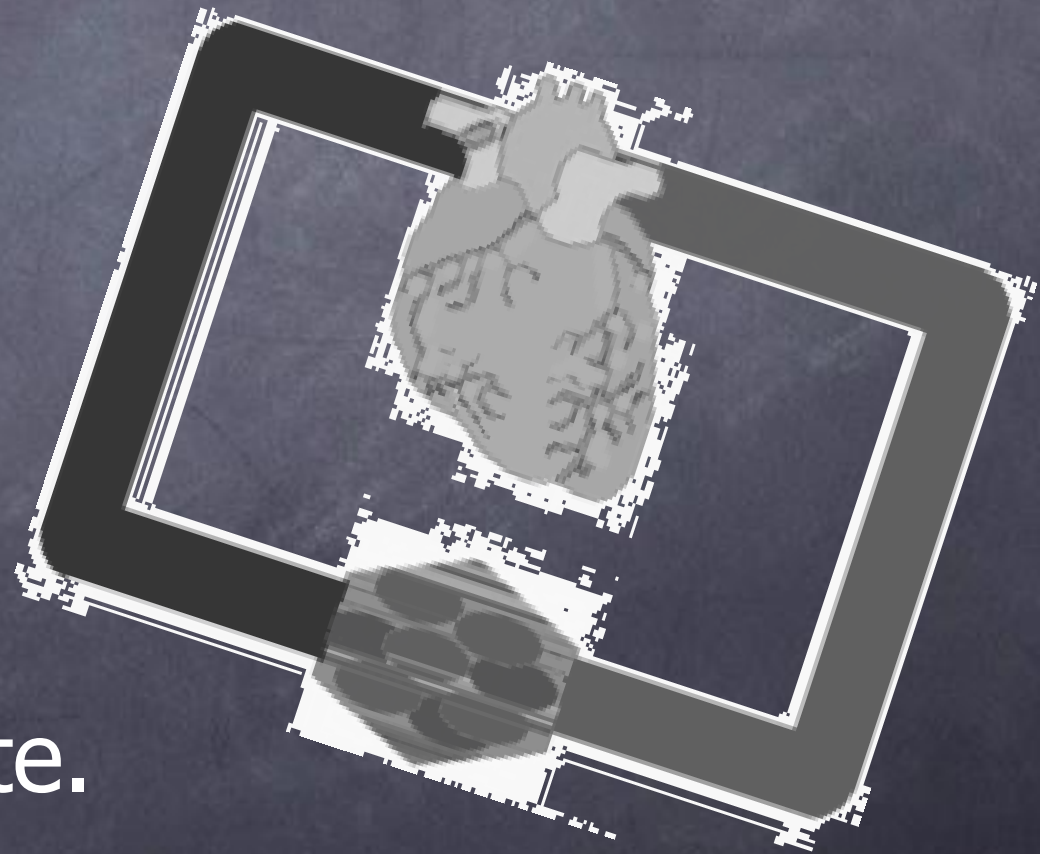
Heart Rate Increases  
Blood vessels and capillary sphincters tighten up (vasoconstrict)

All to maintain blood pressure and tissue and organ perfusion.





- ❖ Hypotension is a sign of cardiovascular insufficiency.
- ❖ In shock, there is **insufficient pressure to maintain tissue perfusion.**
- ❖ At least one of the components of the CVS has malfunctioned and the others have failed to compensate.

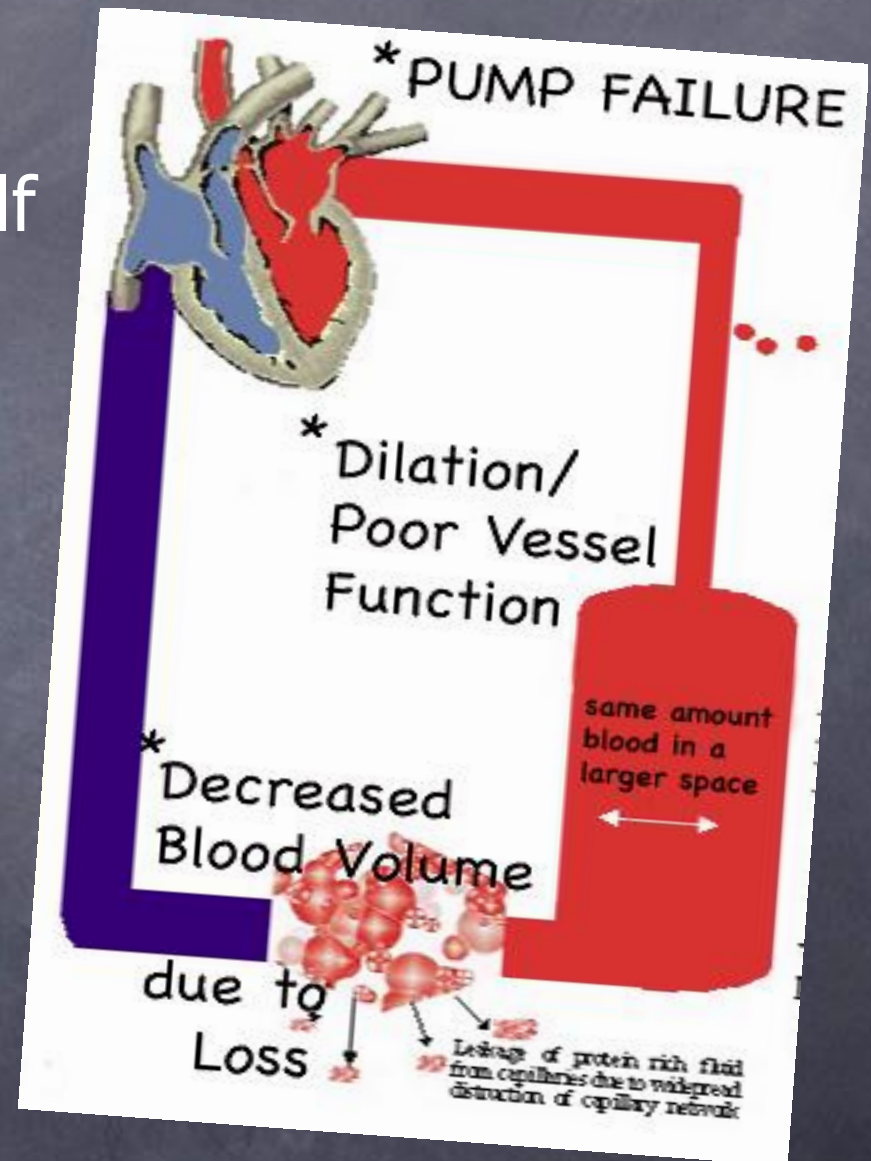


# Stages of Shock

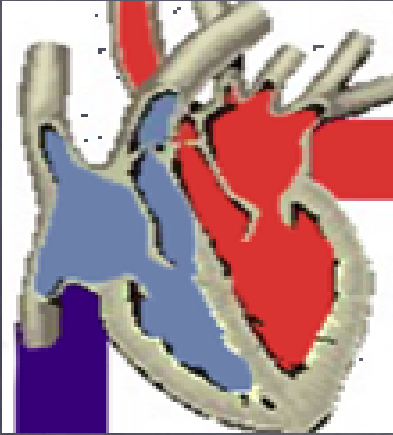
- Compensated
  - Maintains end organ perfusion
  - BP is maintained usually by  $\uparrow$  HR
- Uncompensated
  - Decreases micro-vascular perfusion
  - Sign/symptoms of end organ dysfunction
  - Hypotensive
- Irreversible
  - Progressive end-organ dysfunction
  - Cellular acidosis results in cell death

# What causes Shock?

- ❖ Problems with the Heart itself (Cardiogenic)
- ❖ Loss of fluids (Hypovolemic)
- ❖ Problems with the Vascular System (Distributive)
- ❖ Conditions blocking flow to/ from the Heart (Extra Cardiac Obstructive)







# Cardiogenic Shock

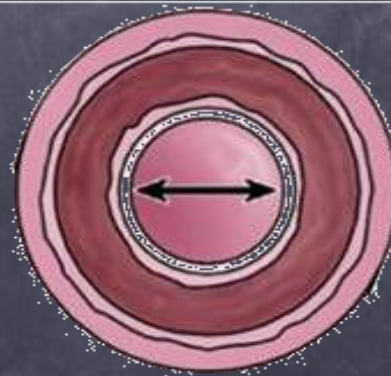
(Problems with the Pump itself:  
The Heart Muscle)

- ❖ If the heart muscle is damaged, it can not pump effectively.
- ❖ Normal compensatory mechanisms can make the situation worse.
- ❖ Pump failure can cause fluid to back up into the lungs, resulting in Pulmonary edema
- ❖ Pulmonary edema leads to impaired ventilation

# Distributive Shock

- ❖ Due to poor vessel function: a problem with abnormally dilated vessels.
- ❖ Blood vessels are normally kept in a state of tonic vasoconstriction, maintained by the interaction between special pressure receptors in vessel walls and the **autonomic nervous system**.

NORMAL

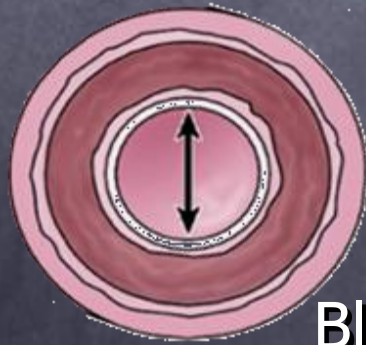


(tonic vasoconstriction)

# Distributive Shock

- ❖ Injury, toxins, medications and chemicals may reverse normal tonic vasoconstriction and the blood vessels dilate and the patient becomes hypotensive.

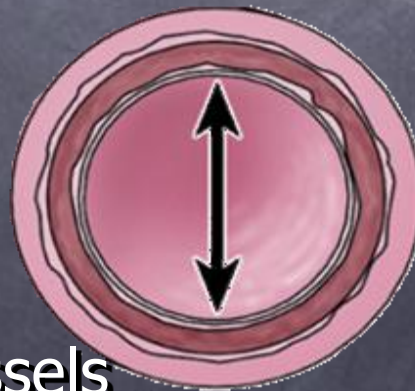
NORMAL



(tonic vasoconstriction)

Blood Vessels

ABNORMAL



(vasodilation)



# Types of Distributive Shock

- ❖ Septic Shock
- ❖ Neurogenic Shock
- ❖ Anaphylactic Shock
- ❖ (Drugs, Chemicals, Toxins)

# Distributive Shock (Septic Shock)

- ❖ Occurs when an infection enters the bloodstream and travels throughout the body.
- ❖ Toxins released from infectious organisms override compensatory mechanisms.
- ❖ A number of physiological upsets contribute to dilation of blood vessels, hypotension and inadequate perfusion.

- **Signs and symptoms can vary.** Some patients have fever while others have normal temps and can even be hypothermic. The skin may be flushed, pale or even cyanotic. If the infection is in the lungs, the patient may have trouble breathing. If the infection is in the brain, the person may be altered.

- Other causes of distributive shock: Drug Overdose, Addison's crisis (severe Adrenal Insufficiency)

Combined vessel and content failure:

Toxins damage vessel walls, leakage and impairing ability to contract.



# Distributive Shock (Neurogenic Shock)

- ❖ Cervical spinal cord injury can interrupt the normal control of the Autonomic Nervous System (blocks sympathetic nerves).
- ❖ Blood vessels dilate, the size of the vascular system increases, and blood can not fill the enlarged system
- ❖ **Classic Picture:**  
Warm, flushed, dry skin,  
Low blood pressure,  
Normal or slow (bradycardia) heart rate



# Distributive Shock (Anaphylactic Shock)

- ❖ Systemic allergic reaction involving the whole body
- ❖ Body mast cells release chemicals and histamines which cause vasodilation
- ❖ Onset is acute, manifestations vary from mild to rapidly fatal
- ❖ Stings from bees, wasps, hornets are most common



# Hypovolemic Shock

- ❖ Results from fluid loss (dehydration) or blood loss (hemorrhagic)
- ❖ Hemorrhagic shock is the most common cause of shock after an injury
- ❖ Hemorrhage can be both external and internal bleeding





# Hypovolemic Shock

## Some Blood Facts

- ❖ A 70kg man (150 lbs) has a circulating volume of approximately 5 Liters
- ❖ Loss of 15-30% blood (750ml-1.5L) causes tachycardia and decreased pulse pressure **Fractured tibia or humerus may be associated with 750ml of blood loss**
- ❖ Loss of 30-40% (1.5L-2L) consistently drops systolic blood pressure and usually requires a blood transfusion. **Femur fracture may lose 1.5L blood**
- ❖ More than 40% (>2L) is immediately life-threatening **Pelvic fractures may bleed several liters.**



# Hypovolemic Shock

- ❖ Severe thermal burns cause body fluid loss
- ❖ Pre-existing dehydration aggravates shock

# Extracardiac Obstructive Shock

(or anything that prevents blood flow into or out of the heart)

- ❖ Pericardial Tamponade (build up of fluid in the membrane surrounding the heart)
- ❖ Massive Pulmonary Embolism (blockage of blood flow to the lungs by blood clot, gas bubble, tissue or other object)
- ❖ Tension Pneumothorax (an expanding air collection outside the lung which causes lung collapse and places pressure on heart and blood vessels)



# Psychogenic "Shock"

- ❖ Brought on by strong emotion, fear or unpleasant sights
- ❖ Commonly referred to as fainting or syncope
- ❖ Produces a temporary, generalized vascular dilation and bradycardia

# Progression of Shock (three stages)

- ❖ **Compensated shock**  
(body still responds effectively)
- ❖ **Decompensated shock**  
(body experienced problems with responding)
- ❖ **Irreversible shock**  
(body has failed responding, medical intervention ineffective)

# Signs and Symptoms of Compensated Shock

- ❖ Tachycardia (heart rate  $>100$ )
- ❖ Delayed capillary refill
- ❖ Pallor
- ❖ Anxiety, Agitation, Restlessness
- ❖ Shallow, rapid breathing
- ❖ Shortness of breath
- ❖ Nausea or vomiting
- ❖ Weak pulse
- ❖ Clammy skin
- ❖ Marked thirst
- ❖ Feeling of impending doom
- ❖ Altered mental status

This is the stage during which prehospital interventions and rapid transport are most effective



# Signs and Symptoms of Decompensated Shock

- ❖ Falling blood pressure
- ❖ Labored, irregular breathing
- ❖ Ashen, mottled, cyanotic skin
- ❖ Thready or absent pulse
- ❖ Dull eyes, dilated pupils

Decompensated shock has obvious signs and symptoms. Patient moves rapidly towards death. No amount of vascular resistance can maintain adequate circulation. Critical organs are hypoperfused.

- **De-compensated shock** is the stage when the body's compensatory mechanisms can no longer maintain and they fail. This stage has VERY OBVIOUS signs and symptoms and the patient moves rapidly toward death. **One of the FIRST signs of de-compensated shock is HYPOTENSION.** No amount of vascular resistance can maintain adequate circulation. Even the most critical organs are hypoperfused. **The brain is extremely hypoxic and can no longer maintain control over the body functions.** There is a rapid decrease in level of consciousness. The patient is heading straight towards irreversible shock.

# Irreversible Shock

- ❖ This is the **terminal stage** of shock.
- ❖ Damage to cells and organs is so severe that death will ultimately occur.
- ❖ Aggressive resuscitation and transfusions will not be enough to save patient's life.

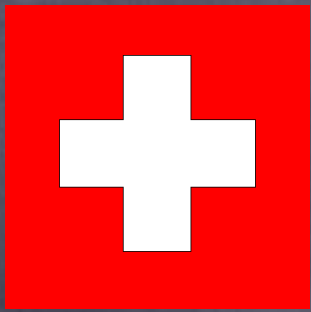


# When to Expect Shock

- ❖ Massive external and internal bleeding
- ❖ Multiple severe fractures
- ❖ Abdominal or chest injuries
- ❖ Spinal injuries
- ❖ Severe infection
- ❖ Major heart attack
- ❖ Anaphylaxis

# Recognizing Shock

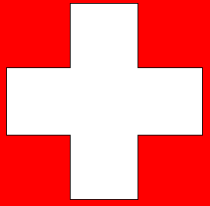
- ❖ Early shock is difficult to recognize and should be expected !
- ❖ Signs and symptoms may be subtle
- ❖ By the time the Blood Pressure drops.....  
shock is already well-developed (decompensated).



# Emergency Medical Care

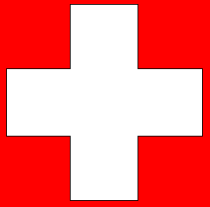
General supportive measures.....





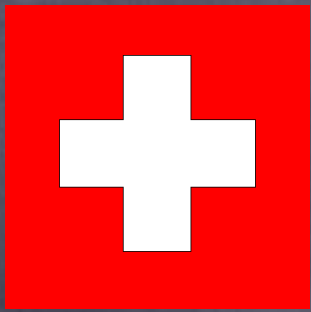
# Emergency Medical Care

- ❖ Make certain patient has an open airway.
- ❖ Everyone gets oxygen.
- ❖ Keep patient supine.
- ❖ Control external bleeding.
- ❖ Splint any broken bones or joint injuries.



# Emergency Medical Care

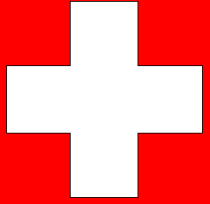
- ❖ Place blankets under and over patient to prevent hypothermia.
- ❖ If there are no broken bones, elevate the legs 6" to 12".
- ❖ Do not give the patient anything by mouth.
- ❖ Transport promptly.



# Emergency Medical Care

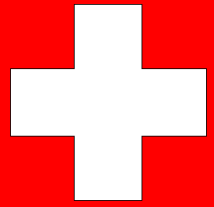
- ❖ (Not every measure is used for every type of shock)





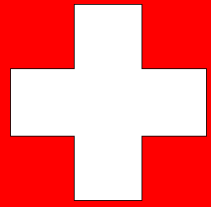
# Treating Cardiogenic Shock

- ❖ OXYGEN
- ❖ Patient may breathe better in a sitting or semi-sitting position.
- ❖ Have suction nearby in case the patient vomits.
- ❖ Transport promptly.



# Treating Neurogenic Shock

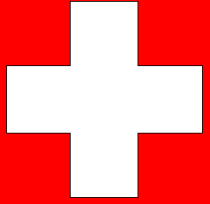
- ❖ Give Oxygen
- ❖ Stabilize cervical spine
- ❖ Keep patient warm.
- ❖ Transport promptly.



# Treating Hypovolemic Shock

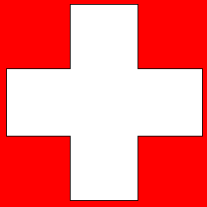
- ❖ Supplemental oxygen
- ❖ Control obvious bleeding.
- ❖ Splint any bone or joint injuries.
- ❖ Elevate legs
- ❖ Keep warm
- ❖ Transport promptly.





# Treating Septic Shock

- ❖ Transport as promptly as possible while giving all general support available.
- ❖ Give high-flow oxygen during transport.
- ❖ Use blankets to conserve body heat.



# Treating Anaphylactic Shock

- ❖ The only *truly effective* treatment is EPINEPHRINE
- ❖ Arrange for epinephrine administration or ASSIST with prescribed EpiPen
- ❖ Provide all possible support: oxygen, ventilatory assistance
- ❖ Provide prompt transport
- ❖ Failure or delay associated with fatalities

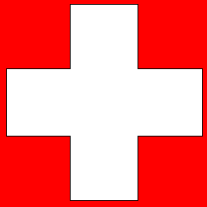


# Epi Auto-injector



Many people with known serious allergic reactions carry epinephrine auto-injectors with them.



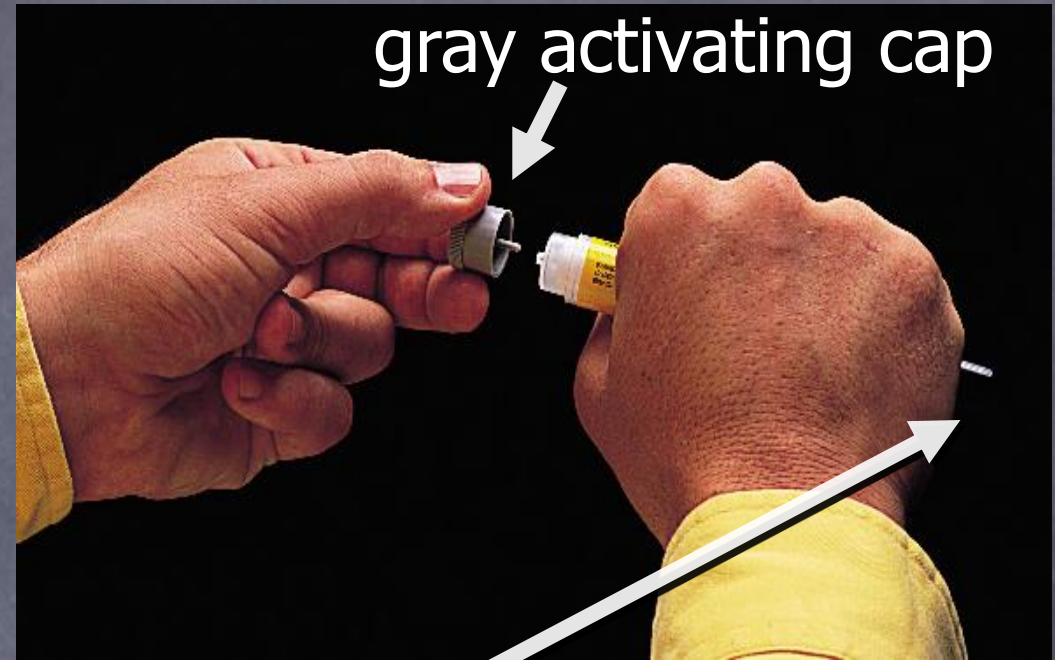


# Treating Anaphylactic Shock

- ❖ *Evidence-based medicine findings demonstrate* that 1st responders and lay public **SHOULD BE TRAINED** in EpiPen administration
- ❖ *Retrospective studies* of people who **DIED** of anaphylactic shock report that epinephrine was **UNDERUSED, DELAYED**, given as wrong dose or wrong route
- ❖ In California, an EMT-B *can assist* in using EpiPens, inhalers, other drug administration devices

# Epi Auto-injector Instructions

- ❖ Grasp auto-injector with one hand forming a fist, keeping the black tip downward  
(this is where the needle is located)



- ❖ Remove gray activating cap with the other hand

# Epi Auto-injector Instructions

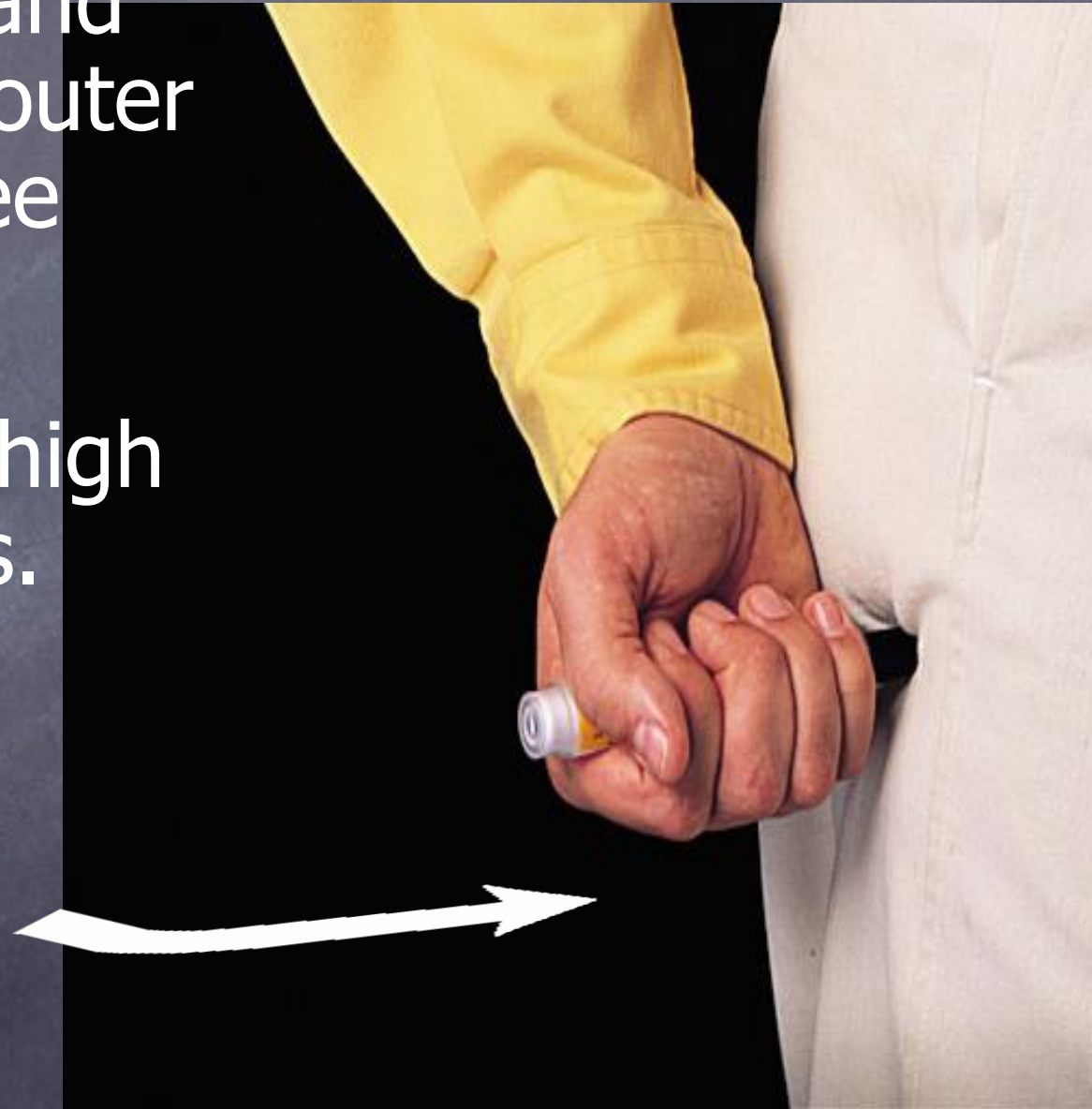
- ❖ After uncapping the auto-injector, place black tip near fleshy outer thigh.
- ❖ Designed to work through (thin) clothing

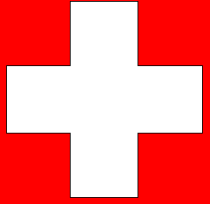




# Epi Auto-injector Instructions

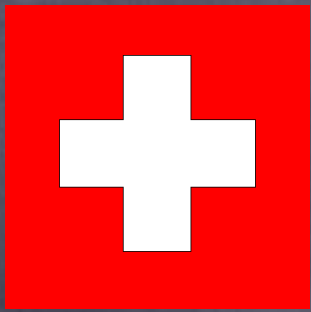
- ❖ Quickly swing out and jab firmly into the outer thigh at a 90 degree angle.
- ❖ Hold firmly in the thigh for several seconds.
- ❖ Spring mechanism is released and epinephrine is administered.





# Treating Respiratory Insufficiency

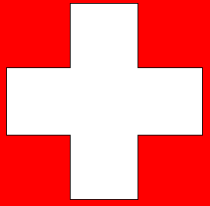
- ❖ Secure and maintain the airway.
- ❖ Clear airway of any obstructions.
- ❖ Ventilate if needed.
- ❖ Administer oxygen.
- ❖ Transport promptly.



# Treating Psychogenic "Shock"

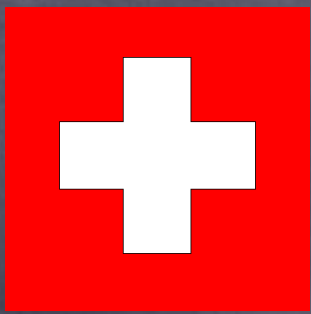
- ❖ It is usually self-resolving.
- ❖ Assess patient for injuries from fall.
- ❖ If patient does not appear normal soon after regaining consciousness, suspect another problem.





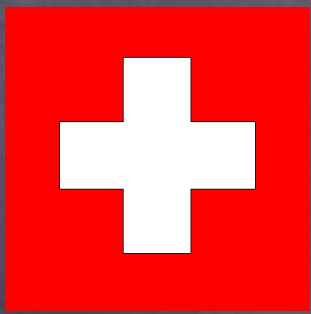
# Special Considerations

- ❖ Age- relative decrease in physiological reserve
- ❖ Athletes- ability to compensate is remarkable
- ❖ Pregnancy- physiological hypervolemia
- ❖ Medications- Beta blockers, Ca channel blockers, Insulin
- ❖ Hypothermia- won't respond well to resuscitation; best treated by prevention
- ❖ Pacemaker- unable to respond to blood loss
- ❖ Children- vitals maintained even in severe shock



# Emergency Medical Care Review

- ❖ Airway, C-spine, Breathing
- ❖ Ventilate, High-flow oxygen
- ❖ Control external bleeding, Check pulse
- ❖ Keep supine (semi-sitting if heart or lung problem), Elevate legs if no fractures or compromise to injury
- ❖ Splint fractures/ joint injuries
- ❖ Prevent heat loss
- ❖ Transport promptly



# Emergency Medical Care Review

- ❖ SUSPECT and RECOGNIZE (appreciate presence of inadequate tissue perfusion; early clues of increased heart rate and delayed capillary refill).
- ❖ IDENTIFY probable cause of the shock state.  
MOST injured patients are HYPOVOLEMIC.
- ❖ Age, general health, medications can affect how the person responds.
- ❖ BASIC PRINCIPAL: Stop the bleeding and replace the volume loss
- ❖ URGENT transport for vascular access and fluid replacement is LIFE-SAVING.



# Phases of organism dying process

- **Preagony.** Characterized the progressive fading of consciousness. Changes of hemodynamics: takhikardia, low pulse, mionectic BP, low microcirculation, breathing is superficial, often pathological.
- **Terminal pause.** More frequent takes place at bloodloss. Transitional state between preagony and by agony. State of unconsciousness. Single respiratory motions appear at the accumulation of  $PsO_2$ .
- ortant functions at acute clinical death, including to the brain.

• **Agony.** Characteristic is strengthening of cardiac activity and breathing as a result of proceeding in oxygenation.

Breathing for as fish. Then cardiac activity goes out acutely.

• **Clinical death.** Stop of breathing and circulation of blood. Basic exchange processes are stored and in anaerobic terms acutely slow. Lasts 3 – 5 minutes. This phase is characteristic that there is possibility to pick up thread all vitally imp

• **Social death** (spiritual, theology, civil) . Characterized by the loss of function of cortex at the maintainance of vegetative functions. Develops in that case, when a reanimation begins lately and conducted uneffective. Duration of it from hours to a few months and depends on weight of damages which develop in the period of clinical death, qualities of intensive therapy and examination in a ppostreanimation period.



• **Death of cerebrum.** Characterized by the loss of function of all cerebrum at artificial maintenance of breathing and circulation of blood.

• **Biological death (real).** Characteristic irreversible biophysiology violations of all functions and systems of organism. Turbid, drying out cornea, of a corpse spots, wide pupils.



# Diagnostics of clinical death

- **Basic signs:**

- absence of pulsation is on carotids
- absence of breathing
- wide pupils, irresponsive on light (through 40 – 60 secs. after the stop of circulation of blood).

- **Additional signs:**

- pallor or cyanosis of skin covers with a transition in earthily - grey color
- absence of independent motions and arephlexy.

**After establishment of diagnosis of clinical death it is necessary to begin the leadthrough of reanimation**

# Algorithm of reanimation measures

## **First stage of reanimation**

- Providing of overhead respiratory tracts communicating
- Artificial ventilation of lungs
- Massage of heart

## **Second stage of reanimation**

Begins from the moment of arrival of first-aid. A purpose of this stage is proceeding in independent circulation of blood.

- Providing of the vehicle breathing (intubation of trachea)
- Continuation of the closed massage of heart

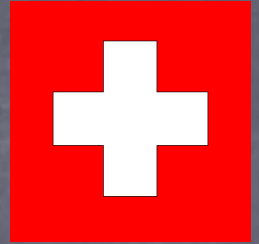
**Third stage of reanimation** - of long duration continuation of life. Treatment of postreanimation illness.

- Purpose: proceeding in higher cerebral functions





# Primary Survey



- Follow a logical sequence
- **A - Airway (Cx spine control)**
- **B - Breathing and ventilation**
- **C - Circulation with haemorrhage control**
- **D - Disability: Neurological status**
- **E - Exposure/Environmental control**
- “How are you?”

**A**

**AIRWAY**



**B**

**BREATHING**



**C**

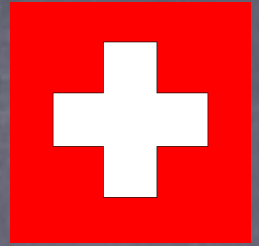
**CIRCULATION**



**DEFIBRILLATION**

**D**





# A - Airway

- **Look**

- Central cyanosis
- “See-saw” or abdominal breathing
- Accessory muscles
- Tracheal tug
- Altered conscious level
- Airway obstruction

- **Listen**

- Grunting, snoring, hoarseness, stridor

- **Feel**

- Airflow on inspiration & expiration





**BREATHING PRESENT**



**RECOVERY  
POSITION  
AND  
TRANSPORT**



**BREATHING ABSENT**



**2 EFFECTIVE RESCUE BREATHS**

- SLOW BREATHS
- TIDAL VOL. 8-10 ml/kg
- Deliver in one sec.
- Rate- 10-12/min.
- Chest rise/ expand



# Assessing the victim



©IRC

- 1-- Make sure the victim, any bystanders, and you are safe.
- 2-- Check the victim for a response.
- Shake shoulders gently
- Ask "Are you all right
- **If he responds**
- Leave as you find him.
- Find out what is wrong.
- Reassess regularly
- **If he does not respond:**
- **Activate Code Blue and get AED**
- 4 --Keeping the airway open, look, listen, and feel for normal breathing.
- **OPEN AIRWAY**
- Look, listen and feel for **NORMAL** breathing
- Do not confuse agonal breathing with **NORMAL** breathing

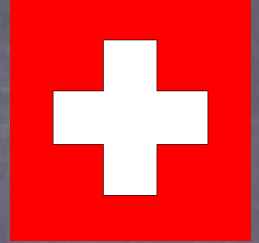
**Keeping the airway open, look, listen, and feel  
for normal breathing. ....OPEN AIRWAY**



©ERC



# B - Breathing



- **Look**

- Cyanosis/accessory muscles
- Respiratory rate
- Sweating
- Raised JVP
- Patency of chest drains
- Remember O2 sats do not detect hypercapnia

- **Listen**

- Noisy breathing
- Clearance of secretions
- Ability to talk in sentences
- Percussion note
- Auscultation

- **Feel**

- Position of trachea
- Surgical emphysema or crepitus

**Look, listen and feel for NORMAL breathing**



©ERC

## If he is breathing normally

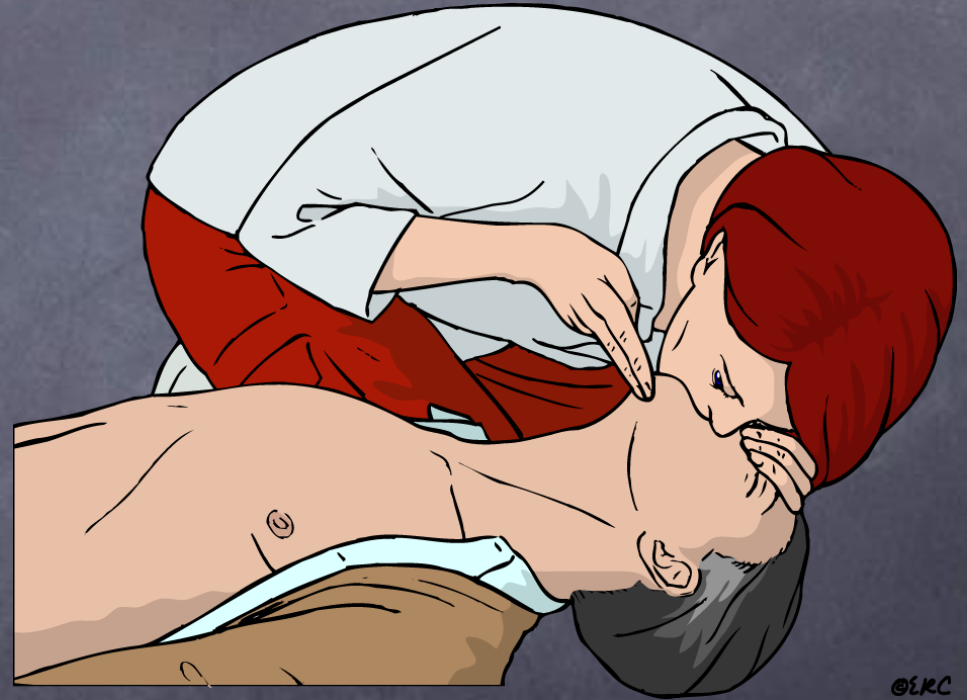
- Turn him into the recovery position
- Send or go for help, or call for an ambulance.
- Check for continued breathing.



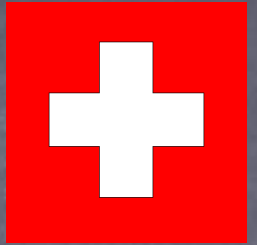


# If he is not breathing normally

- Give 2 rescue breaths
- Pinch the nose
- Take a normal breath
- Place lips over mouth
- Blow until the chest rises
- Take about 1 second
- Allow chest to fall
- Repeat



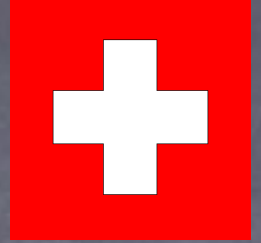
©IRC



# C - Circulation

- Hypovolaemia until proved otherwise
- Haemorrhage must be rapidly excluded
- Overt or covert
- Unless obvious signs of cardiogenic shock
- Cool & tachycardic = hypovolaemic shock

# C - Circulation



- Look
- Reduced peripheral perfusion
- Pallor, coolness, collapsed veins
- BP may be normal
- External haemorrhage – wounds, drains
- Concealed haemorrhage – beware the empty drain
- thoracic, abdominal, GI tract, pelvic or femoral #
- Altered conscious level
- Cerebral perfusion
- Feel
- Pulses – peripheral and central
- Rate, quality, regularity, equality



	Class I	Class II	Class III	Class IV
Blood Loss (ml)	Up to 750	750-1500	1500-2000	>2000
Blood Loss (%)	Up to 15%	15%-30%	30%-40%	>40%
Pulse Rate	<100	>100	>120	>140
BP	Normal	Normal	Decreased	Decreased
Pulse pressure	Normal or increased	Decreased	Decreased	Decreased
Resp Rate	14-20	20-30	30-40	>35
Urine Output	>30	20-30	5-15	Negligible
Mental State	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic
Fluid Replace	Crystalloid	Crystalloid	Crystalloid & blood	Crystalloid & blood



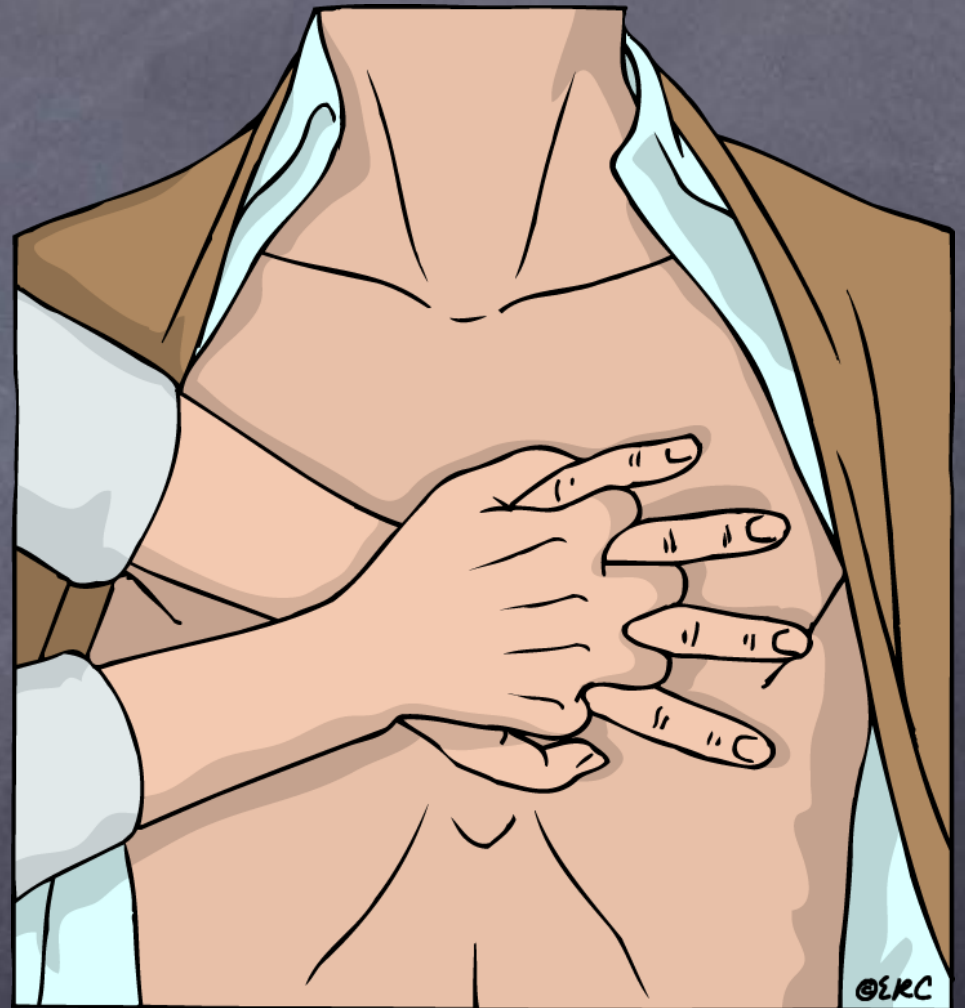
# Chest Compressions

- Patient positioning:  
Firm and hard surface (ground, table/ hard bed) deflate air/ water mattresses.
- Rescuer's position:  
Level with patient, elbows vertically straight and locked, shoulders directly above the hands, heel of one palm over the other.
- Site : sternum in inter-mammary line.
- Depth: 1 1/2- 2 inches.
- Rate: 100 per minute (5 cycles of 30:2-C:V over 2 min.).
- Allow complete chest recoil.



# CHEST COMPRESSIONS

## 30 CHEST COMPRESSIONS



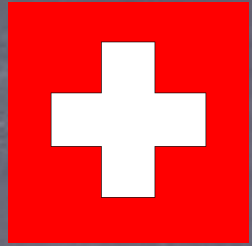
# Hands off- time

- Less than 10 sec.
- Specific interventions: defibrillation, advanced airway, moving the patient.

Avoid :

- Prolonged rhythm analysis
- Frequent pulse checks
- Too long breaths
- Unnecessary moving the pt.

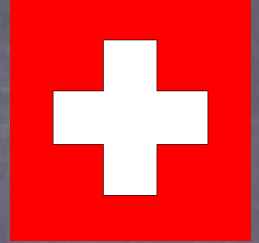
# D - Disability: Neurological Status



- **Pupils / GCS**
- **AVPU system**
  - A – Alert
  - V – responds to verbal stimulus
  - P – responds only to pain
  - U – unresponsive to any stimulus
- **Sedatives, analgesics, anaesthetic drugs**
- **Hypoglycaemia**
- **Review the ABCs – missed something**



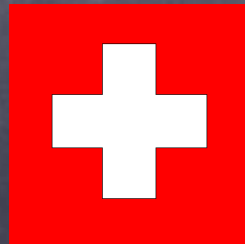
# E - Exposure



- Patient must be adequately exposed
- Avoid hypothermia
- Warm blankets/warming device
- Warmed IV fluids
- Respect dignity
- If at any time the patient deteriorates
- Reassess the ABCs

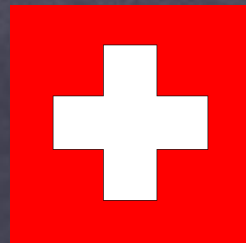
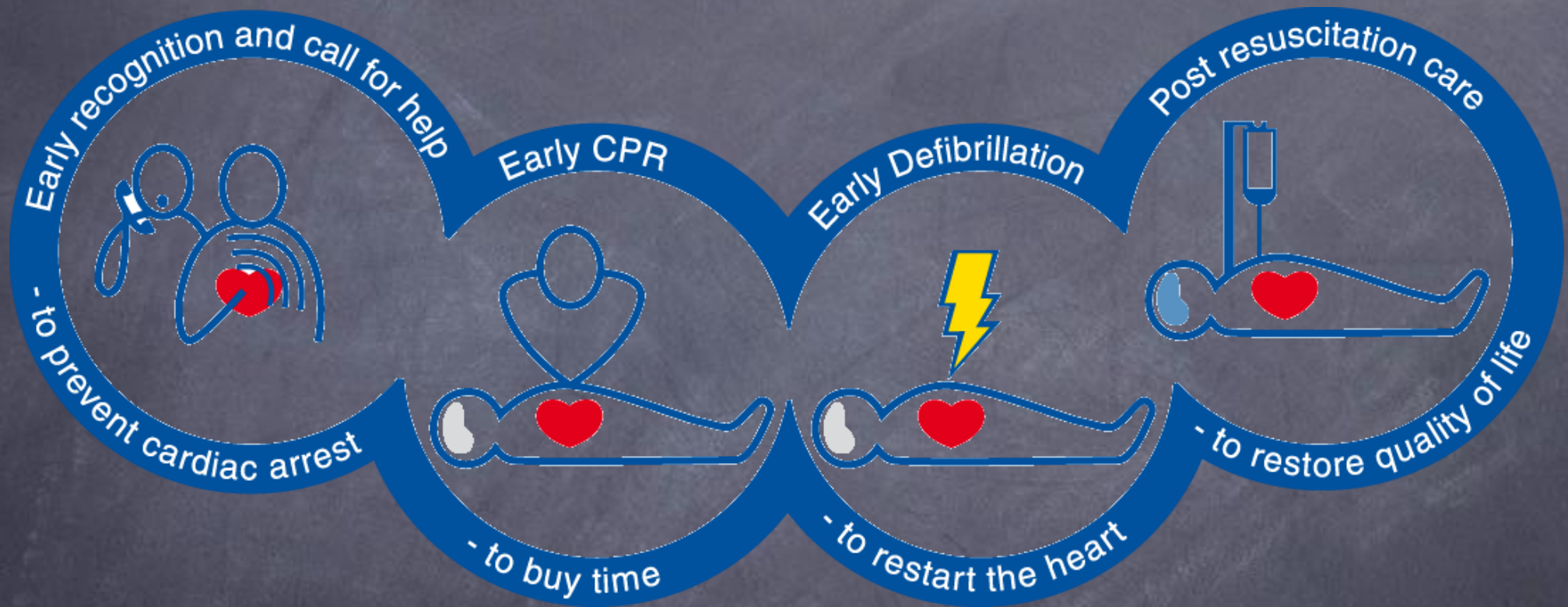


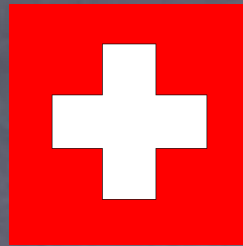
# Basic Life Support





# CHAIN OF SURVIVAL





**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**Call 112**

**30 chest compressions**

**2 rescue breaths**

# APPROACH SAFELY!

Scene

Rescuer

Victim

Bystanders

**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**Call 112**

**30 chest**

**compressions**  
**2 rescue breaths**



# CHECK RESPONSE



**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**Call 112**

**30 chest  
compressions  
2 rescue breaths**

# CHECK RESPONSE



Shake shoulders gently  
Ask "Are you all right?"

If he responds

- Leave as you find him.
- Find out what is wrong.
- Reassess regularly.

# SHOUT FOR HELP



**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**Call 112**

**30 chest  
compressions  
2 rescue breaths**



# OPEN AIRWAY



©ERC

**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**Call 112**

**30 chest  
compressions  
2 rescue breaths**

# CHECK BREATHING



©ERC

**Approach safely**

**Check response**

**Shout for help**

**Open airway**

**Check breathing**

**30 chest  
compressions**

**2 rescue breaths**

# CHECK BREATHING



- Look, listen and feel for **NORMAL** breathing
- Do not confuse agonal breathing with **NORMAL** breathing



# AGONAL BREATHING

- Occurs shortly after the heart stops in up to 40% of cardiac arrests
- Described as barely, heavy, noisy or gasping breathing
- Recognise as a sign of cardiac arrest

# 30 CHEST COMPRESSIONS



**Approach safely**

**Check response**

**Shout for help**

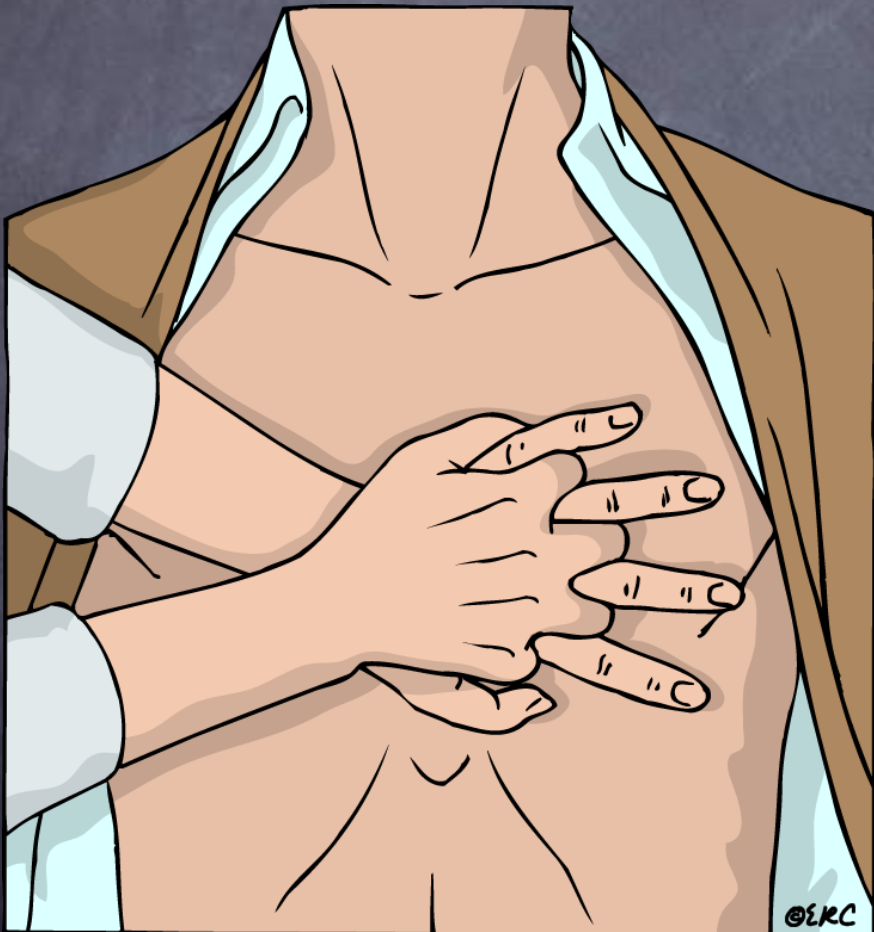
**Open airway**

**Check breathing**

**30 chest  
compressions**

**2 rescue breaths**

# CHEST COMPRESSIONS



- Place the heel of one hand in the centre of the chest
- Place other hand on top
  - Interlock fingers
- Compress the chest
  - Rate 100 min<sup>-1</sup>
  - Depth 4-5 cm
  - Equal compression : relaxation
- When possible change CPR operator every 2 min



# RESCUE BREATHS



**Approach safely**

**Check response**

**Shout for help**

**Open airway**

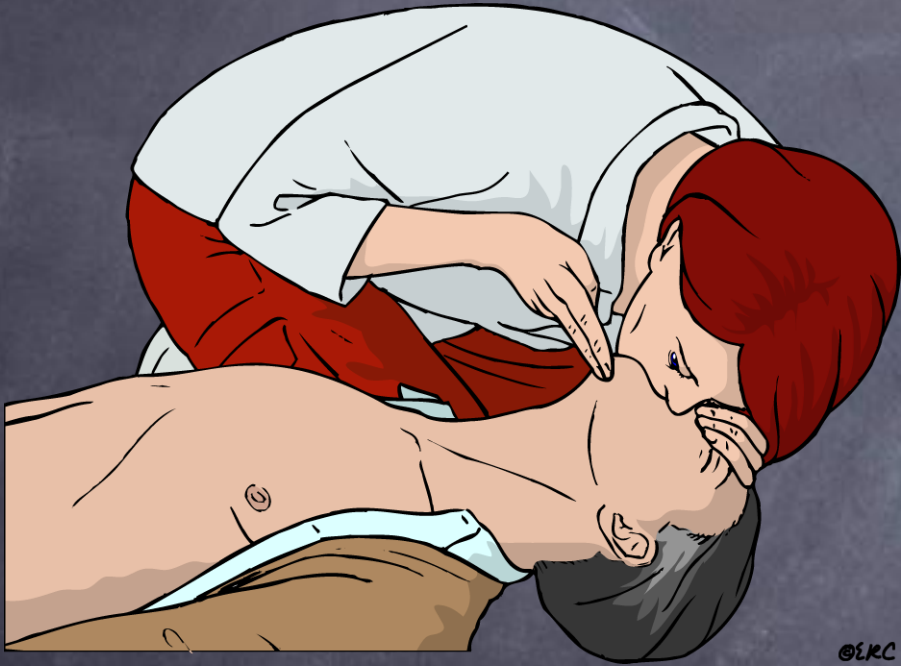
**Check breathing**

**Call 112**

**30 chest**

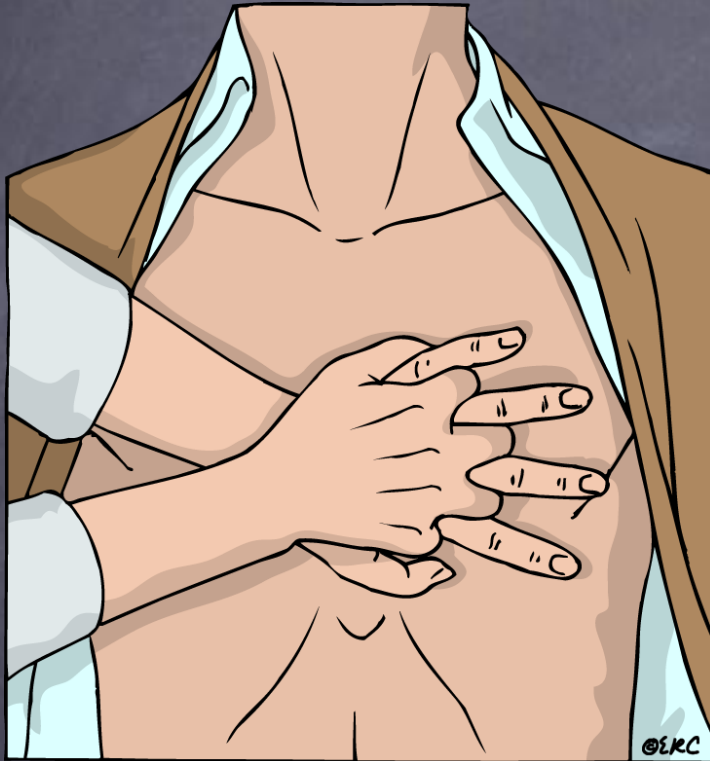
**compressions  
2 rescue breaths**

# RESCUE BREATHS

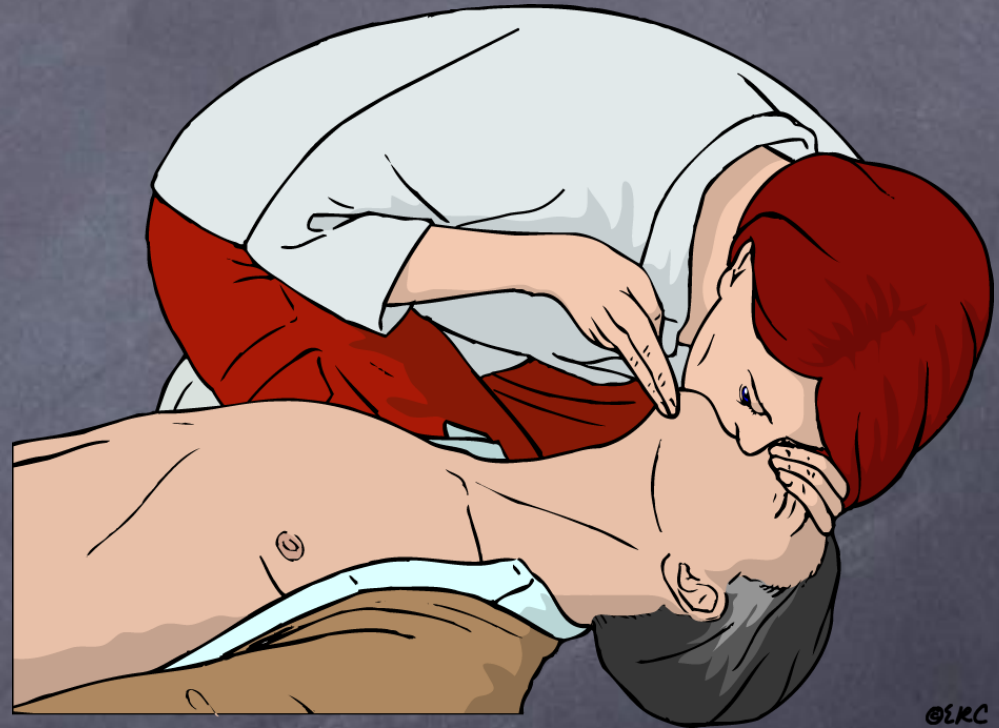


- Pinch the nose
- Take a normal breath
- Place lips over mouth
- Blow until the chest rises
- Take about 1 second
- Allow chest to fall
- Repeat

## CONTINUE CPR

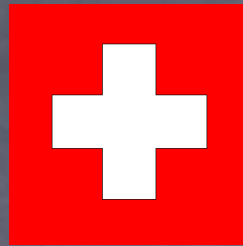


30



2





**Approach safely**

**Check response**

**Shout for help**

**Open airway**

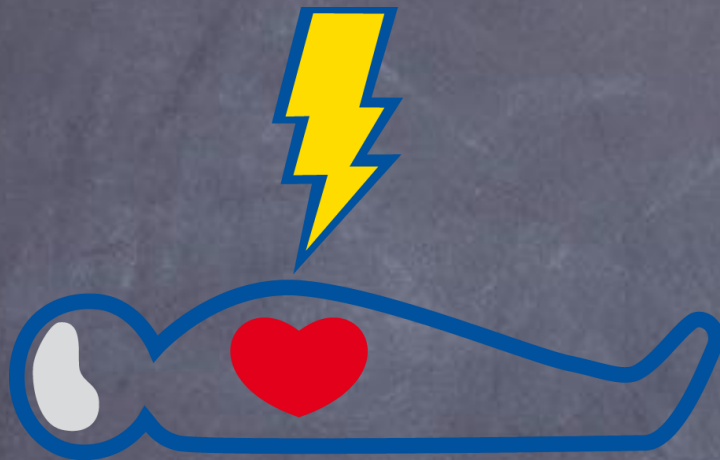
**Check breathing**

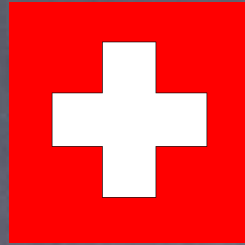
**30 chest compressions**

**2 rescue breaths**



# DEFIBRILLATION





**Approach safely**

**Check response**

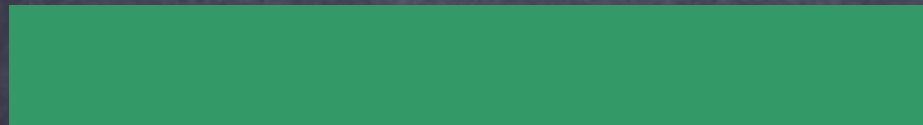
**Shout for help**

**Open airway**

**Check breathing**

**Attach AED**

**Follow voice prompts**





# SWITCH ON AED



- Some AEDs will automatically switch themselves on when the lid is opened

©ERC

# ATTACH PADS TO CASUALTY'S BARE CHEST

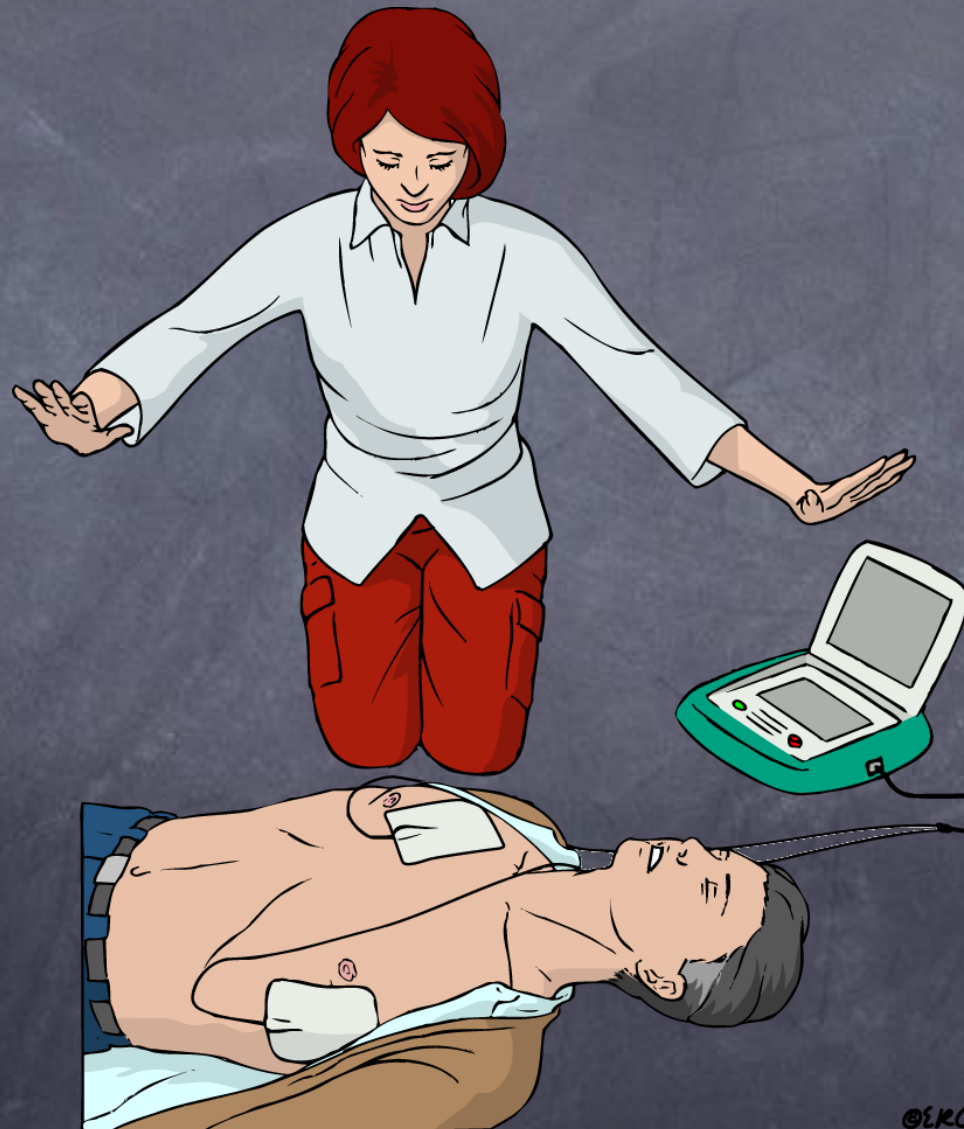


©ERC



©ERC

# ANALYSING RHYTHM DO NOT TOUCH VICTIM





# SHOCK INDICATED



- Stand clear
- Deliver shock

# SHOCK DELIVERED FOLLOW AED INSTRUCTIONS



©ERC

30



©ERC

2

**NO SHOCK ADVISED  
FOLLOW AED INSTRUCTIONS**



©ERC

30

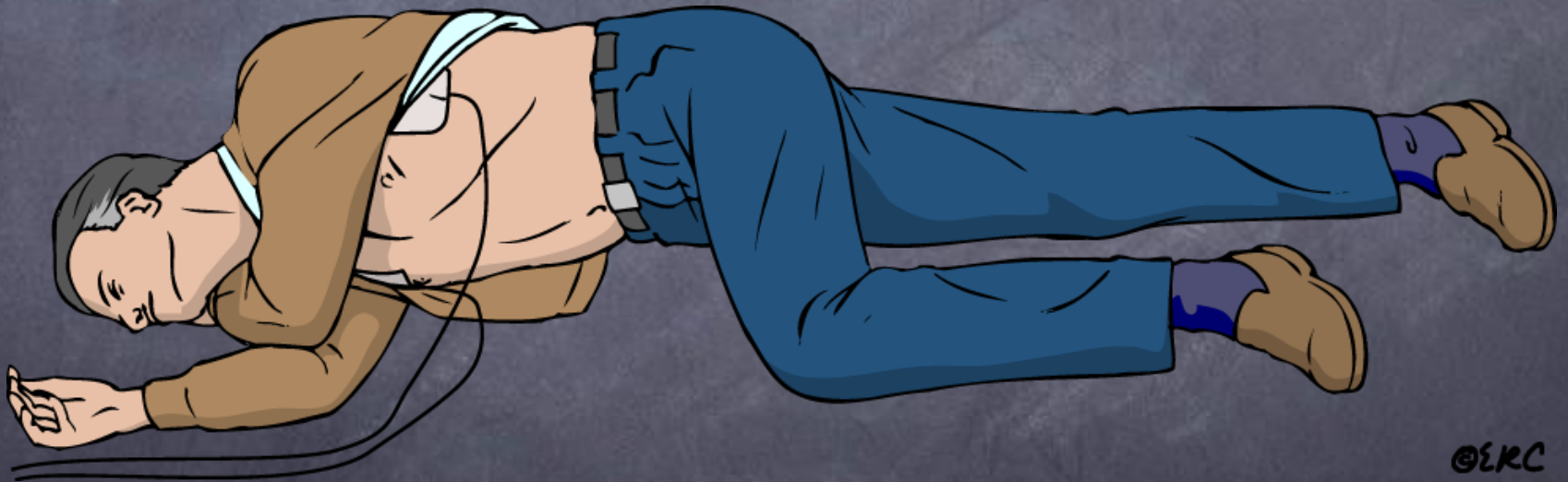


©ERC

2



**IF VICTIM STARTS TO  
BREATHE NORMALLY PLACE  
IN RECOVERY POSITION**





# CPR IN CHILDREN

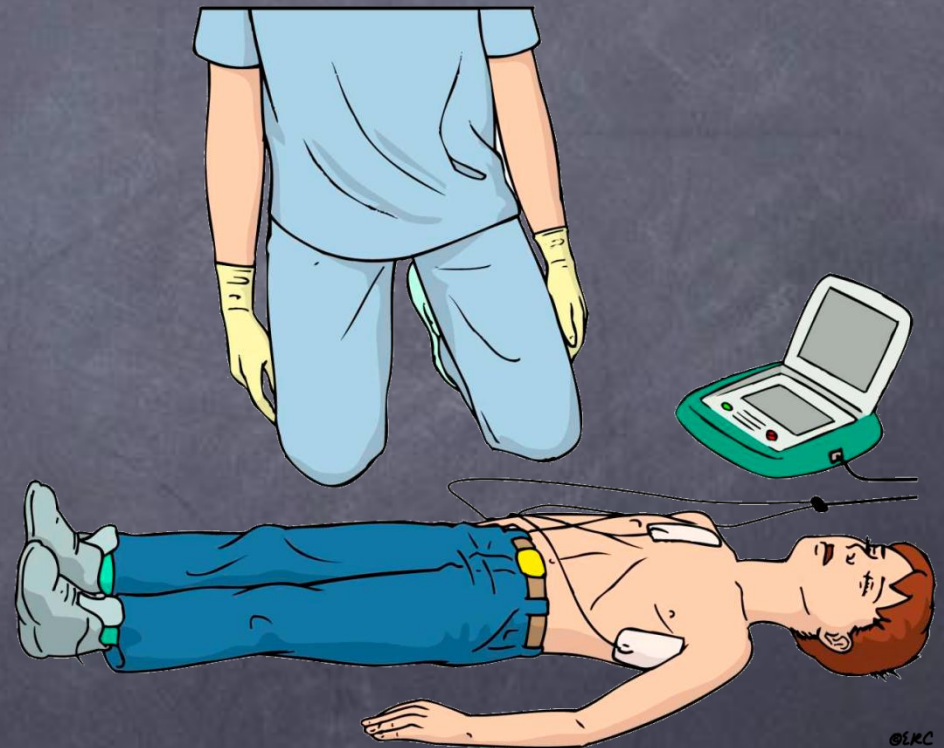
- Adult CPR techniques can be used on children
- Compressions  $\frac{1}{3}$  of the depth of the chest





# AED IN CHILDREN

- Age > 8 years
  - use adult AED
- Age 1-8 years
  - use paediatric pads / settings if available (otherwise use adult mode)
- Age < 1 year
  - use only if manufacturer instructions indicate it is safe





**Approach safely**

**Check response**

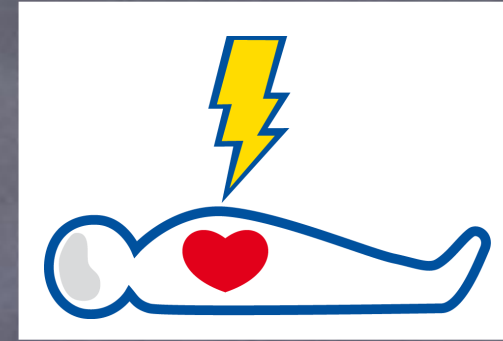
**Shout for help**

**Open airway**

**Check breathing**

**30 chest  
compressions**

**2 rescue breaths**



**Approach safely**

**Check response**

**Shout for help**

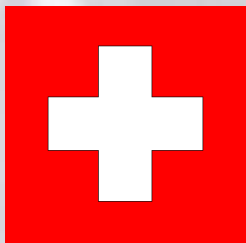
**Open airway**

**Check breathing**

**Attach AED**

**Follow voice prompts**

# **Automated External Defibrillation and Cardiopulmonary Resuscitation**





# American Heart Association

## Rationale for Early Defibrillation

- The most frequent initial rhythm in sudden cardiac arrest is ventricular fibrillation
- The most effective treatment for terminating ventricular fibrillation is electrical defibrillation
- The probability of successful defibrillation is directly related to the time from fibrillation to defibrillation
- Ventricular fibrillation will, without prompt or appropriate treatment, degenerate into asystole

- “Push hard and push fast”
  - 100 compressions per minute
  - 30:2 compression to breath ratio
- Pulse checks should NOT follow a defibrillation attempt. Always resume CPR after shocking a patient with an AED.
- If the downtime is less than four to five minutes, use the AED



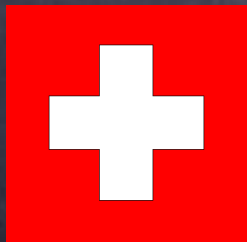


# AHA Rationale for Current AED and CPR Standards

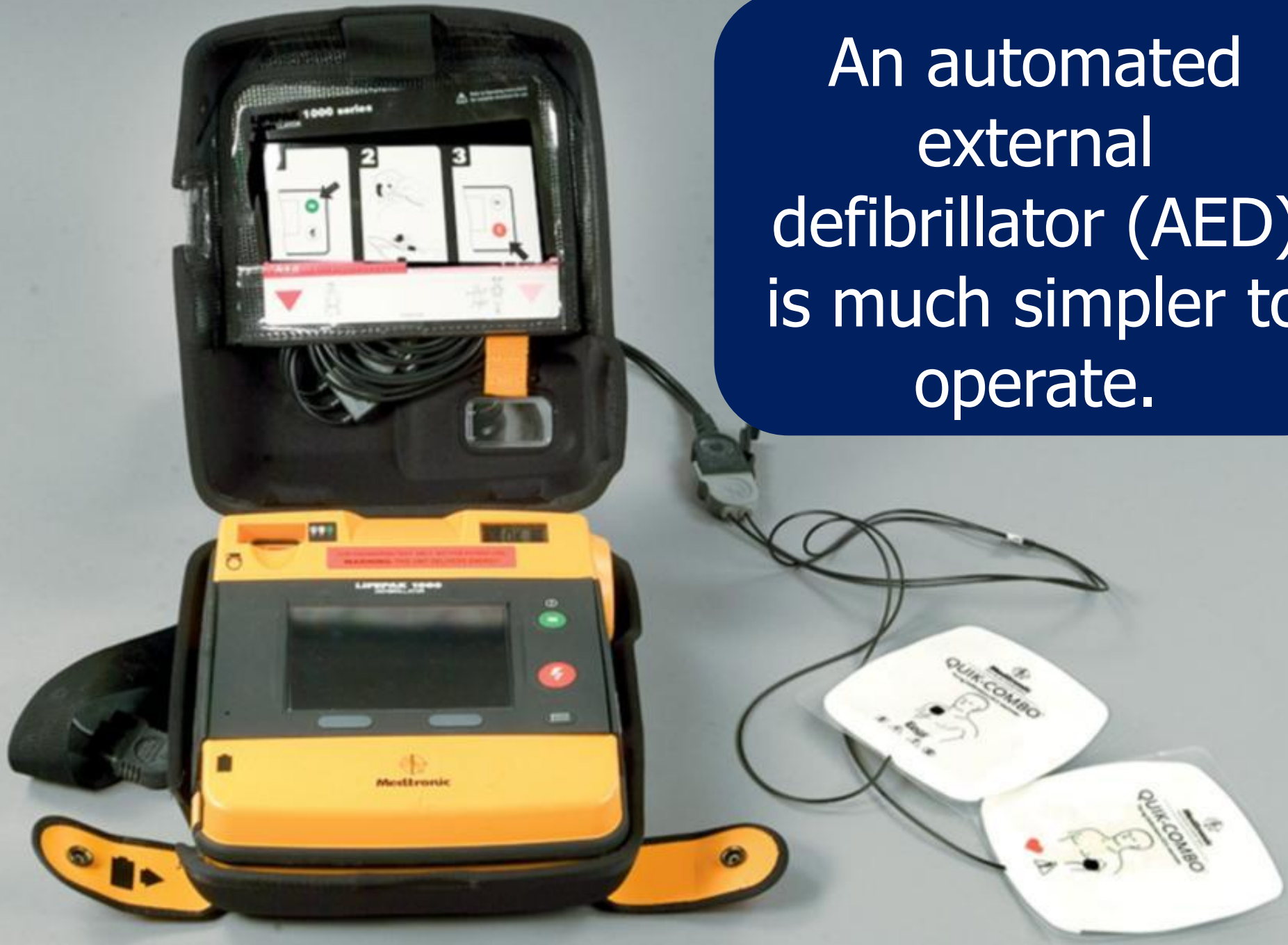
- “Push hard and push fast” will help avoid compressions that are delivered either too slow or too shallow
- The ratio of **30:2** minimizes interruptions to compressions for pulse checks and ventilations
- **Compressions prior to defibrillation** in unwitnessed arrests will make defibrillation more successful
- Rarely will a perfusing rhythm be evident by a pulse check immediately after defibrillation
- CPR as just described can double or triple the chance of survival



# Types of Defibrillators



An automated external defibrillator (AED) is much simpler to operate.



## Types of AEDs:

- Fully automated AED
- Semiautomated AED





# Biphasic versus Monophasic

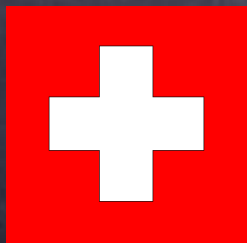
150 to 200 J

Biphasic: more  
effective with less  
energy

200, 300, 360 J

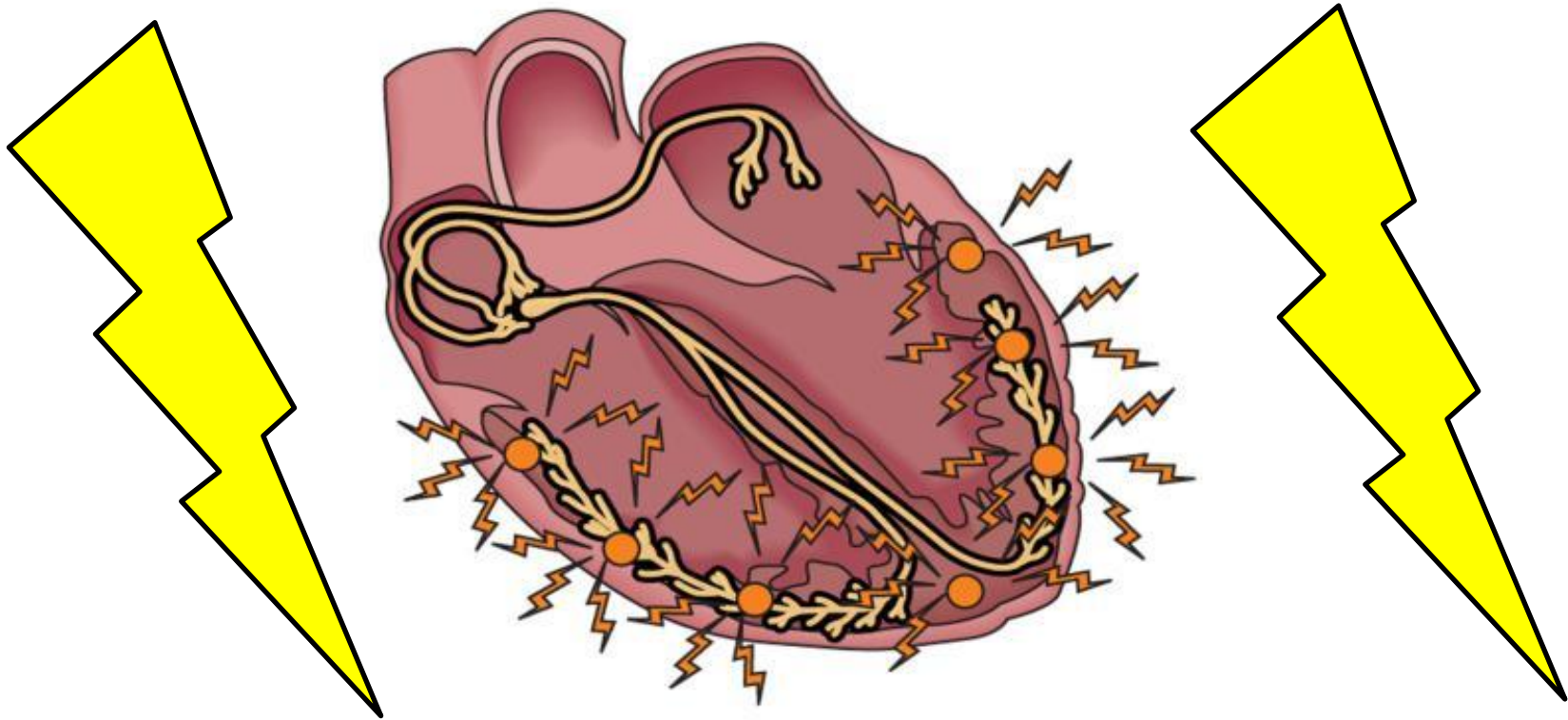
Monophasic: less  
effective with more  
energy

# Analysis of Cardiac Rhythms

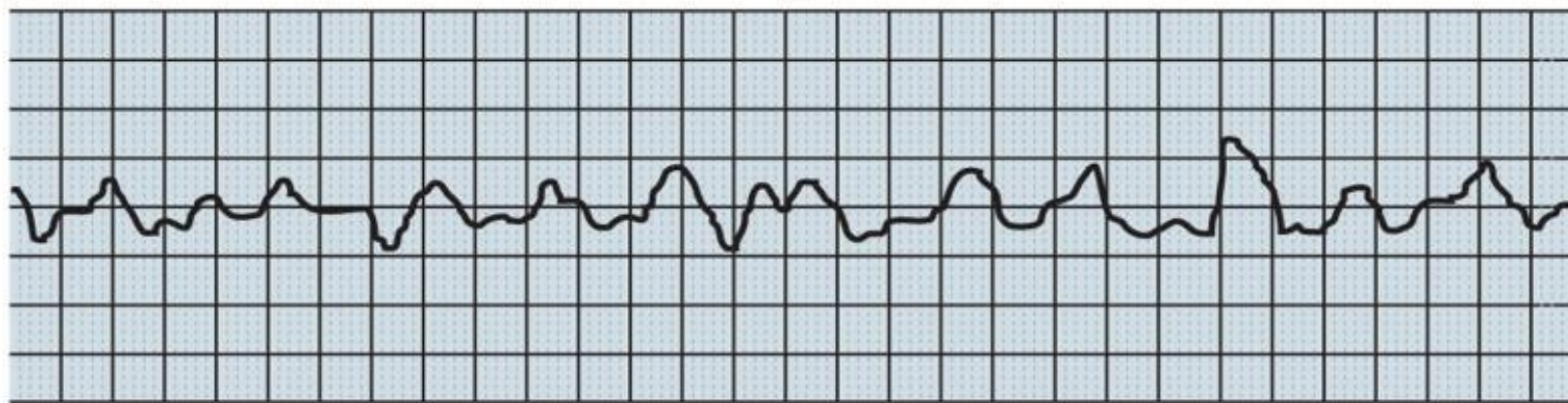


[Back to Objectives](#)

# Ventricular Fibrillation: Shockable!

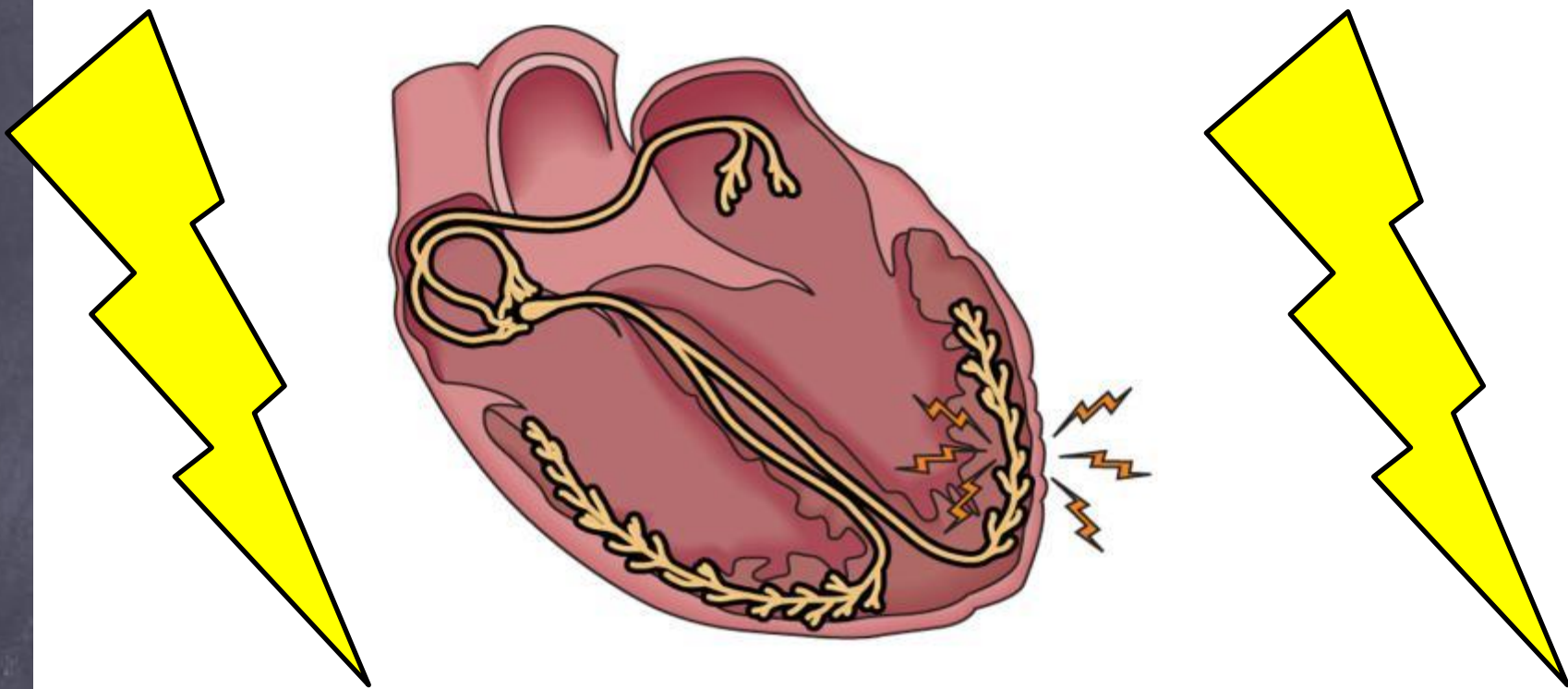


Chaotic electrical discharge as seen on an ECG tracing.

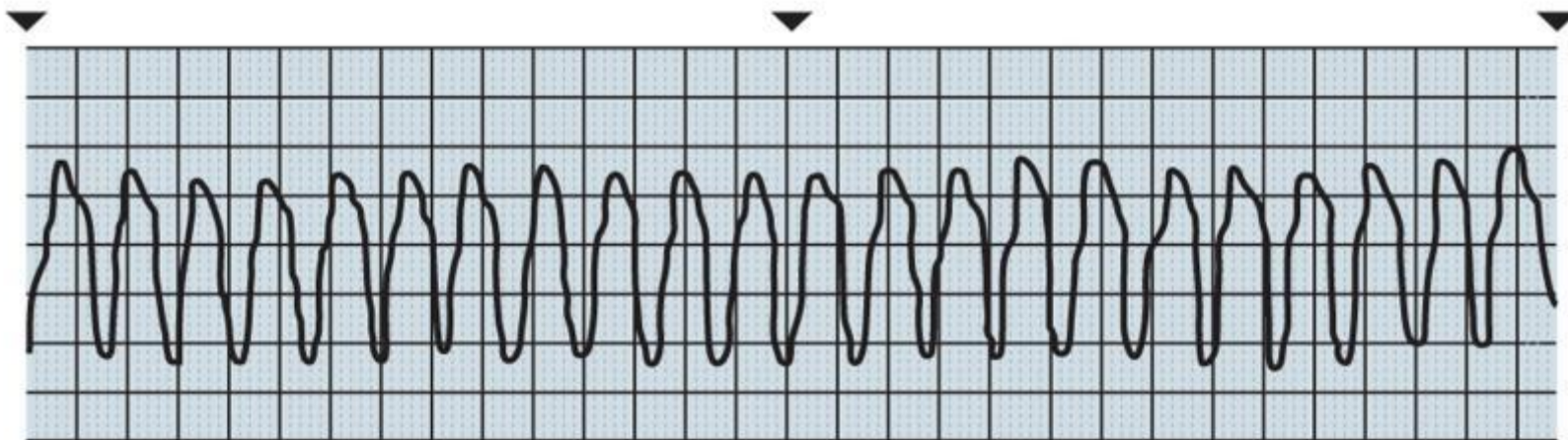




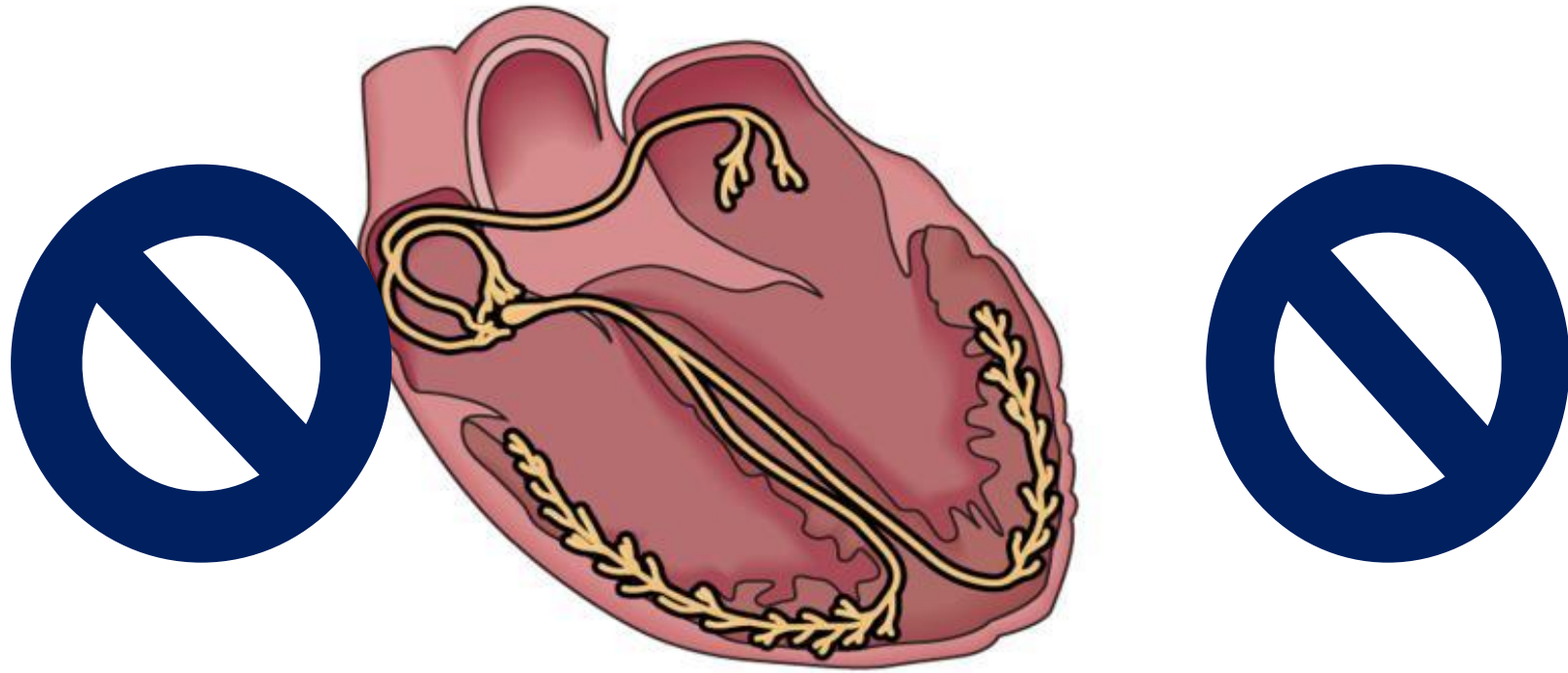
# Ventricular Tachycardia: Shockable!



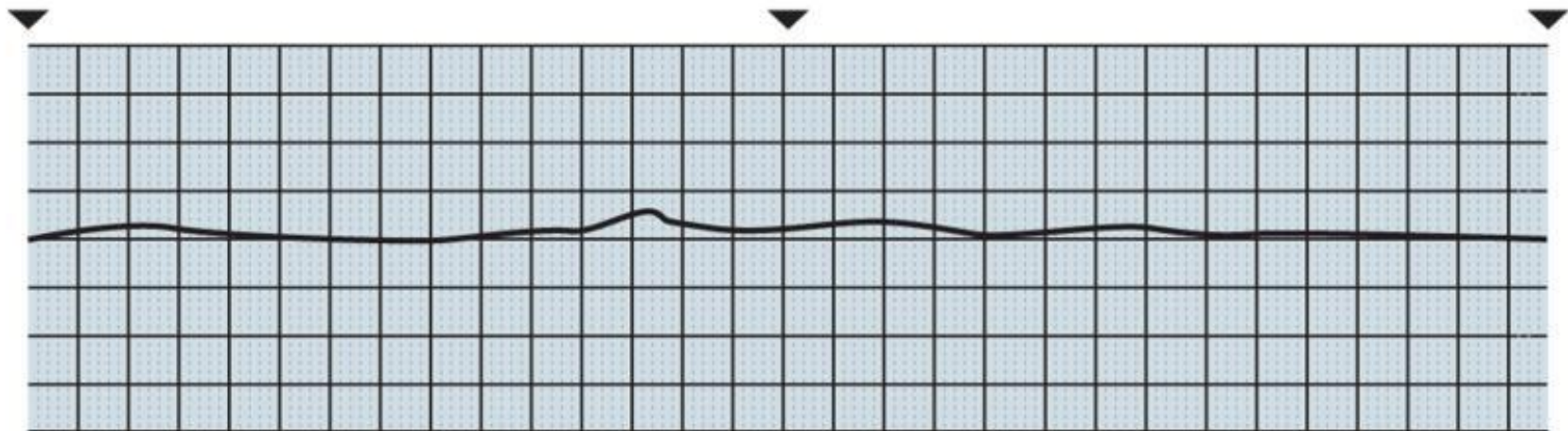
ECG tracing of ventricular tachycardia.



# Asystole: NOT Shockable!

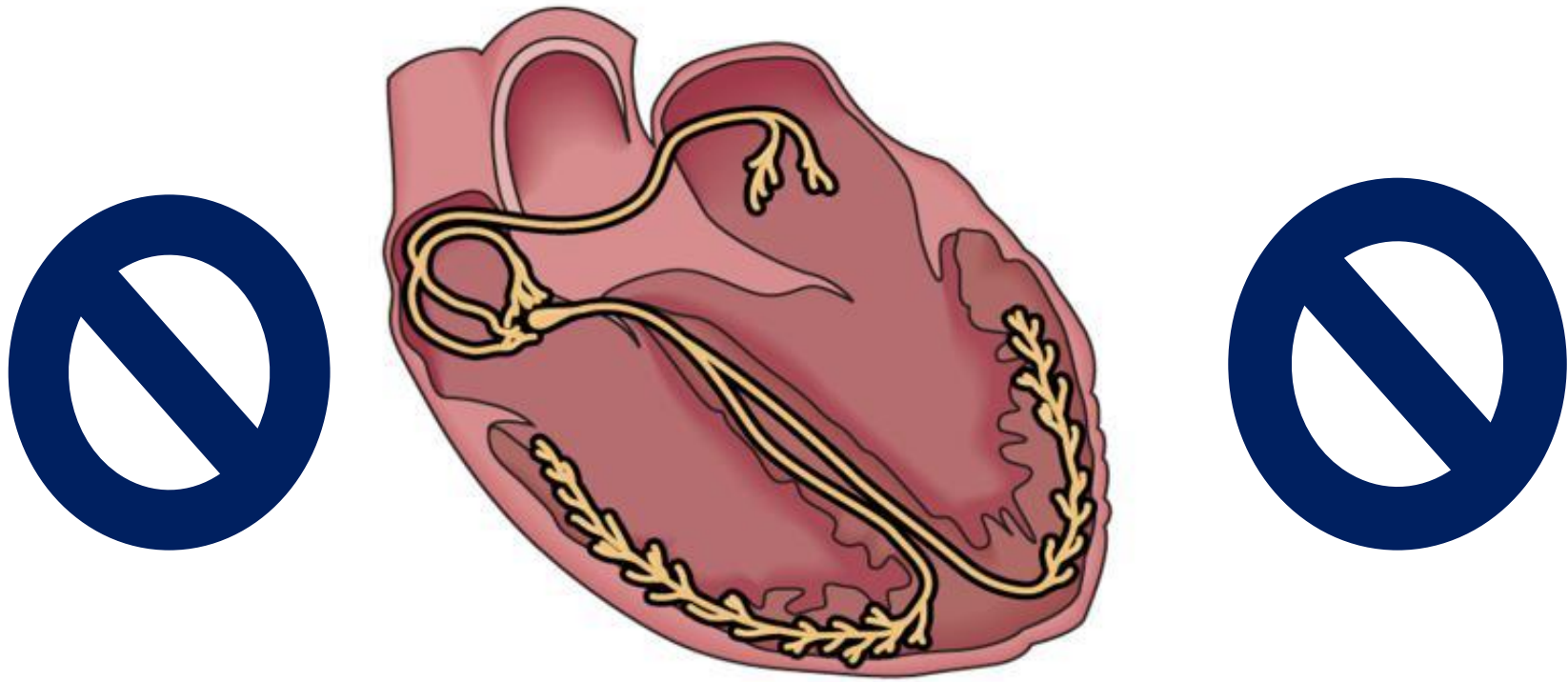


ECG tracing of asystole



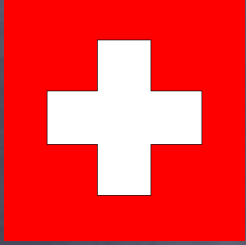


# Pulseless Electrical Activity: NOT Shockable!



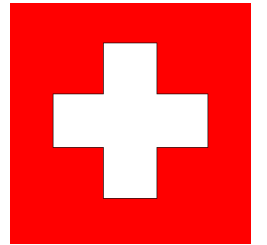
Organized electrical  
activity with no pulse





**NEVER** touch the  
patient, AED, or cables  
when the AED is  
analyzing a rhythm.

HAZARDS OF INTUBATING  
IN -10° WEATHER



**Thank you for being here!**