

# Introductory Course

## Fourth Year

Hanna K. Al-Makhamreh, M.D., FACC  
Interventional Cardiologist

- Introduction.
- Basic Life Support (BLS).
- Advanced Cardiac Life Support (ACLS).

- Cardiovascular diseases (CVDs) are the number one cause of death globally: more people die annually from CVDs than from any other cause.
- An estimated 17.3 million people died from CVDs in 2008, representing **30% of all global deaths.**

- Of these deaths, an estimated 7.3 million were due to coronary heart disease and 6.2 million were due to stroke.
- Low- and middle-income countries are disproportionately affected: over 80% of CVD deaths take place in low- and middle-income countries and occur almost equally in men and women.

- The number of people who die from CVDs, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030.
- ***CVDs are projected to remain the single leading cause of death.***

# Sudden Cardiac Death

- Sudden cardiac death (SCD) accounts for up to 50% of cardiovascular-related deaths in the United States and other developed countries.
- By definition, *SCD refers to* the acute and natural death from cardiac causes within a short period (often within an hour of onset of symptoms).

- The time and mode of death are unexpected, and often death occurs in patients without any prior potentially fatal conditions.
- Most cases of SCD are associated with underlying cardiac arrhythmias; however, other causes have been identified.

- Recordings during episodes of SCD have shown an underlying rhythm of ventricular tachycardia (VT), ventricular fibrillation (VF), or VT degenerating into VF in 85% of cases.
- In other studies, bradyarrhythmia was the underlying rhythm in 15% of patients who died suddenly.

- The incidence of SCD is higher among men than women. The incidence also increases with age.
- In older patients, SCD occurs most often with reduced left ventricular function and symptomatic heart failure.
- Only 5% to 15% of cardiac arrest patients are successfully resuscitated and discharged from the hospital without any associated neurologic deficits.

- Survival from SCD often depends on immediate cardiopulmonary resuscitation and the availability and use of automated external defibrillators (AEDs).
- The American Heart Association recommends the placement of AEDs in public locations.



HEARTSTART  
RESUSCITATOR



PHILIPS

PULL

PULL

PHILIPS

Used for signs of sudden cardiac arrest  
Use with HeartStart Resuscitator

1. PULL

2. PLACE

3. PRESS

PHILIPS HEARTSTART



## Major causes of sudden cardiac death

### Ischemic heart disease

Coronary artery disease with myocardial infarction or angina

Coronary artery embolism

Nonatherogenic coronary artery disease (arteritis, dissection, congenital coronary artery anomalies)

Coronary artery spasm

### Nonischemic heart disease

Hypertrophic cardiomyopathy

Dilated cardiomyopathy

Valvular heart disease

Congenital heart disease

Arrhythmogenic right ventricular dysplasia

Myocarditis

Acute pericardial tamponade

Acute myocardial rupture

Aortic dissection

### No structural heart disease

Primary electrical disease (idiopathic ventricular fibrillation)

Brugada syndrome (right bundle branch block and ST segment elevation in leads V1 to V3)

Long QT syndrome

Preexcitation syndrome

Complete heart block

Familial sudden cardiac death

Chest wall trauma (commotio cordis)

### Noncardiac disease

Pulmonary embolism

Intracranial hemorrhage

Drowning

Pickwickian syndrome

Drug-induced

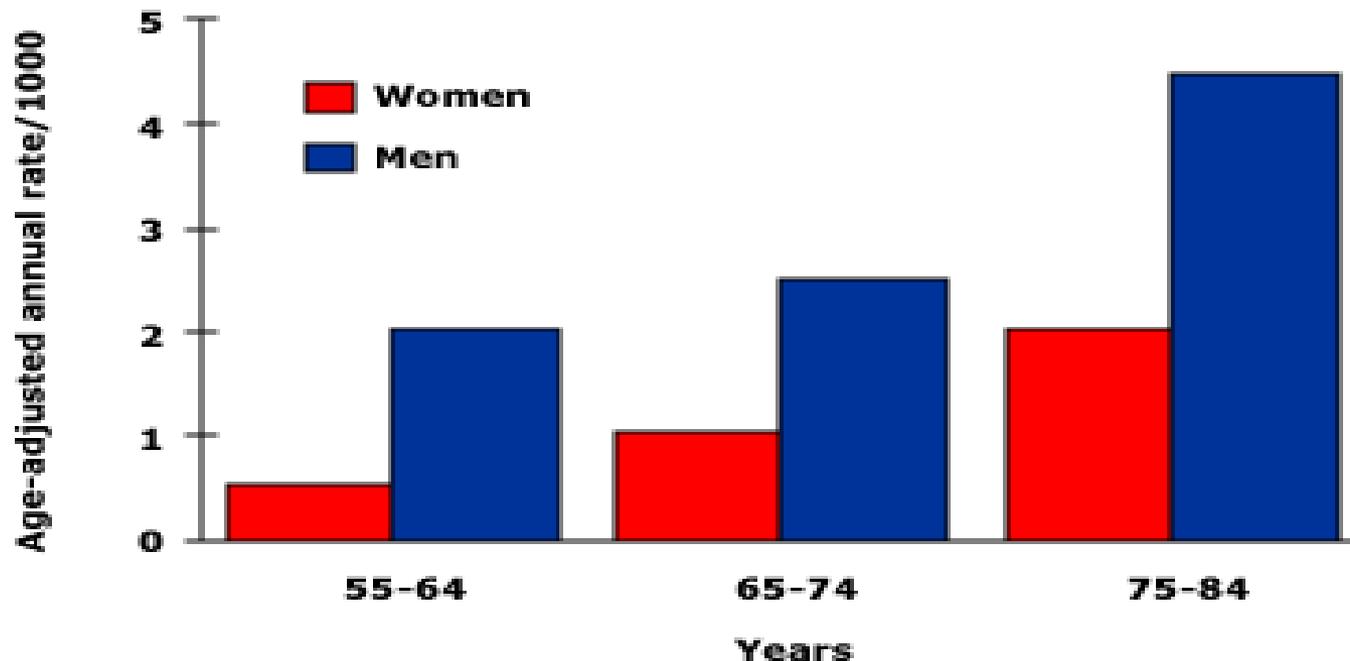
Central airway obstruction

Sudden infant death syndrome

- *Atherosclerotic coronary artery disease is the leading cause of SCD.*
- Studies have shown that 40% to 86% of patients who survived SCD, depending on the age and sex of the population, had coronary vessels with more than 75% cross-sectional stenosis.

## Incidence of sudden death in men and women increases with age

---



During a 38 years follow-up of subjects in the Framingham Heart Study, the annual incidence of sudden death increased with age in both men and women. However, at each age, the incidence of sudden death is higher in men than women.

*Data from Kannel, WB, Wilson, PWF, D'Agostino, RB, et al, Am Heart J 1998; 136:205.*

# Basic Life Support

- Cardiopulmonary resuscitation (CPR) as we recognize it today was developed in the late 1950s .
- Elam and Safar described the technique and benefits of mouth-to-mouth ventilation in 1958.
- Kouwenhoven, Knickerbocker, and Jude subsequently described the benefits of external chest compressions, which in combination with mouth-to-mouth ventilation form the basis of modern CPR.

- External defibrillation, first described by Kouwenhoven, has since been incorporated into resuscitation guidelines.
- Basic life support consists of cardiopulmonary resuscitation and, when available, defibrillation using automated external defibrillators (AED).
- The keys to survival from sudden cardiac arrest (SCA) are early recognition and treatment, specifically, immediate initiation of excellent CPR and early defibrillation.

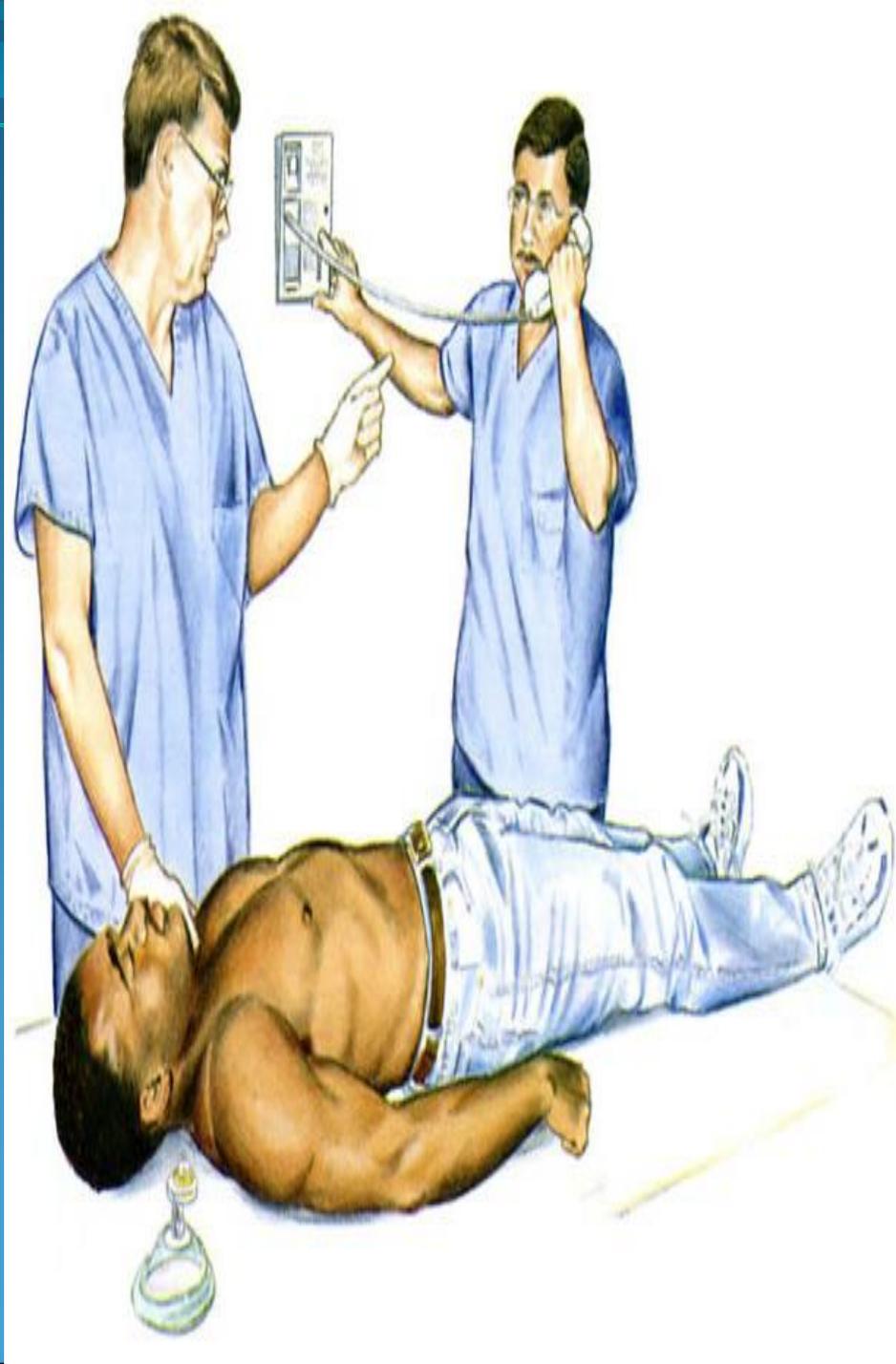
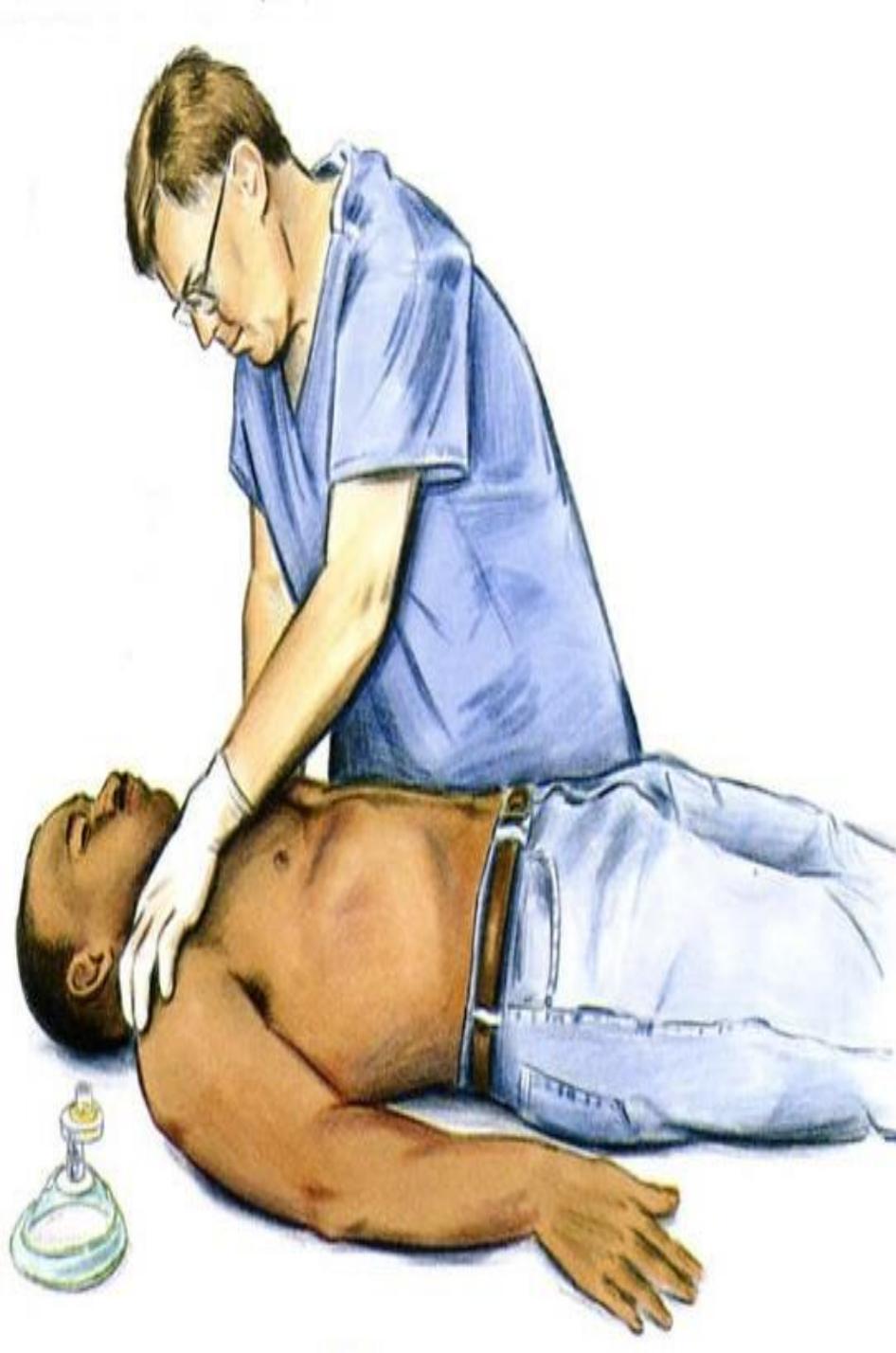
**1**

**No movement or response**

**2**

**PHONE 911 or emergency number**  
**Get AED**

or send second rescuer (if available) to do this



- In the 2006 AHA guidelines **A-B-C.**
- In the 2010 AHA guidelines **C-A-B.**

- Chest compressions:
- Chest compressions are the most important element of CPR.
- Coronary perfusion pressure and return of spontaneous circulation (ROSC) are maximized when excellent chest compressions are performed.
- The mantra of the AHA 2010 BLS Guidelines is: "*push hard and push fast on the center of the chest*".

# 2015 Updates

- The following goals are essential for performing excellent chest compressions:
- Maintain a rate of at least **100-120** compressions per minute.
- Compress the chest at least 5 cm-6cm (2-2.4 inches) for adults and (1.5-2) inches or 4cm for children with each down-stroke.
- Use cell phone to call 911 while on the speaker.
- No interruptions Except for AED or switch rescuer.

- Allow the chest to recoil completely after each down-stroke (eg, it should be easy to pull a piece of paper from between the rescuer's hand and the patient's chest just before the next down-stroke).
- Minimize the frequency and duration of any interruptions.

# Chest Compressions

**Importance** (vital organ perfusion)

**Before:**

*At the victim's side.*



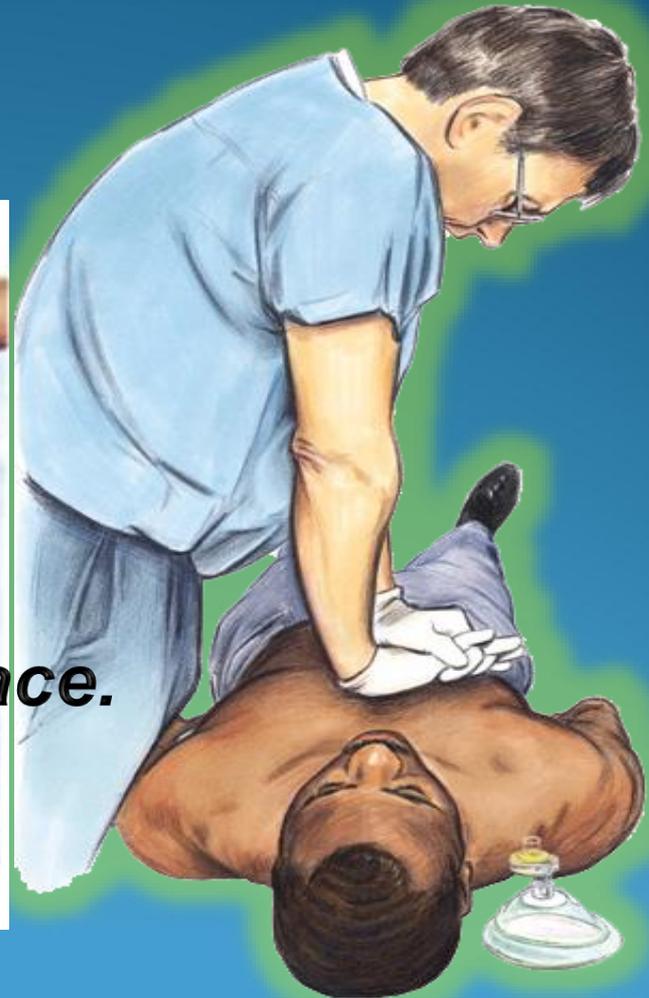
**Supine + Firm, Flat Surface.**

**Exposure**

**Landmark**

**Arms** (straightened)

**Shoulders** (directly over hands)



# Chest Compressions

## During:

*Push Hard, Deep & Fast*  
*Rate (100 times/min)*

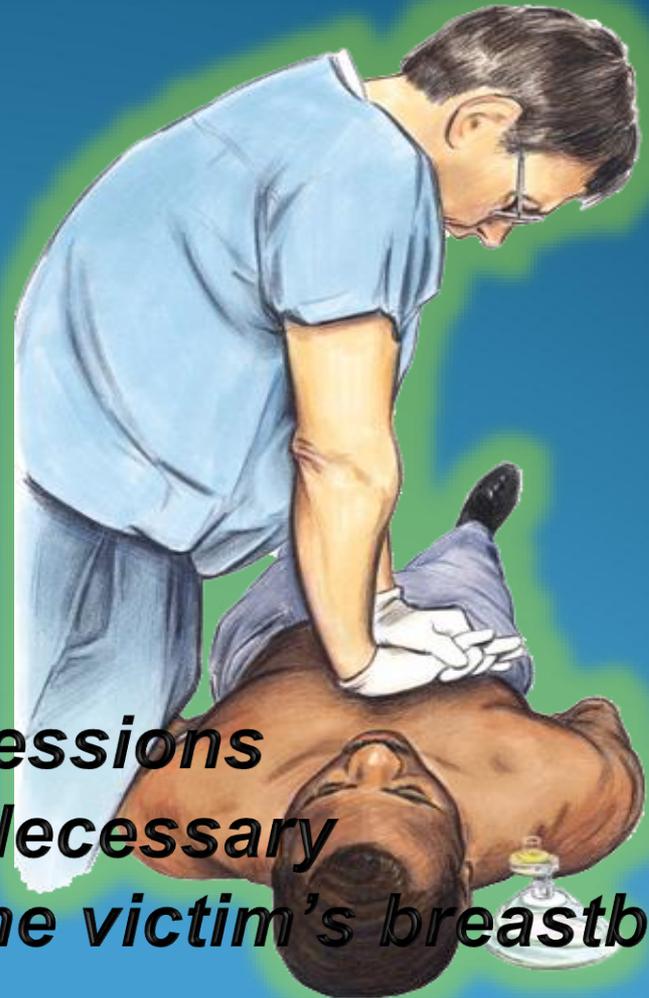
*Depth (2 inch)*

*Chest Recoil*

*Do NOT Interrupt Compressions*

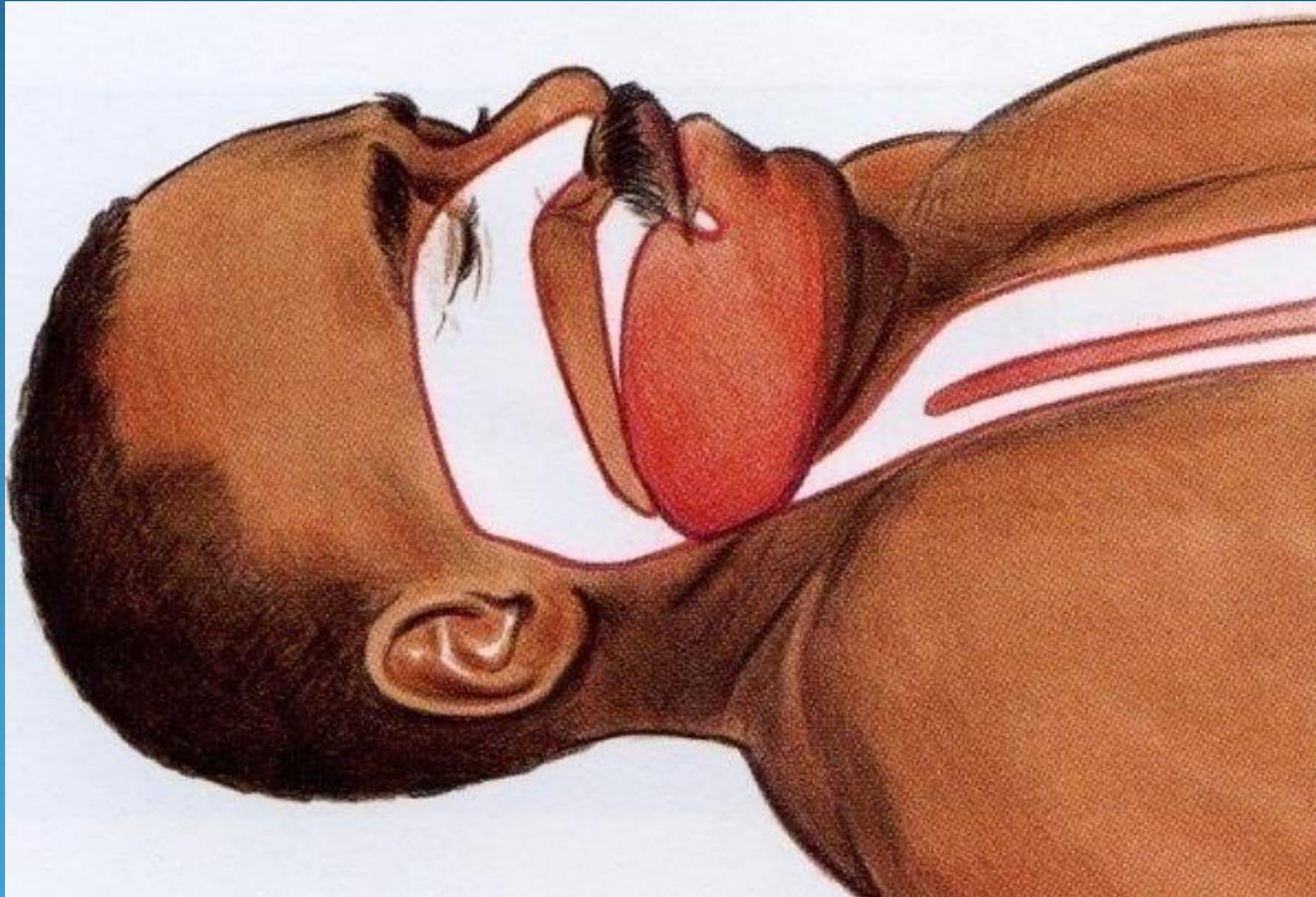
*Move Victim only when Necessary*

*Push straight down on the victim's breastbone*



# Airway Obstruction

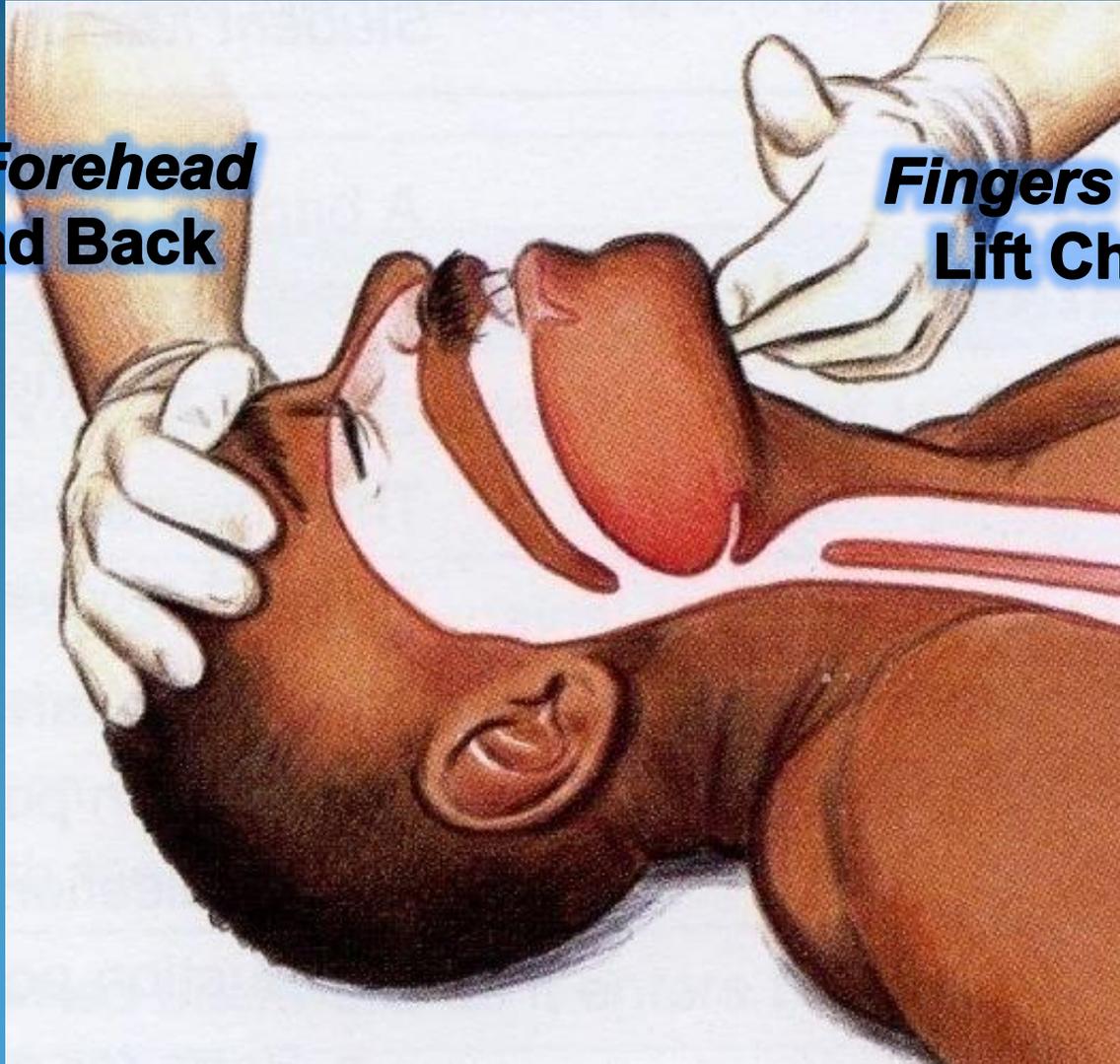
*Tongue is the Main Cause of Airway Block In the Unresponsive Pt.*



# Head-Tilt-Chin Lift & Spontaneous Breathing

***Palm + Forehead***  
**Tilt Head Back**

***Fingers + Lower Jaw***  
**Lift Chin Forward**



- Breathing:
- A bag valve mask (also known as a BVM or Ambu bag) is a hand-held device used to provide positive pressure ventilation to a patient who is not breathing or who is breathing inadequately.



# Bag-Mask E-C Technique

Above the Head

Mask on Face

E-C clamp technique

*Nasal bridge= guide for correct position*

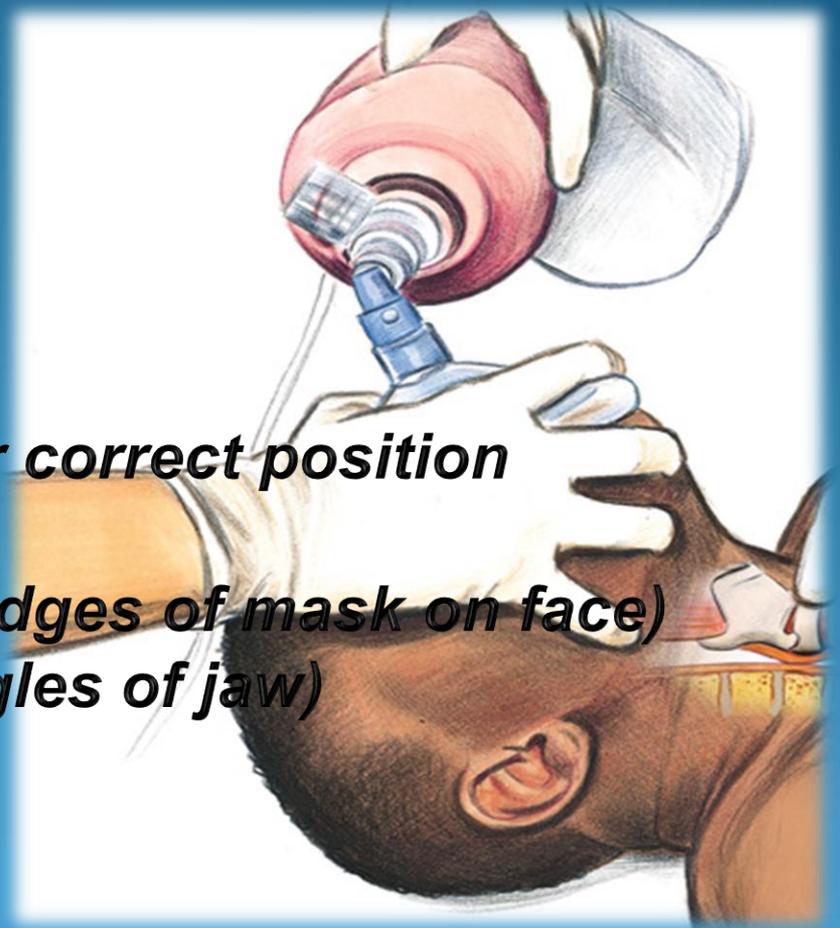
*Tilt head*

*Make a "C" (pressing edges of mask on face)*

*Form an "E" (lifting angles of jaw)*

*Open airway*

Squeeze the bag



- The vast majority of tracheal intubations involve the use of a viewing instrument of one type or another.
- Since its introduction by Kirstein in 1895, the conventional laryngoscope has been the most popular device used for this purpose.
- Today, the conventional laryngoscope consists of a handle containing batteries with a light source, and a set of interchangeable blades.



**Endotracheal tube** goes through patient's mouth and into the windpipe

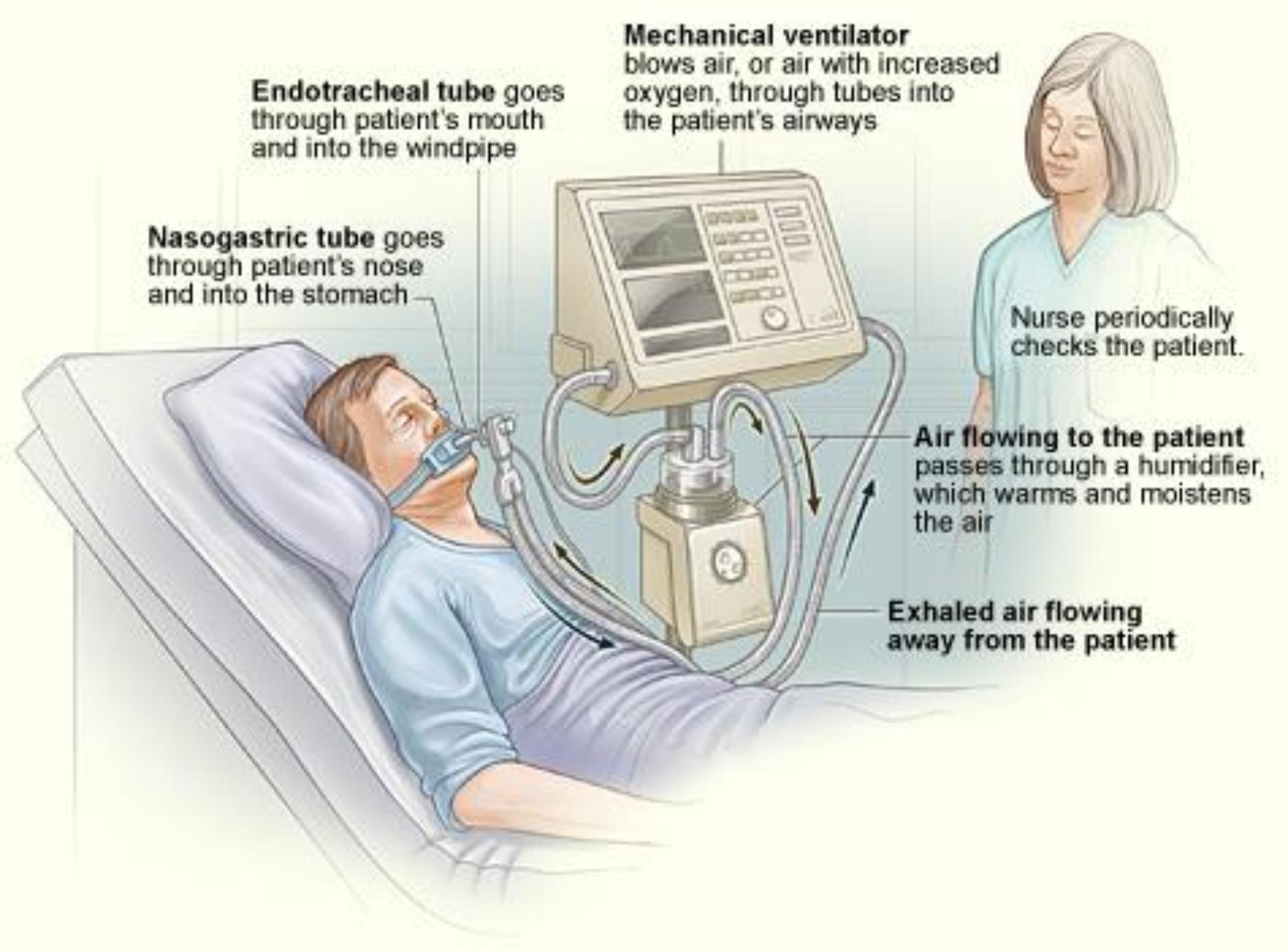
**Mechanical ventilator** blows air, or air with increased oxygen, through tubes into the patient's airways

**Nasogastric tube** goes through patient's nose and into the stomach

Nurse periodically checks the patient.

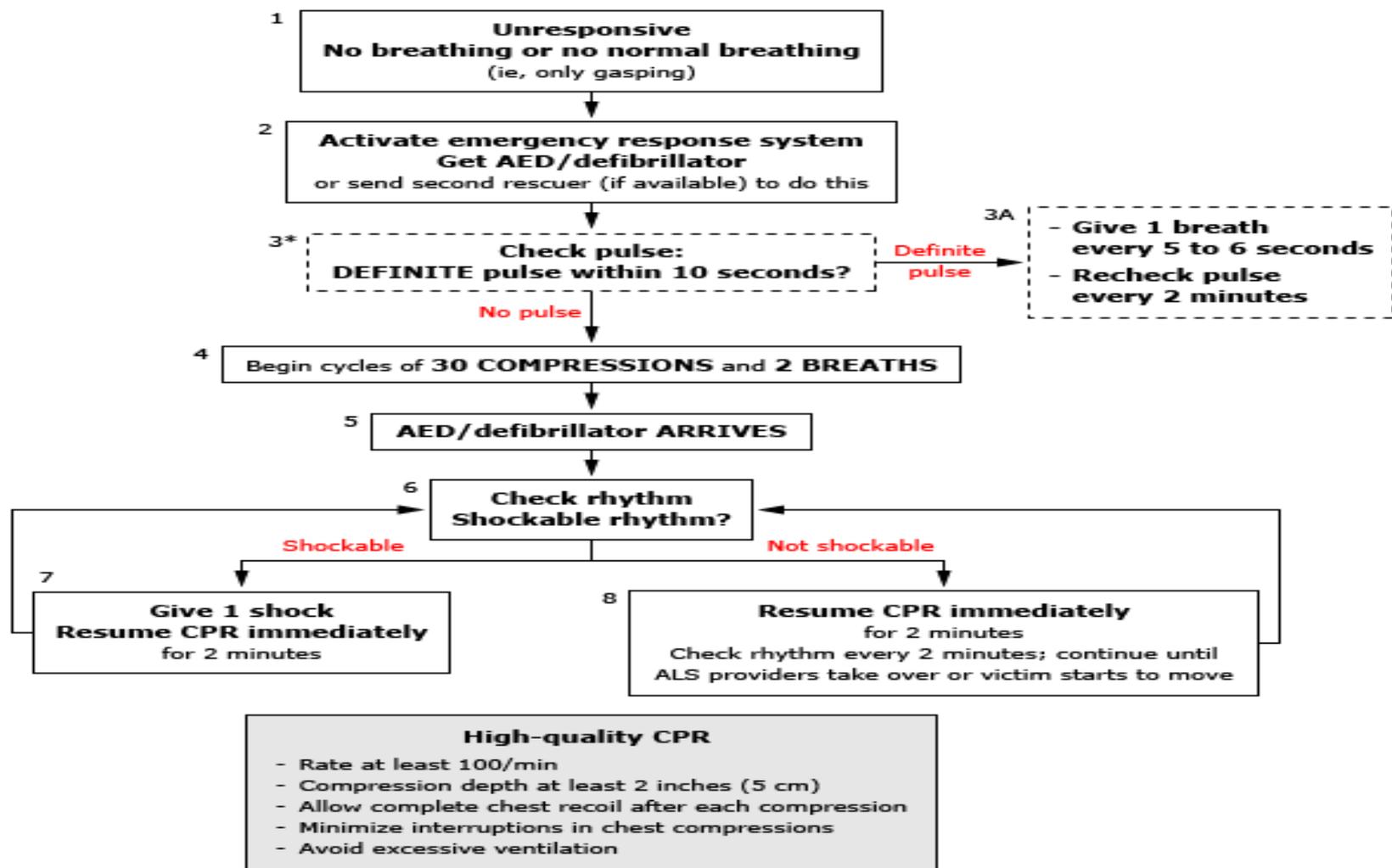
**Air flowing to the patient** passes through a humidifier, which warms and moistens the air

**Exhaled air** flowing away from the patient



- Proper ventilation for adults includes the following:
- Give 2 ventilations after every 30 compressions for patients without an advanced airway.
- Give each ventilation over no more than one second.
- Provide enough tidal volume to see the chest rise.
- Avoid excessive ventilation.
- Give 1 asynchronous ventilation every 8 to 10 seconds (8 to 10 per minute) to patients with an advanced airway (eg, supraglottic device, endotracheal tube) in place.

## Adult BLS algorithm for healthcare providers: 2010 guidelines

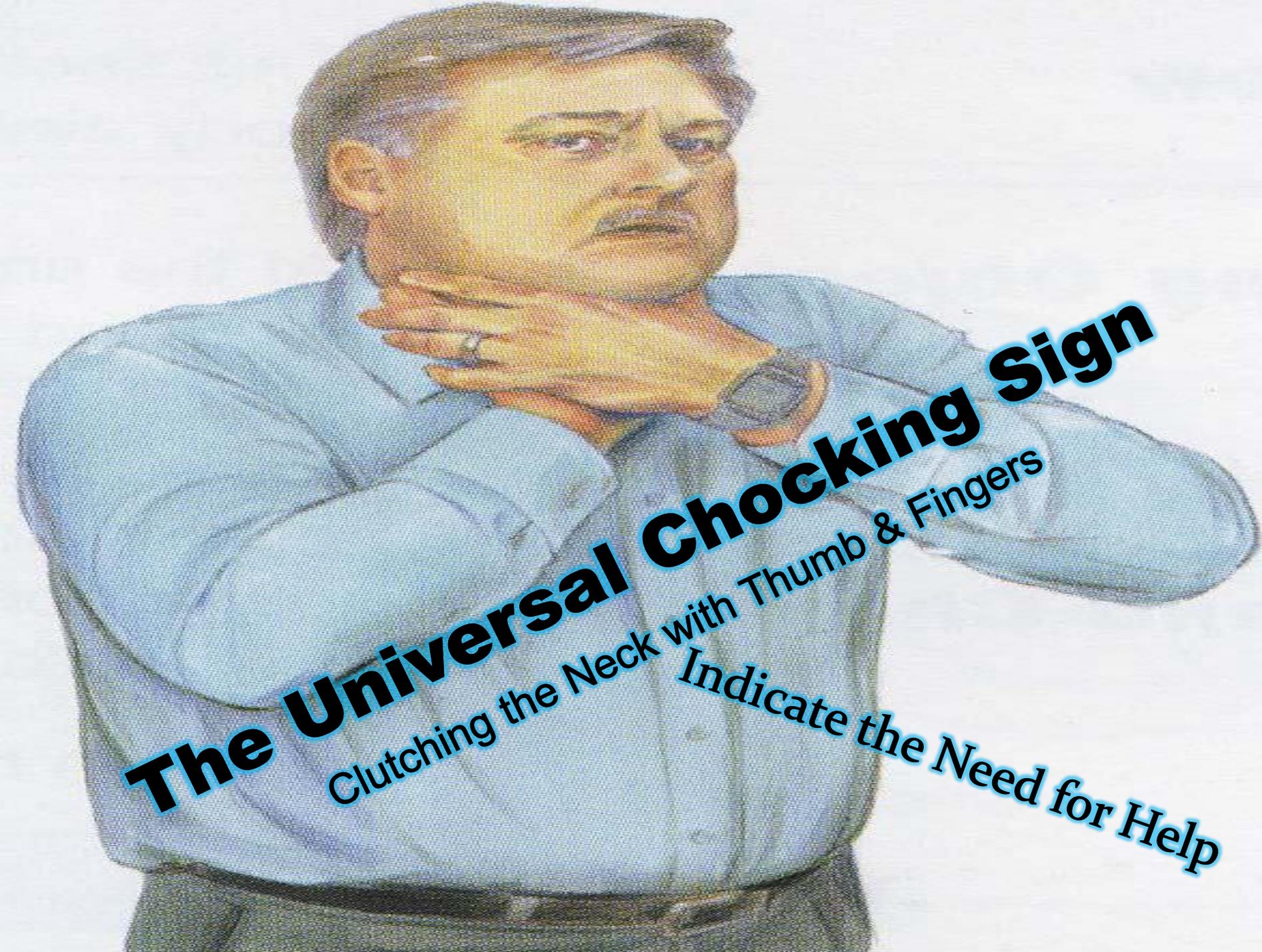


AED: automated external defibrillator; ALS: advanced life support; BLS: basic life support.

\* The boxes bordered with dashed lines are performed by healthcare providers and not by lay rescuers.

Reprinted with permission. *Adult Basic Life Support: 2010. American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.* © 2010 American Heart Association, Inc.

- Sequence:
- Before beginning basic life support (BLS), rescuers must ensure that the scene is safe for them and the victim (such as by removing the victim from a burning building).
- The next steps in BLS are activating emergency medical services (EMS), getting an automated external defibrillator (AED), and starting CPR.



# **The Universal Choking Sign**

Clutching the Neck with Thumb & Fingers

Indicate the Need for Help

# Relieving Chocking in Responsive Adults & Children

*Abdominal Thrusts (Heimlich Maneuver)*

*With Victim Standing or Sitting*

## Steps:

***Behind + Stand/ Kneel***

*+ Wrap arms around waist*

***Fist + Thumb against abdomen***

*(between navel & breastbone)*

***Gasp fist + Quick upward thrust***

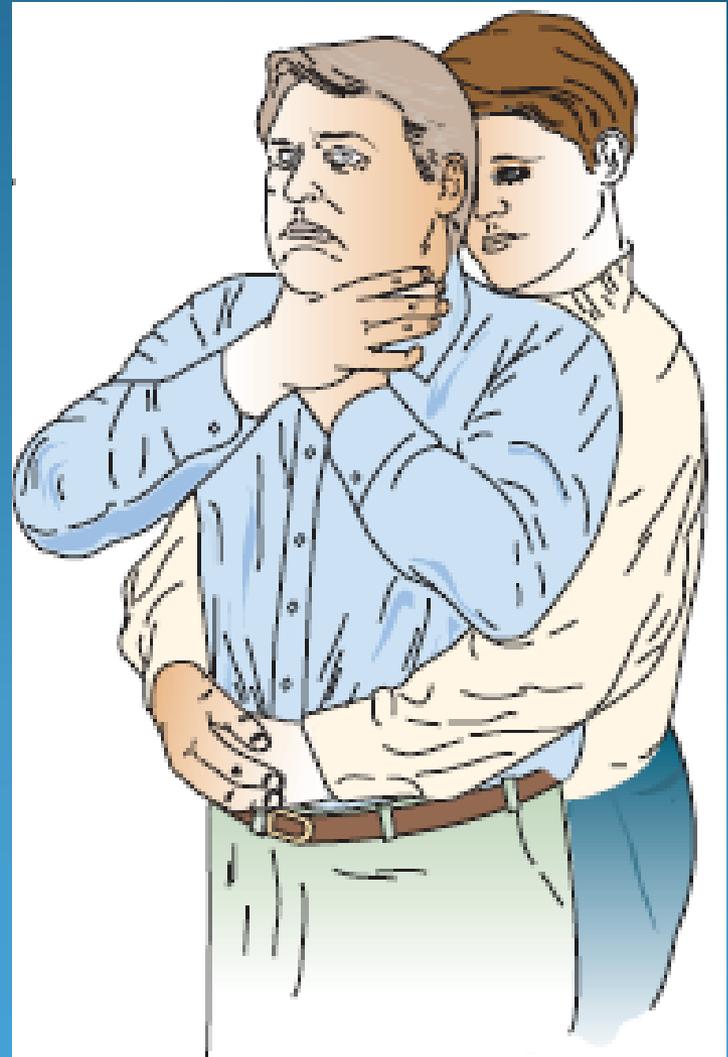
***Repeat until object expelled***

*OR victim unresponsive*

***Examine for Complications***

*(damage to internal organs)*

***NOT for Infants***



# Relieving Chocking in UnResponsive Adults & Children

*Abdominal Thrusts (Heimlich Maneuver)  
With Victim Lying Down*



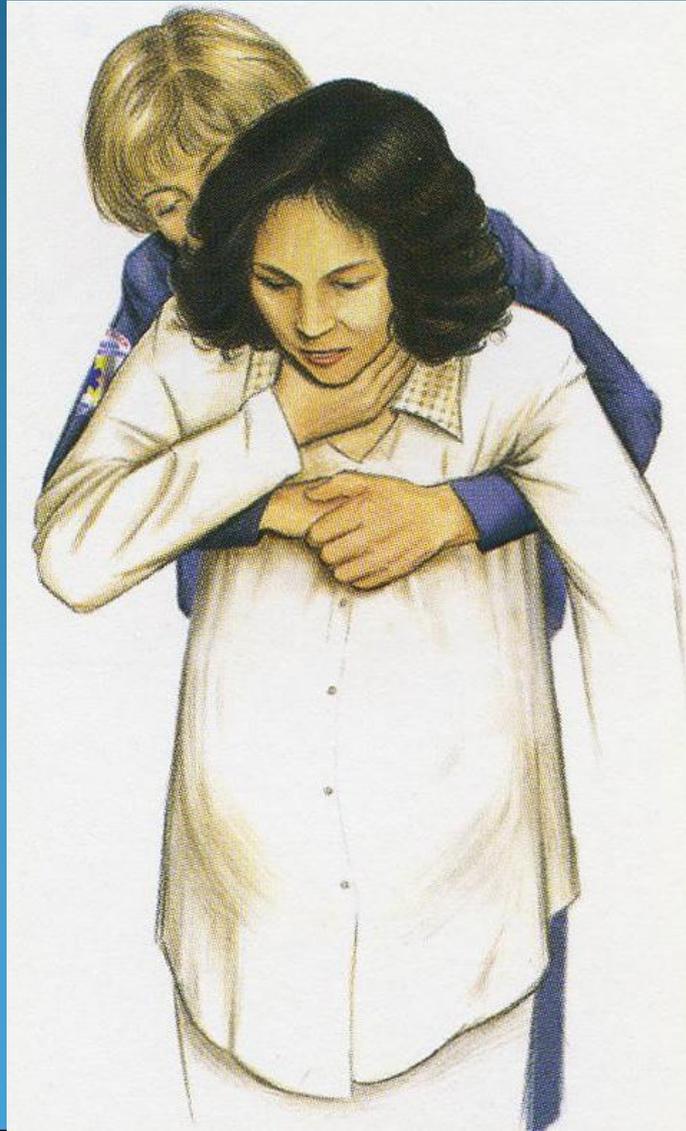
**Examine for Complications**

*(damage to internal organs)*

**NOT for Infants**

# Relieving Chocking in Responsive Pregnant & Obese Victims

## *Chest Thrusts*



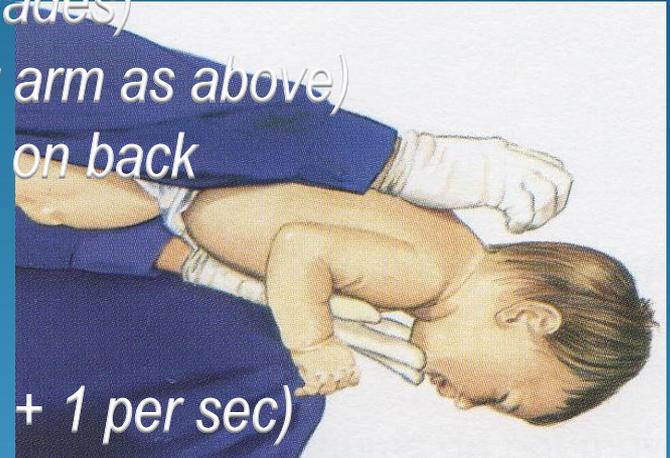
# Relieving Choking in Responsive Infants

## Up to 5 Back Slaps

*(heel + middle back between shoulder blades)*

*Free hand on back + Palm on head (first arm as above)*

*Turn infant as a unit with Support + Hold on back*



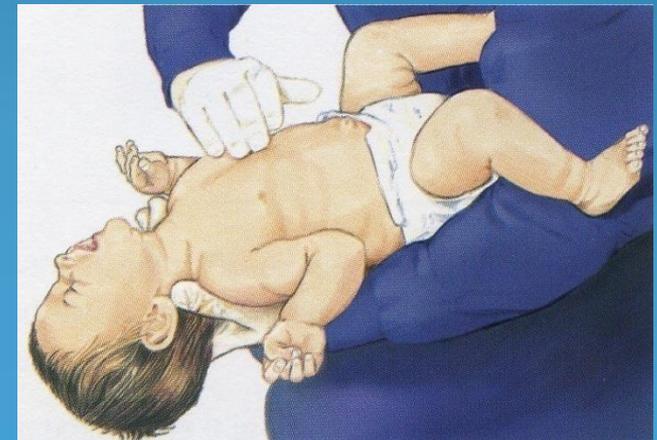
## Up to 5 Chest Thrusts

*(quick downward + just below nipple line + 1 per sec)*

## Repeat Cycle

*until obstruction removed*

*OR unresponsive*



- Adult cardiac arrest management.
- Adult tachycardia management.
- Adult bradycardia management.

*Good Luck*