UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE
"NICOLAE TESTEMIȚANU" DIN REPUBLICA MOLDOVA

NATIONAL EMERGENCY MEDICAL ASSISTANCE SERVICE
in the REPUBLIC of MOLDOVA

LECTURE nr. 5

Basic life support and cardio-respiratory and cerebral resuscitation (ABCDE) in adults. External automatic defibrillation in adults. General concepts, use of AEDs and special circumstances.

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2023

LECTURE nr. 5

BASIC CARDIO-RESPIRATORY RESUSCITATION IN ADULTS

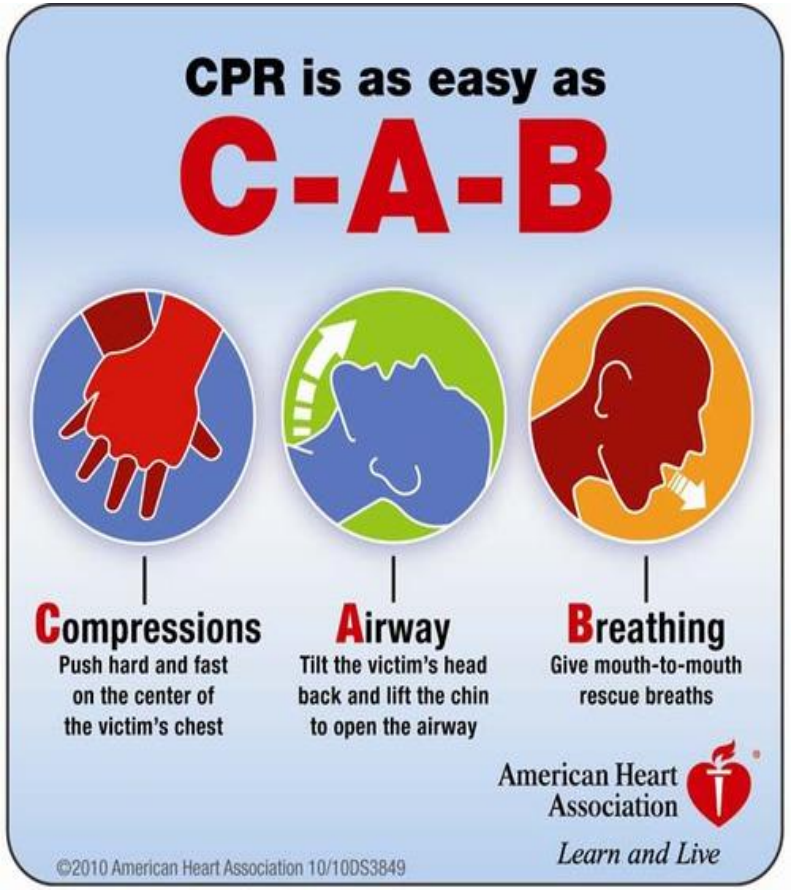
I. GENERAL CONCEPTS

American Heart Association®

Life is Why

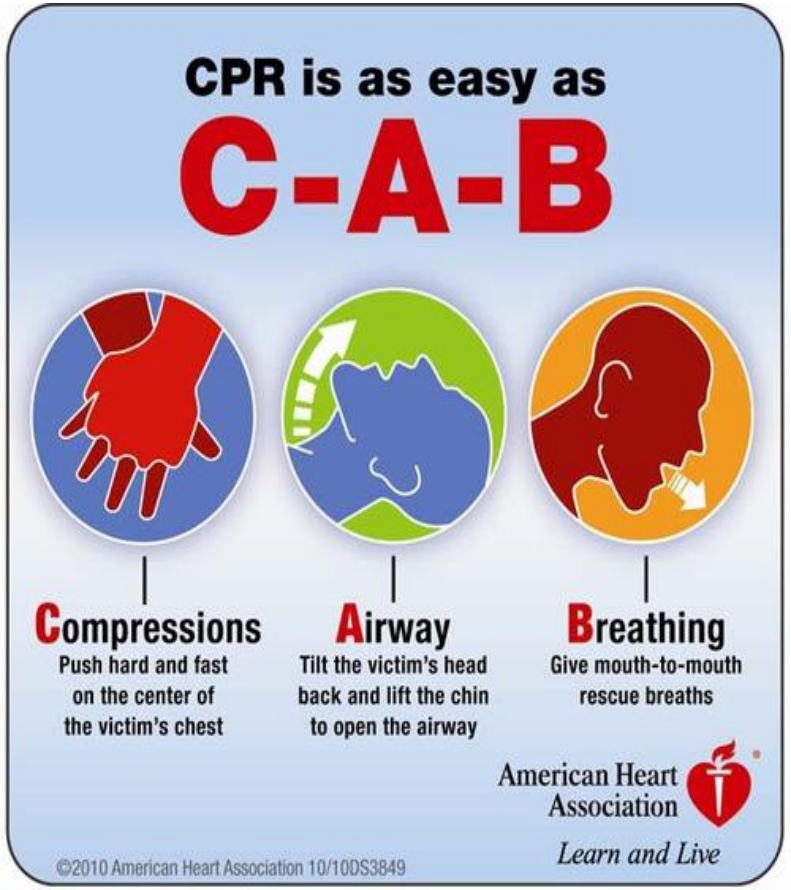
Life is Why? A simple yet powerful answer to the question of why we should all be healthy in heart and mind. It also explains why we do what we do: Lifesaving work. Every day. Here you will find information that correlates what you are learning in this

Definitions and Terminology



- **Basic Life Support (BLS). - BLS is the phase of CPR that includes recognition of cardiac arrest, access to the EMS system.**
- **Cardiopulmonary resuscitation (CPR). - In its broadest sense CPR refers to attempting any of the maneuvers and techniques used to restore spontaneous circulation.**
- **Basic CPR. - Basic CPR is the attempt to restore spontaneous circulation using the techniques of chest wall compressions and pulmonary ventilation**

Definitions and Terminology

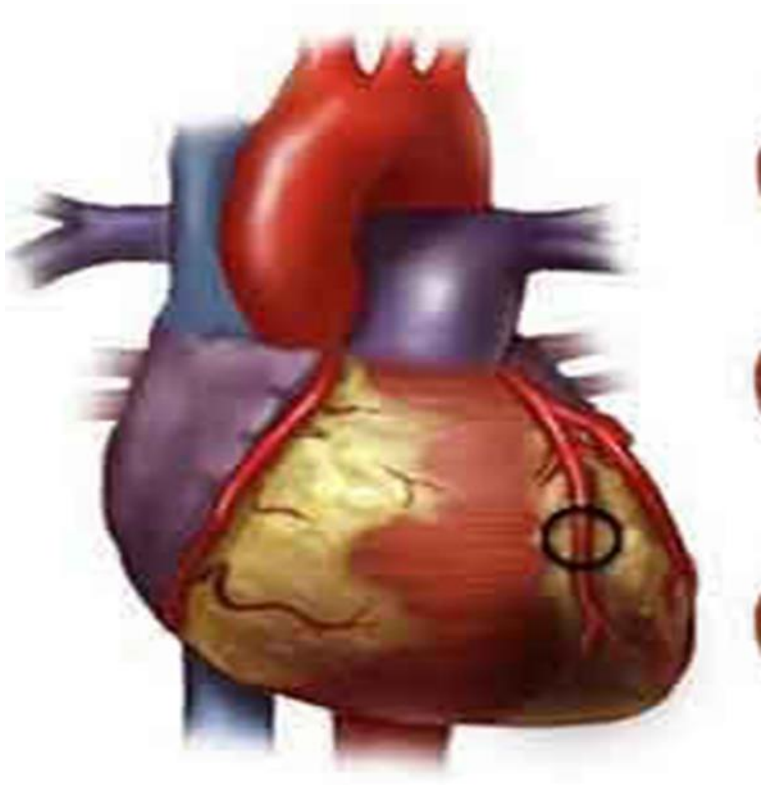


Adult BLS consists:

Step A: airway control
Step B: breathing support, emergency artificial ventilation and oxygenation of the lung
Step C: circulation support, recognition of pulselessness and establishment of artificial circulation by cardiac compressions, control of hemorrhage and positioning for shock

Step D – Defibrillation – shoc VF/ PulselessVT

Sudden Cardiac Death (Cardiac arrest)



Despite important advances in prevention, sudden cardiac arrest remains a leading cause of death.

Seventy percent of out-of- hospital cardiac arrests occur at the home.

The annual incidence of OHCA in Europe is between 67 to 170 per 100 000 inhabitants.

The use of AEDs remains infrequent in Europe. The average rate of applying an AED for OHCA in Europe is 28 (range 3.8% to 59%). with a shock being delivered in 16.5%.

Data from the The Guidelines 2020 survival to hospital discharge was 25%.

In 2012 the European Parliament published a written declaration (0011/2012) recommending that all 184 member states adopt common programs for the training of lay people and implementation of AEDs in 185 public places, adjusting of legislation in order to facilitate CPR and defibrillation by non-medical persons.

OUT- OF-HOSPITAL CARDIOPULMONARY ARRESTS AETIOLOGY

Aetiology	N(%) (n=21 175)
Presumed cardiac disease	17 451 (82.4%)
Non-cardiac internal aetiologies	1814 (8.6%)
Lung disease	901 (4.3%)
Cerebrovascular disease	407 (2.2%)
Gastrointestinal haemorrage	71 (0.3%)
Obstetric/pediatric	50 (0.2%)
Pulmonary embolism	38 (0.2%)
Epilepsy	36 (0.2%)
Diabetes mellitus	30 (0.1%)
Renal disease	23 (0.1%)
Non-cardiac external aetiologies	1910 (9.0%)
Trauma	657 (3.1%)
Asfixia,drug overdose,drowning,electric shock/lightning,other suicide, other external	1253 (5.8%)

Based on data from Scotland and from five cities in other parts of Europe the annual incidence of resuscitation for out of hospital cardiopulmonary arrest of cardiac aetiology is 49.5-66 per 100 000 population.

Data from Pell JP et al.Heart 2003<89>839-42

PHASES OF CARDIOPULMONARY AND CEREBRAL RESUSCITATION

BLS

↓

ACLS

↓

PLS

- **BLS- attempts to give a person in cardiopulmonary arrest an open airway, adequate ventilation, and through chest compression-mechanical circulation to the vital organs.**
- **ACLS – attempts to restore spontaneous circulation, airwayn, including management and endotracheal intubation, electrical therapy, intravenous and invasive therapeutic and monitoring techniques.**

PCLS - multidisciplinary post-cardiac arrest care to prevent the return of cardiac arrest and tailor specific therapies to improve long-term survival.

1

Basic Life Support (BLS)

ABCD

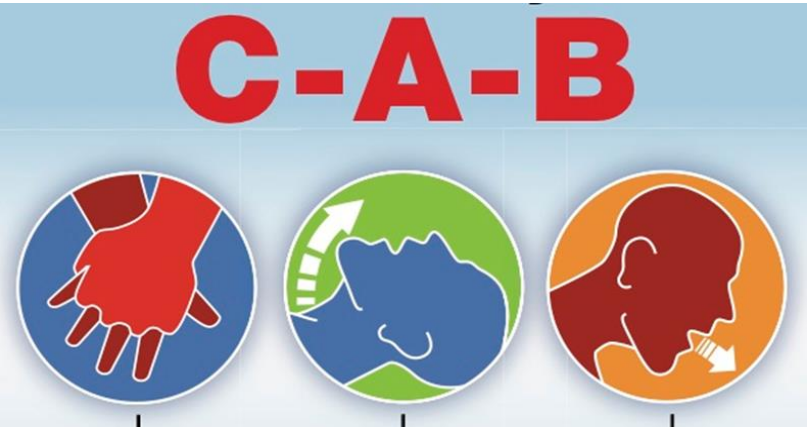
A – (Airway) - open the airway

B - (Breathing) - provide positive – pressure ventilations

C – (Circulation) – give chest compressions

D – Defibrillation – shoc VF/ PulselessVT

2011-2015-2020



C – (Circulation)

A – (Airway)

B - (Breathing)

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Advanced Life Support

A. Advanced Cardiac Life Support (ACLS);

B. Advanced Traumatic Life Support (ATLS);

C Pediatric Advanced Life Support (APLS).

- Endotracheal intubation
- Ventilation
- Monitoring techniques

D. (Drugs) – intravenous and invasive therapeutic

E. (Electricity) –Electrical therapy

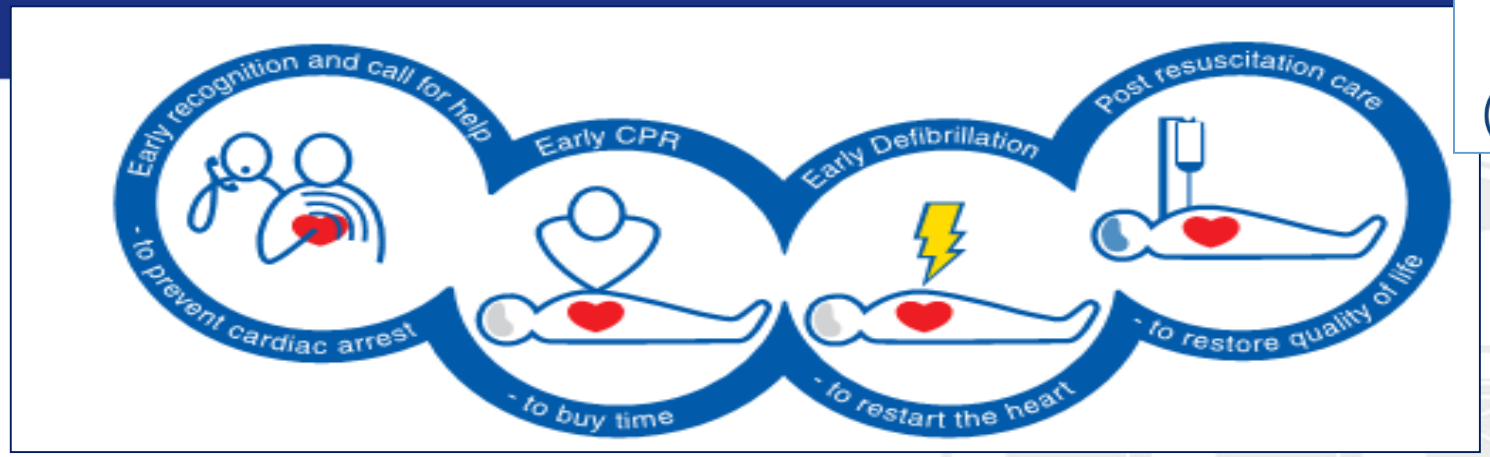
F. (Fluids)

PROLONGED LIFE SUPPORT(PLS)
Multidisciplinary post-cardiac arrest care

Post-Resuscitative Brain-Oriented Therapy.

To optimize respiratory, cardiovascular metabolic, renal and hepatic function for survival of the entire organism.

EUROPEAN RESUSCITATION COUNCIL GUIDELINES FOR RESUSCITATION 2015



Adult Chain of Survival

AMERICAN HEART ASSOCIATION 2016

Early Access | Early CPR | Early Defibrillation | Effective Advanced Vital Support | Early Advanced Care

The AHA adult Chain of Survival

Components of Cardiopulmonary Resuscitation

Early Access | Early CPR | Early Defibrillation | Effective Advanced Vital Support | Early Advanced Care

B L S (basic life support)

S – Stop

A – Asses

F kit, 02, AED

E Ex. protec.

ACLS (advanced cardiac life support)

PRLS (post resuscitation life support)

- ✖ BLS (basic life support)
- ✖ ACLS (advanced cardiac life support)
- ✖ PRLS (post resuscitation life support)

Remember S-A-F-E

S — Stop.

- Stop
- Think
- Act

A — Assess the scene.

- Scene safe?
- Safe to approach?
- Any hazards?
- Additional risks?

F — Find the first aid kit, oxygen unit and AED, and take them to the injured person.

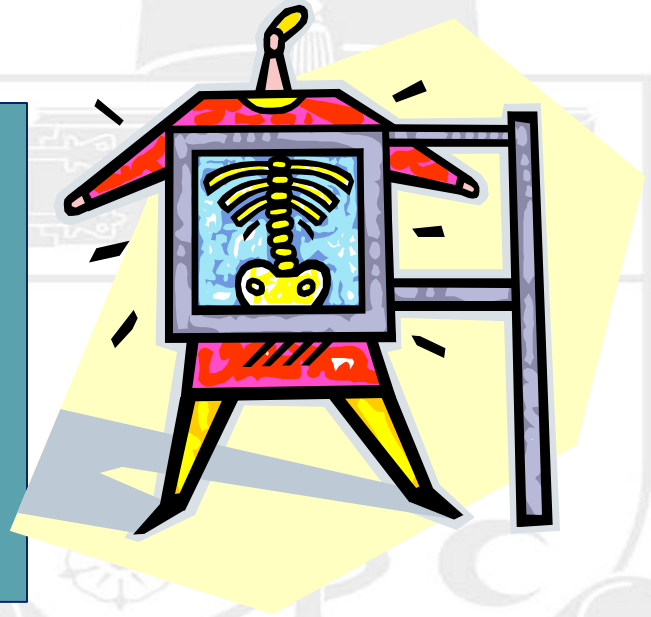
- First aid kits contain critical supplies such as barriers.

E — Exposure protection.

- Use barriers such as gloves and mouth-to-mask barrier devices.
- Don gloves, and inspect them for damage.

The four life threatening emergencies

- Heart attack – ischemia
- Cardiac arrest - VF
- Stroke- Cerebral disorders
- Choking



Before Beginning CPR:

- **Is the airway open?**
- **Is the patient breathing?**
- **Does the patient have circulation?**

  (Is there a pulse?)

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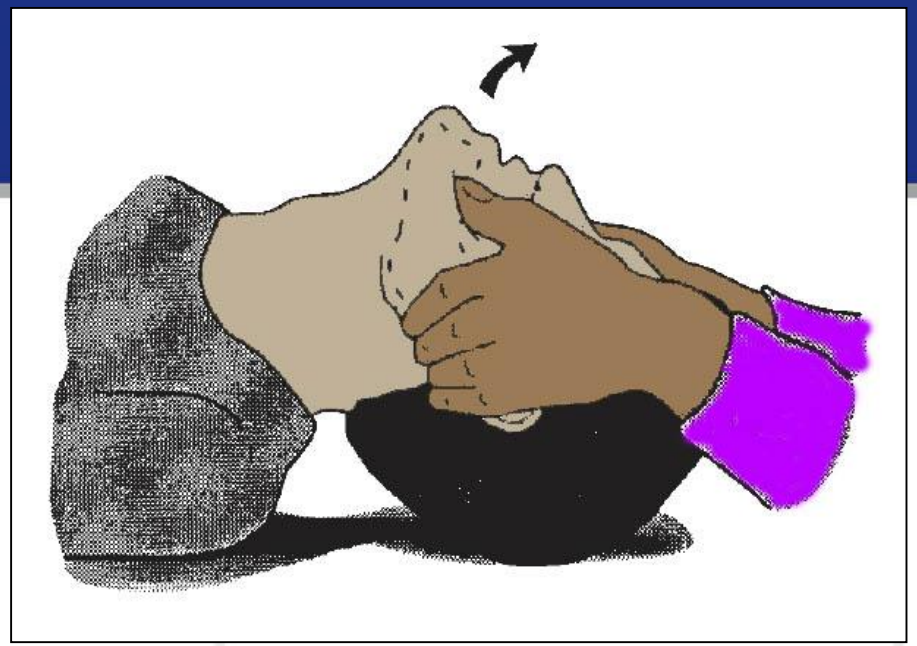
Airway opening

Head Extension

Mandible subluxation

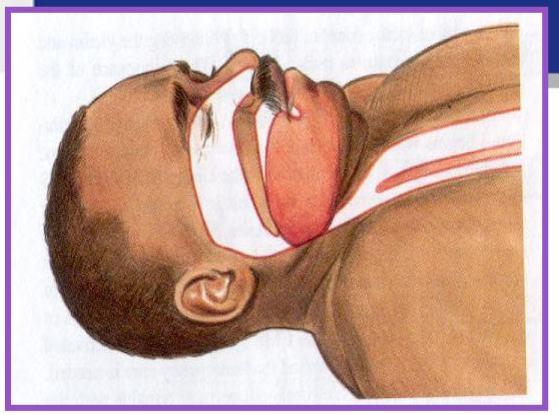
- The traumatized patient - jaw subluxation

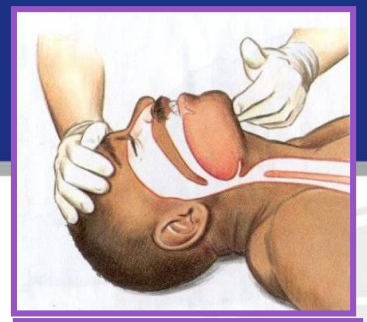
Chin Lift



The chin lift is another form of opening the airway of an unconscious patient. This technique is applied by pulling the mandible forward by grasping the inside of the *incisors* and lifting outward. Again, as the mandible is displaced forward or anterior, the tongue is lifted from the posterior pharynx. This maneuver should not be used if you suspect that the patient may have a spinal injury as it may harm the patient's spine further.

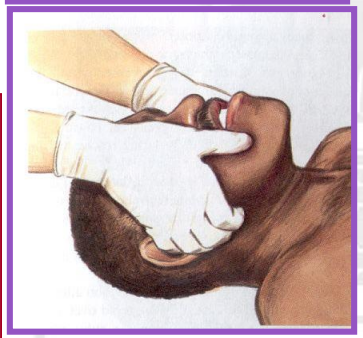
Basic life support/CPR





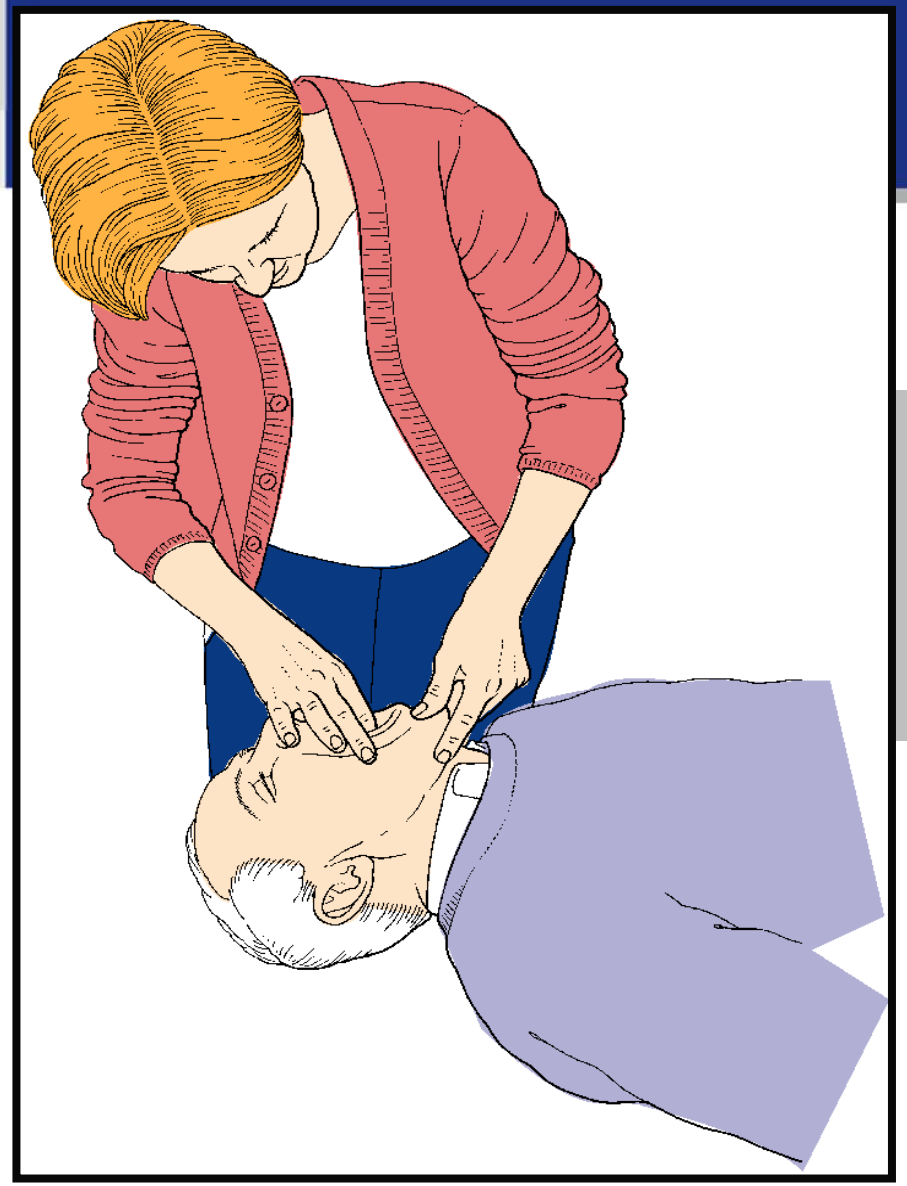
"Head tilt-chin lift"

If suspected head trauma



"Jaw thrust"

Open airway using head tilt – chin lift method. One hand on forehead pushing to tilt the head back, two fingers on the bony part of the chin to lift the chin.
The head tilt – chin lift method lifts the tongue up to allow air to pass through the air passage.
The jaw thrust (without head tilt) is used when there may be a cervical spine injury. Put hands on each side of the victim's head and place fingers under the angles of the lower jaw. Lift upward with both hands to displace jaw forward to lift the tongue and open the airway.



Digital cleaning of the oral cavity

It will only be done to remove visible solid foreign bodies

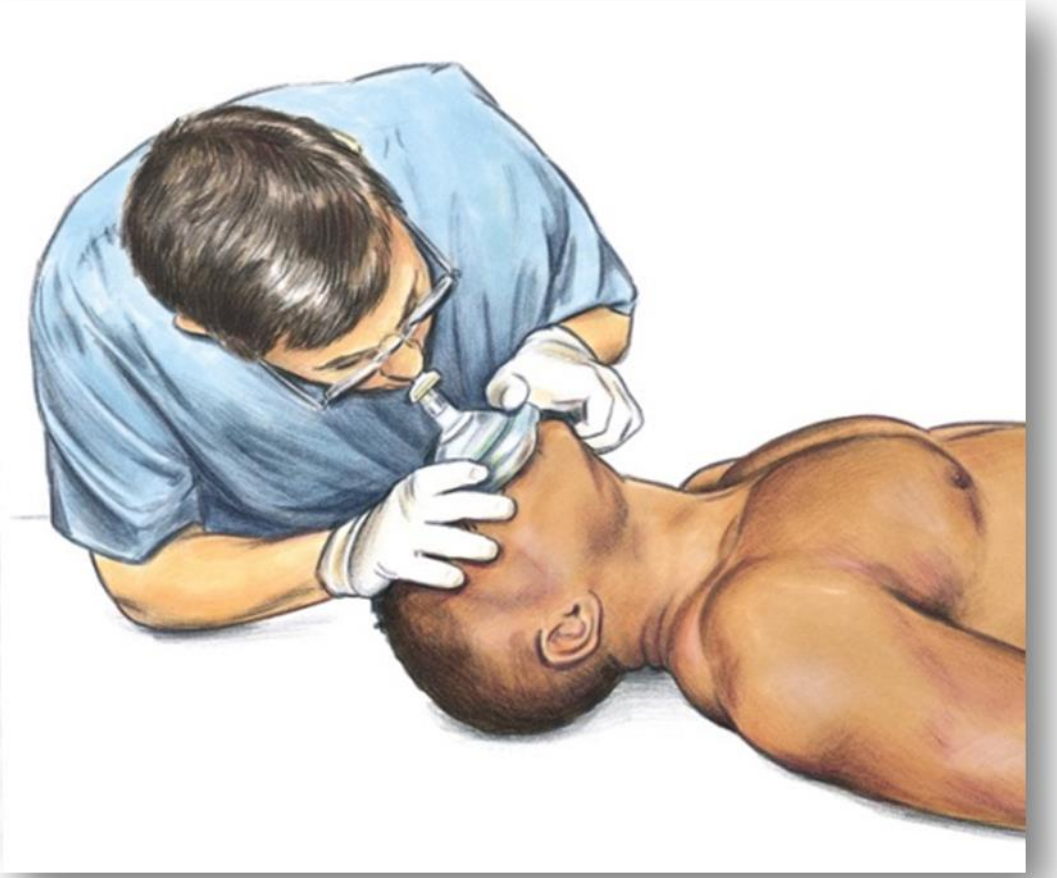
Respiratory assessment

- To assess respirations observe the patient's breathing. Observing the chest rise and fall is the first means of assessment.
- Listen to the sound of breath
- Feel the exhaled air on the cheek
- *To decide whether the patient is breathing or not should not take longer than 10 seconds*

Mouth-to-Barrier Device Ventilation

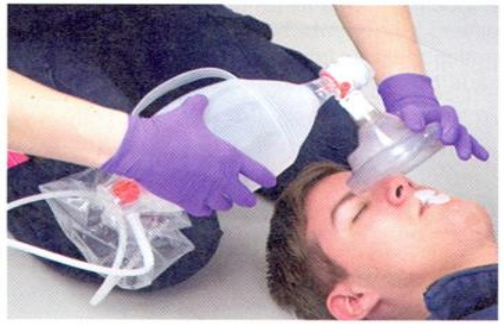
- A barrier device is a thin film of material, usually plastic or silicone, that is placed on the patient's face and used to prevent direct contact with the patient's mouth during positive pressure ventilation. One common type of barrier device is a face shield.
- Step1.
  - Put on apropriate personal protective equipment. Open the patient's airway and place the barrier device over the patient's mouth.
- Step 2.
  - Place your mouth over the mouthpiece of the barrier device. Take a normal breath and breathe into the device with enough force to cause the patient's chest to rise gently.

Mouth-to-Mask Ventilation



Steps	Action
1	Position yourself at the victim's side.
2	Place the mask on the victim's face, using the bridge of the nose as a guide for correct position.
3	Seal the mask against the face: • Using your hand that is closer to the top of the victim's head, place the index finger and thumb along the border of the mask. • Place the thumb of your other hand along the lower margin of the mask.
4	Place the remaining fingers of your hand closer to the victim's neck along the bony margin of the jaw and lift the jaw. Perform a head tilt-chin lift to open the airway .
5	While you lift the jaw, press firmly and completely around the outside margin of the mask to seal the mask against the face.
6	Deliver air over 1 second to make the victim's chest rise.

Bag-Mask Ventilation



- A bag-mask device consists of a self-inflating bag; a non-rebreathing valve with an adapter than can be attached to a mask, a tracheal tube, or another invasive airway device; and an oxygen inlet valve.

Bag-Mask Ventilation

N= 250ml
In = 450-500ml
C = 600-1000ml
A = 1500-2000ml

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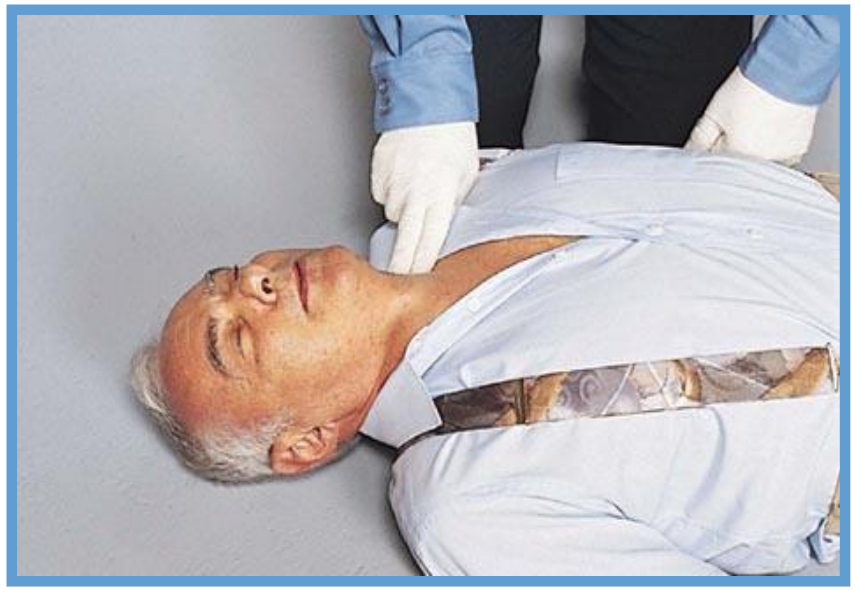
CHECK PCIRCULATION (PULS)



Check for a pulse and if none begin CPR. Hold the head back with pressure on the forehead (like when opening the airway) when feeling for pulse.

Approach safely

Check response

Shout for help

Open airway

Check breathing

Check pulse

Call 112

30 chest compressions

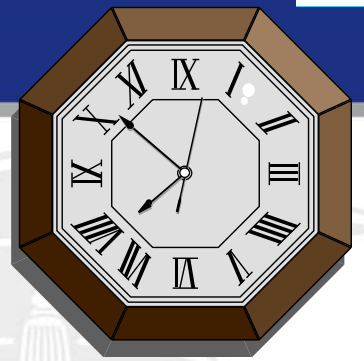
2 rescue breaths

Diagnosis of cardiac arrest

~~Blood pressure measurement~~

~~Taking the pulse on peripheral arteries~~

~~Auscultation of cardiac tones~~

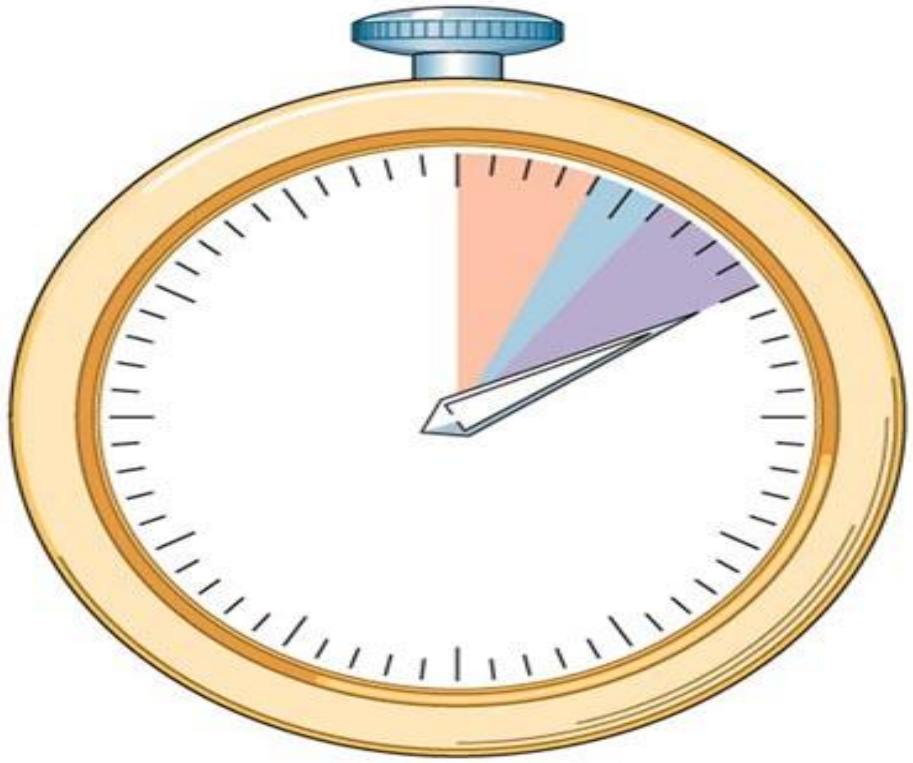


Loss of time !!!

Symptoms of cardiac arrest

- absence of pulse on carotid arteries – *a pathognomonic symptom*
- respiration arrest – *may be in 30 seconds after cardiac arrest*
- enlargement of pupils – *may be in 90 seconds after cardiac arrest*

Death of Brain Cells

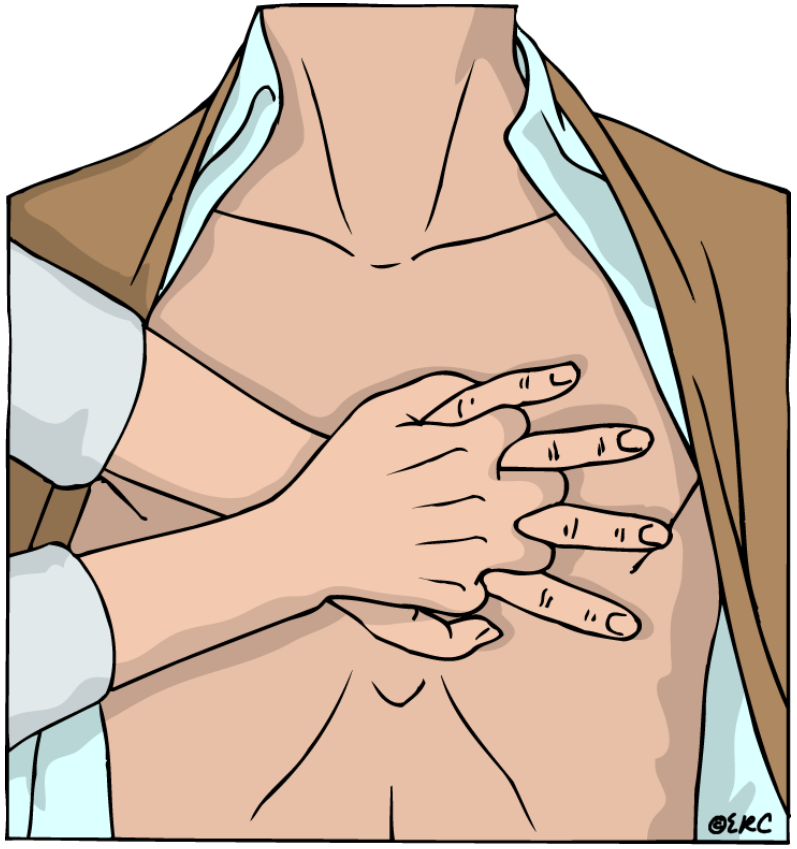


0 minutes: cessation of breathing and circulation

4-6 minutes: brain damage begins

10 minutes: brain cells begin to die

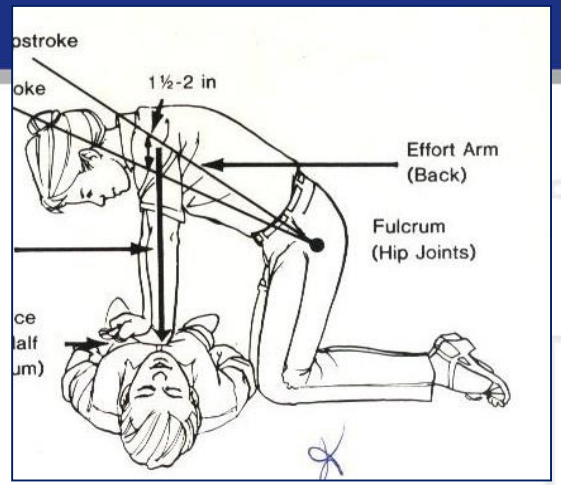
CHEST COMPRESSIONS

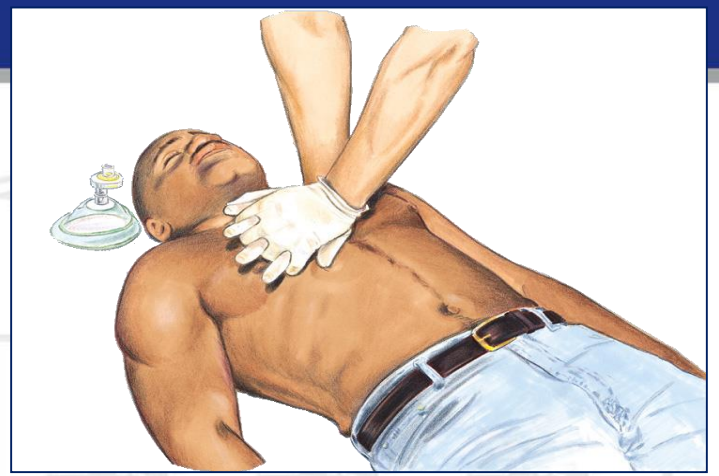


- Place the heel of one hand in the centre of the chest
- Place other hand on top
- Interlock fingers
- Compress the chest
  - Rate 100 min^{-1}
  - Depth 5-6 cm
  - Equal compression : relaxation
- When possible change CPR operator every 2 min

Hands-Only CPR.

Foundational Facts
Chest Compression Technique





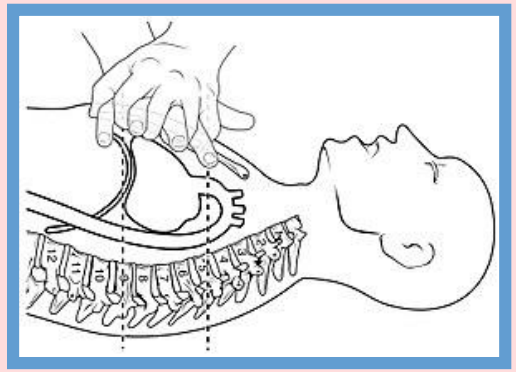
The foundation of CPR is chest compressions. Follow these steps to perform chest compressions in an adult:

- **Position yourself at the victim's side.**
- **Make sure the victim is lying face up on a firm, flat surface.**
- **If the victim is lying face down, carefully roll him face up.**
- **If you suspect the victim has a head or neck injury, try to keep the head, neck, and torso in a line when rolling the victim to a face up position.**

- **At the end of each compression, make sure you allow the chest to recoil completely.**
- **Minimize interruptions of chest compressions (you will learn to combine compressions with ventilation next).**

CAUTION

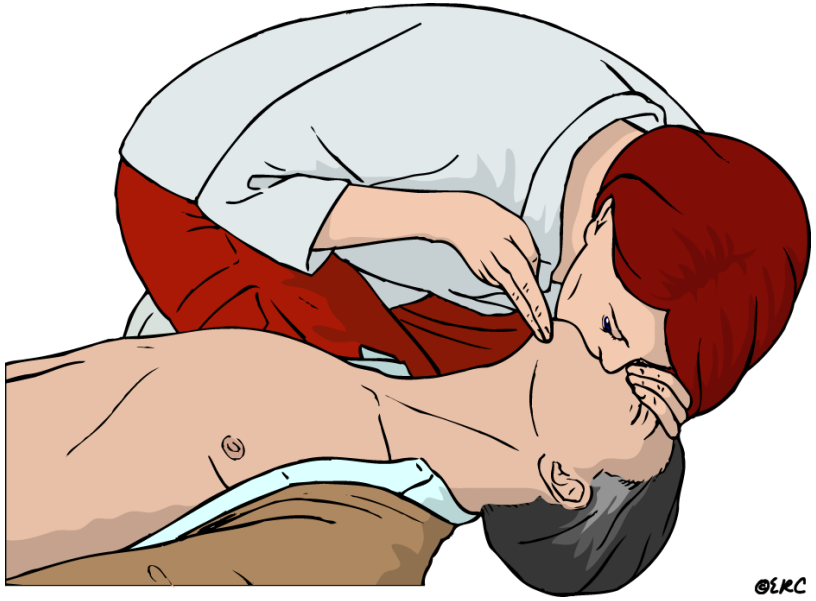
Do Not Move the Victim during Compressions



Do not move the victim while CPR is in progress unless the victim is in a dangerous environment (such as a burning building) or if you believe you cannot perform CPR effectively in the victim's present position or location.

When help arrives, the resuscitation team, based on local protocol, may choose to continue CPR at the scene or transport the victim to an appropriate facility while continuing rescue efforts.

RESCUE BREATHS



- Approach safely
- Check response
- Shout for help
- Open airway
- Check breathing
- Call 112
- 30 chest compressions
- **2 rescue breaths**

Approach safely

Check response

Shout for help

Open airway

Check breathing

Check pulse

Call 112

30 chest compressions

2 rescue breaths

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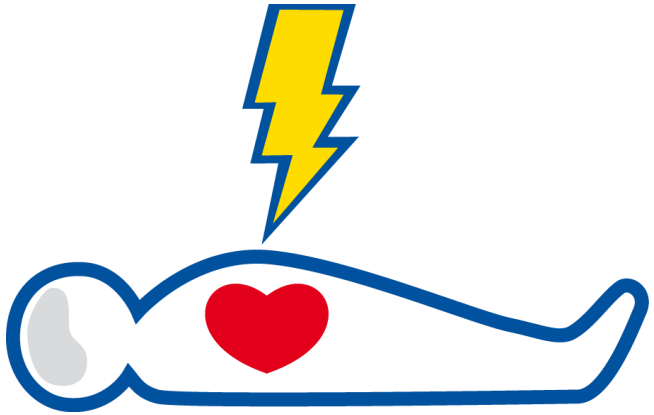
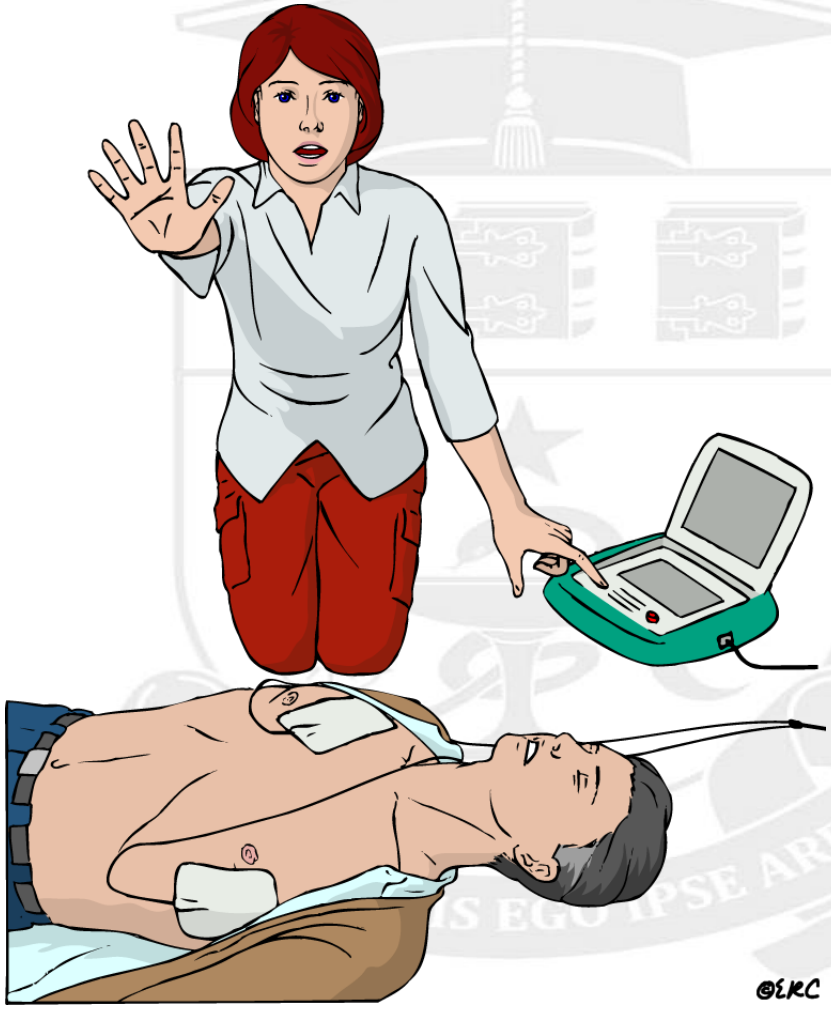
DEFIBRILLATION





Approach safely

Check response

Shout for help

Open airway

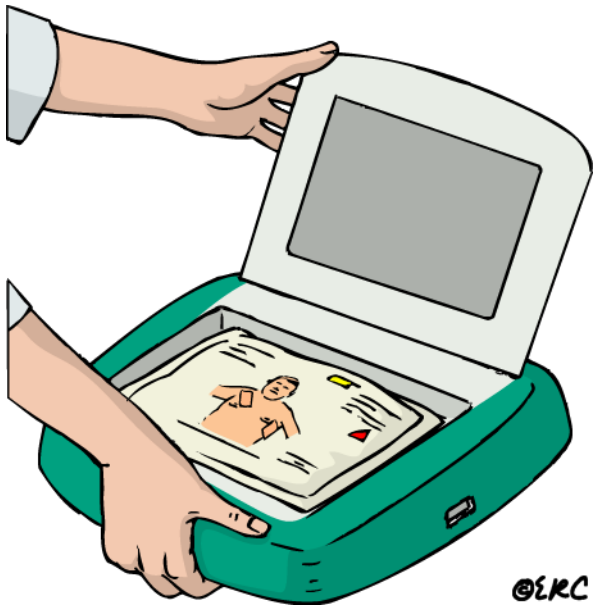
Check breathing and pulse

Call 112

Attach AED

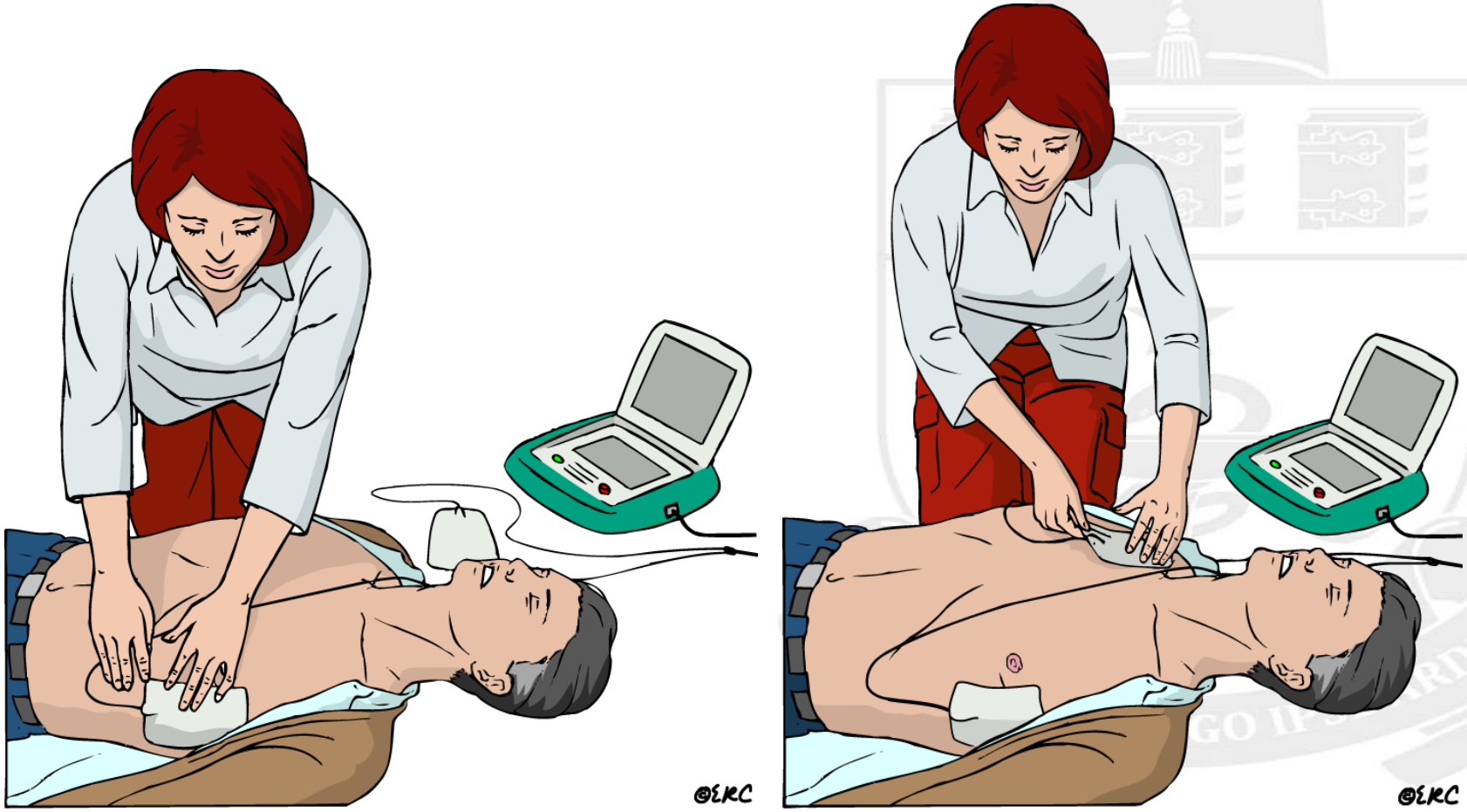
Follow voice prompts

SWITCH ON AED



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

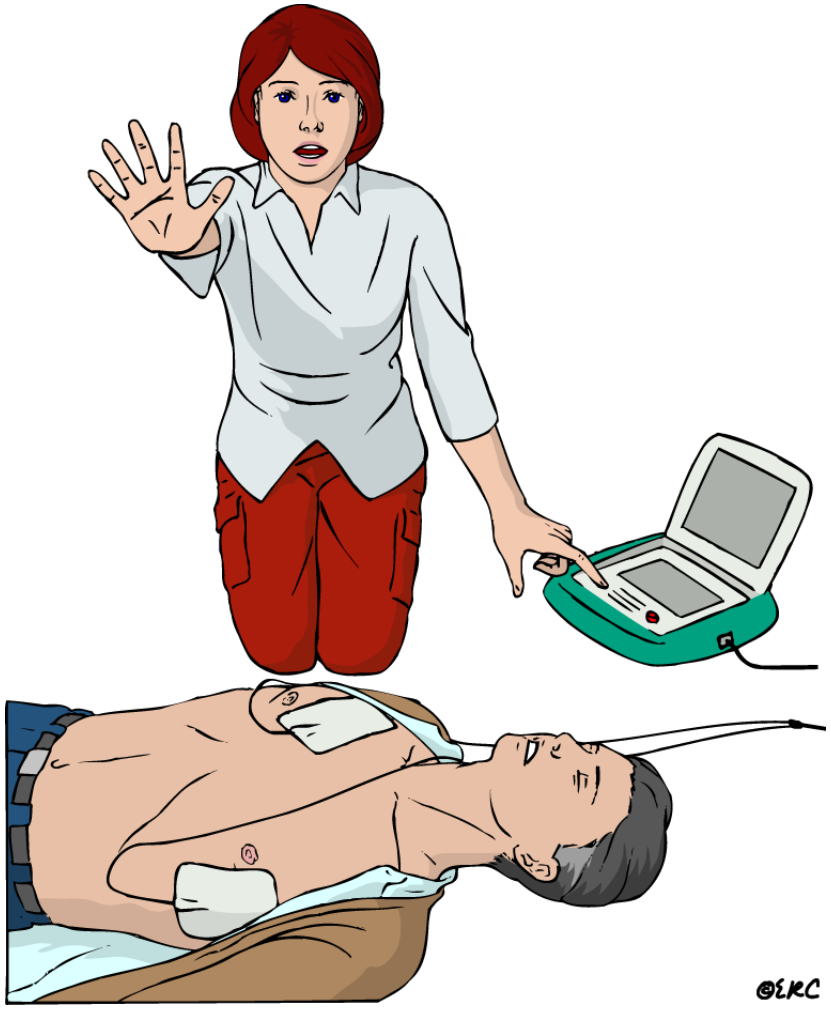
ATTACH PADS TO CASUALTY'S BARE CHEST



ANALYSING RHYTHM DO NOT TOUCH VICTIM

ALLIS EGO IPSE ARDEO!

SHOCK INDICATED



- Stand clear
- Deliver shock

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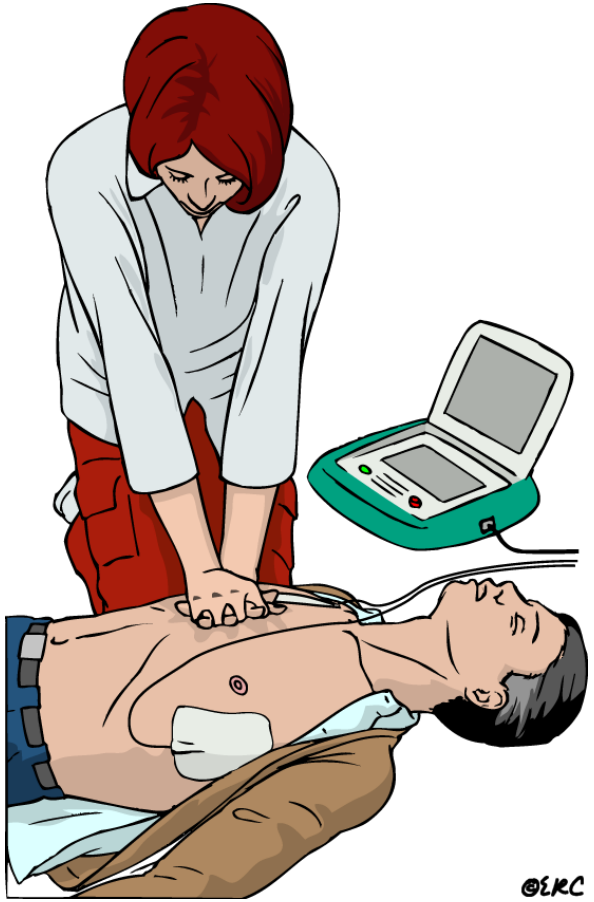
SHOCK DELIVERED FOLLOW AED INSTRUCTIONS



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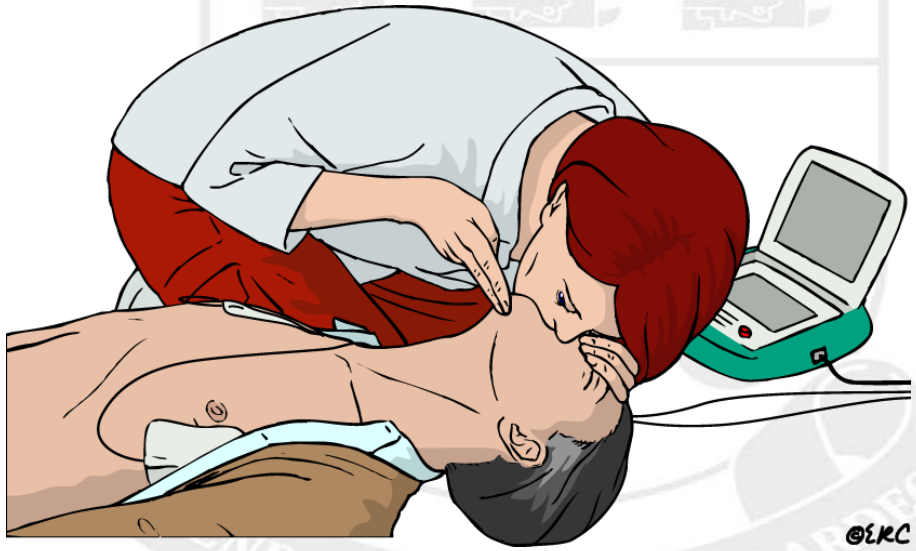

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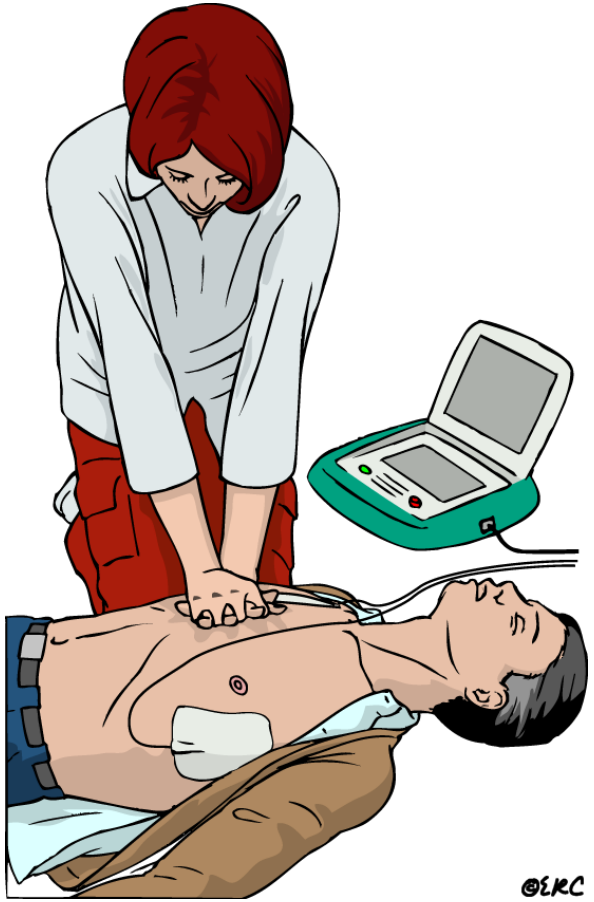
NO SHOCK ADVISED FOLLOW AED INSTRUCTIONS



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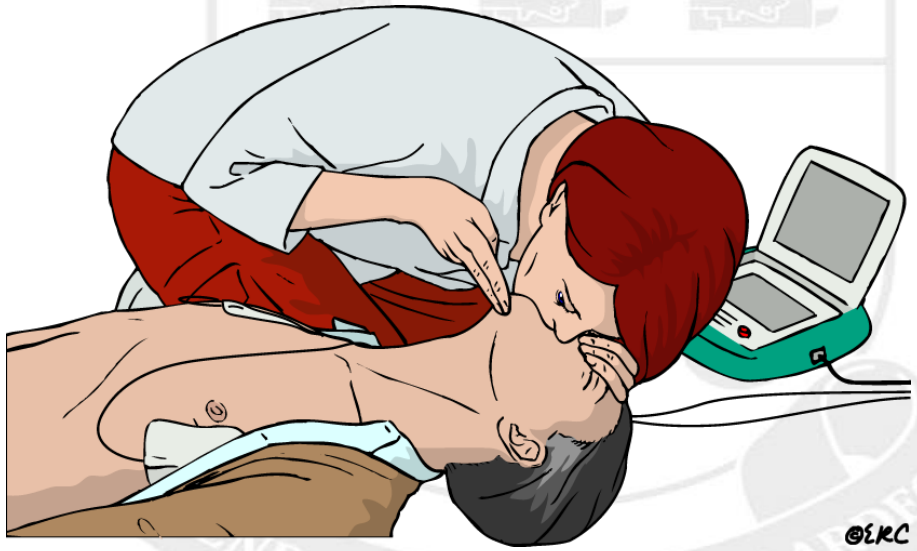

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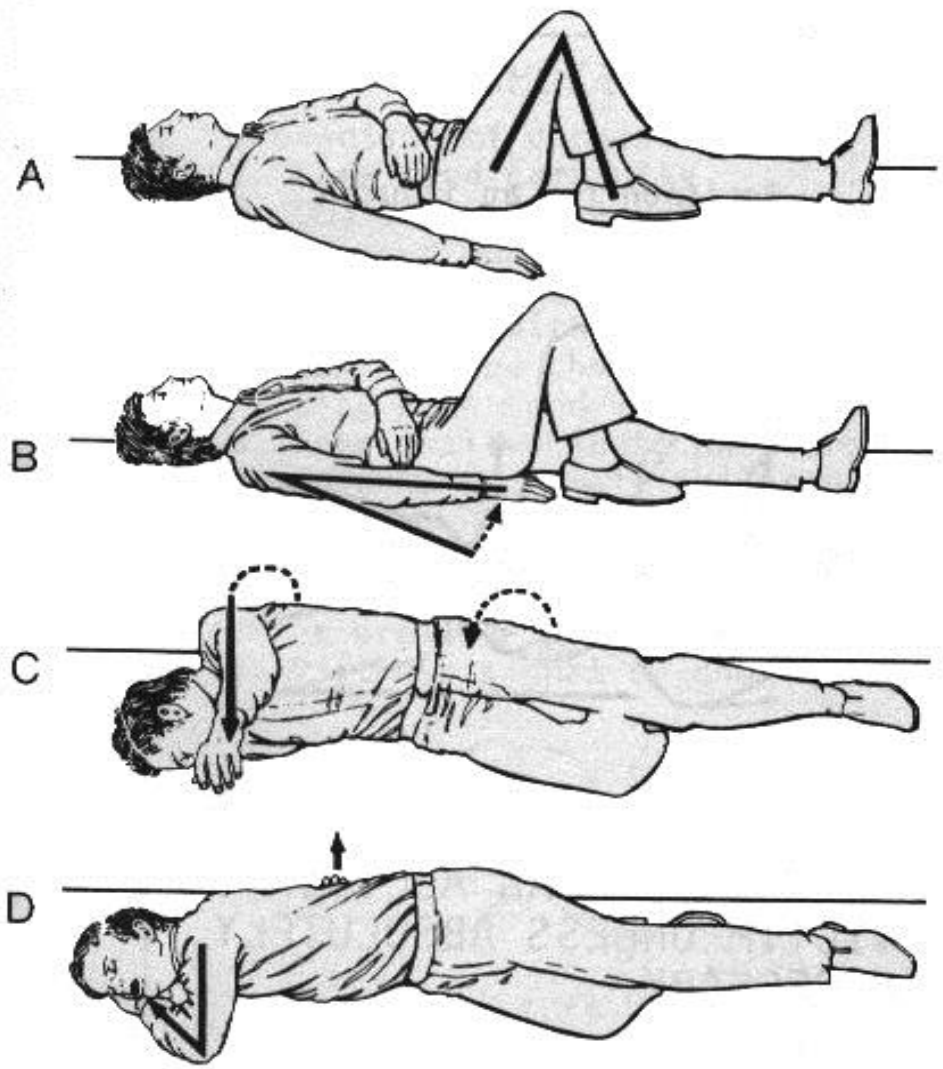
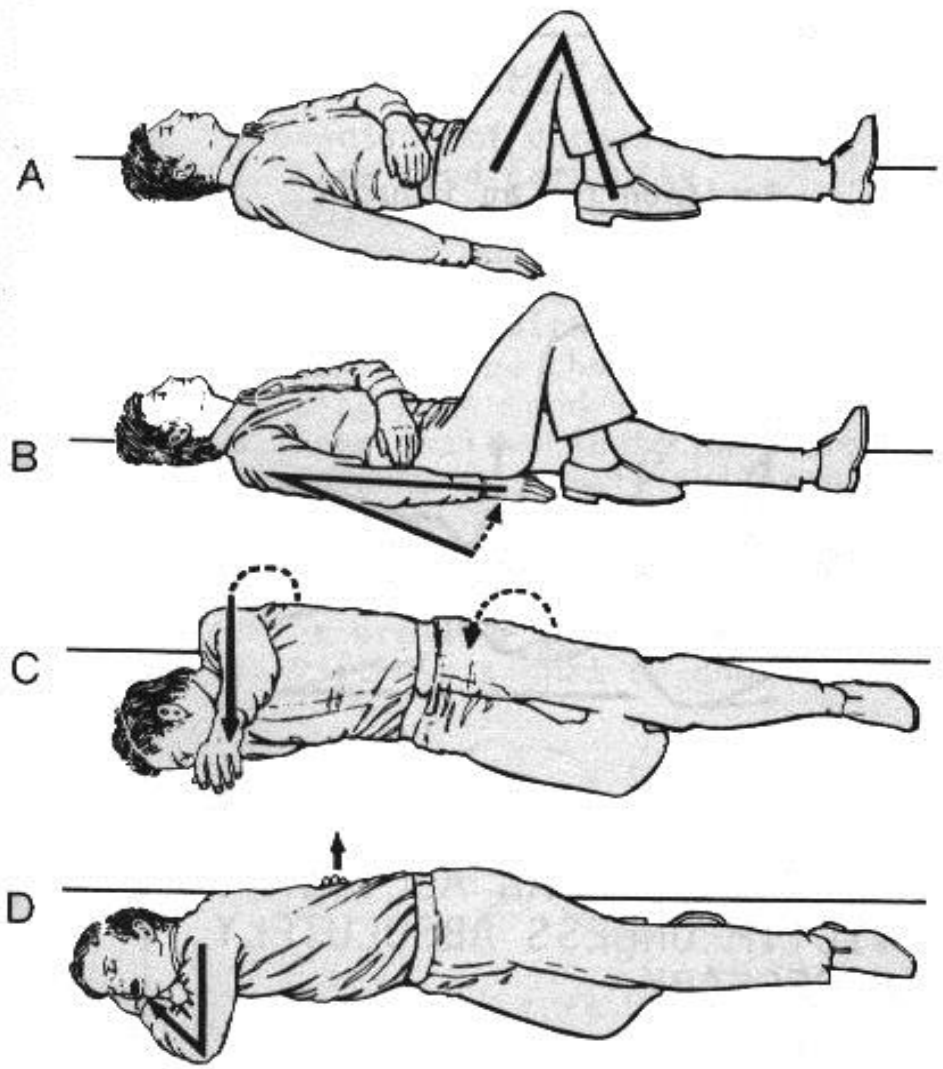
Recovery Position



A. Stable side position – for spontaneously breathing unconscious patient

- Flex leg closest to you
- Put hand closest to you under his buttocks
- Gently roll him onto his side
- Tilt his head backward and keep his face low. Put his upper hand under his lower cheek to maintain head tilt and to prevent him from rolling onto his face. The lower arm behind his back prevents him from rolling backward.

Recovery Position



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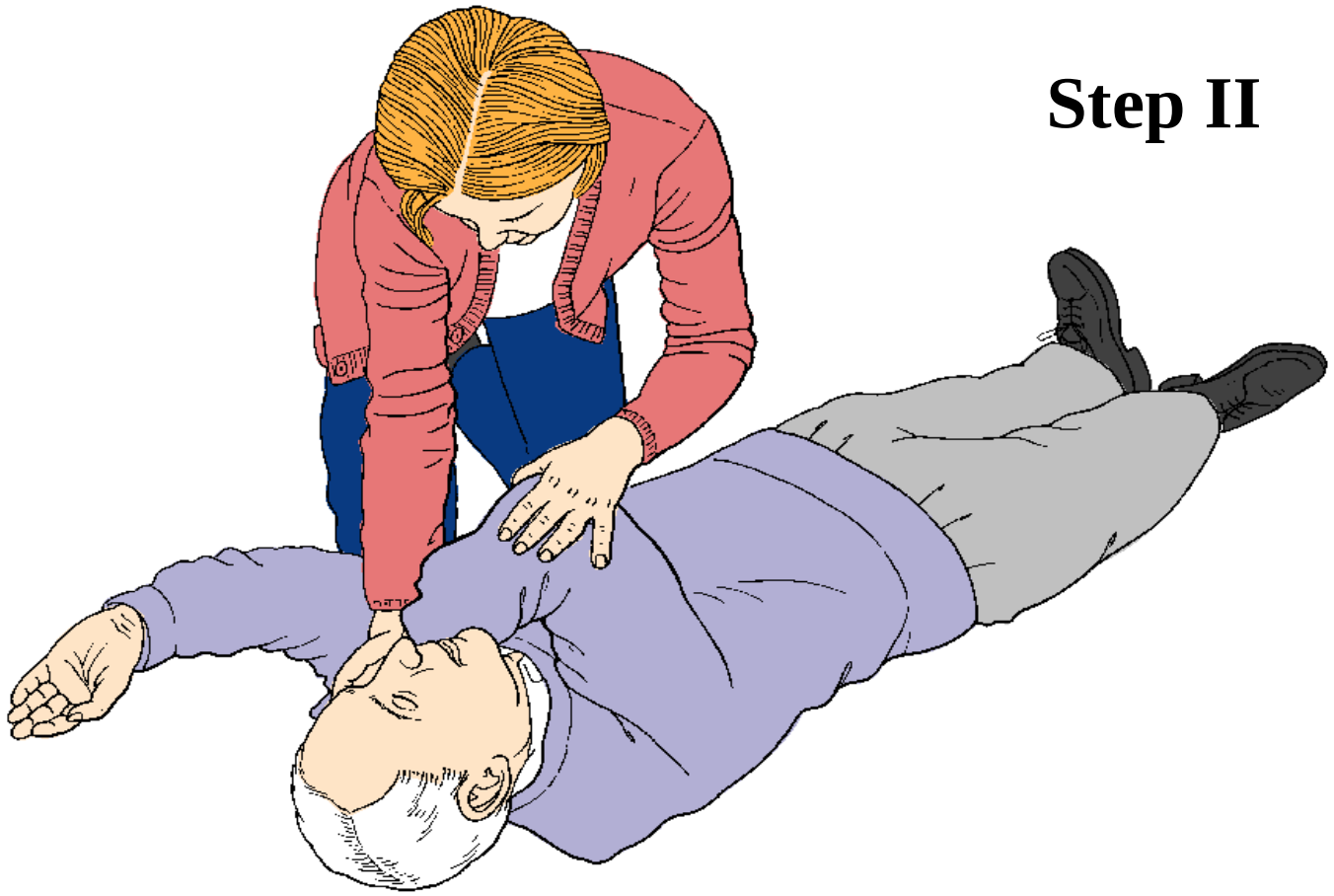
B. Lateral Recovery Position

Place the arm nearest to you out at right angles to his body, elbow bent with the hand palm uppermost

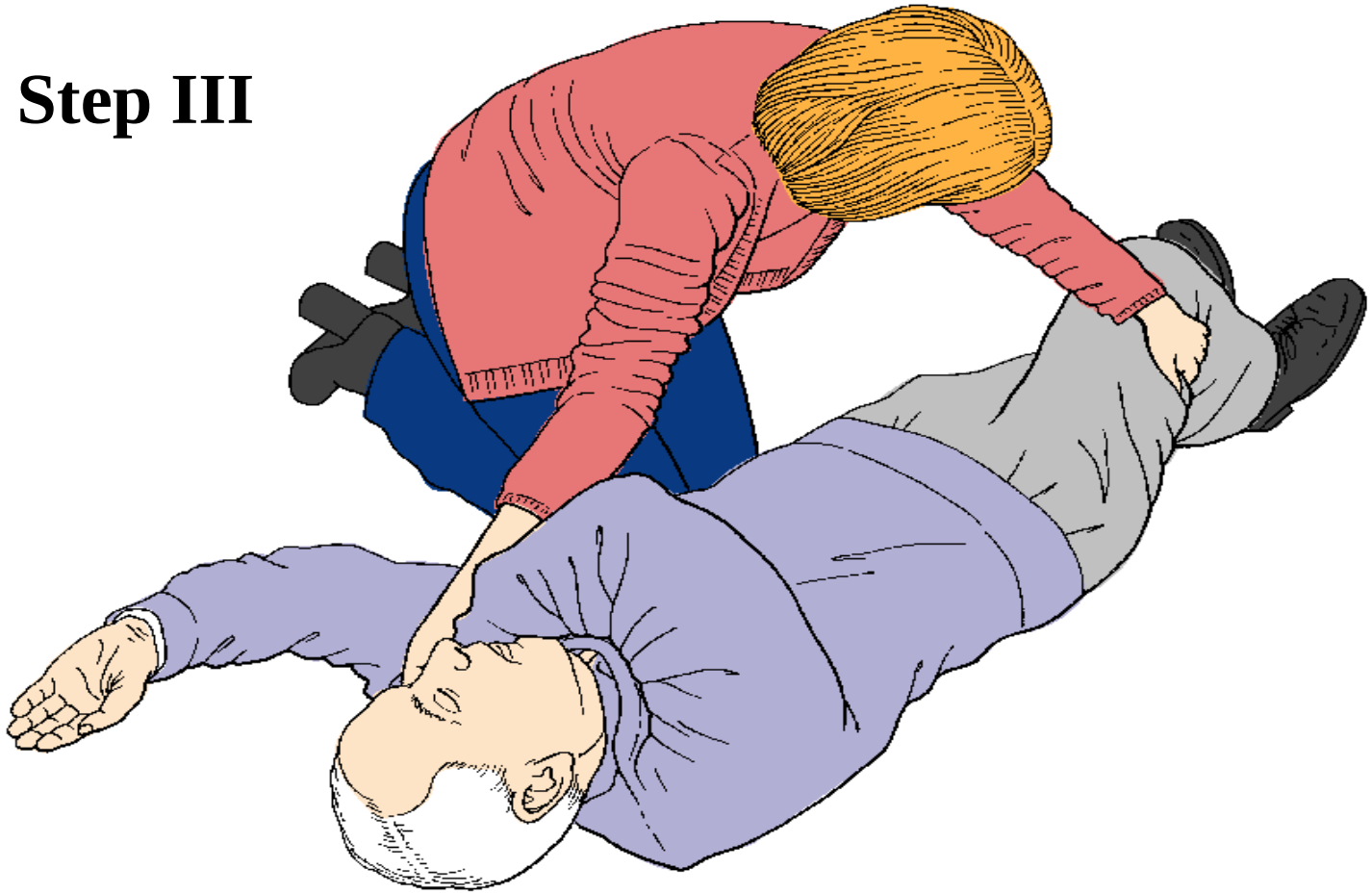
B. Lateral Recovery Position



Bring the far arm across the chest, and hold the back of the hand against the victim's cheek nearest to you

B. Lateral Recovery Position

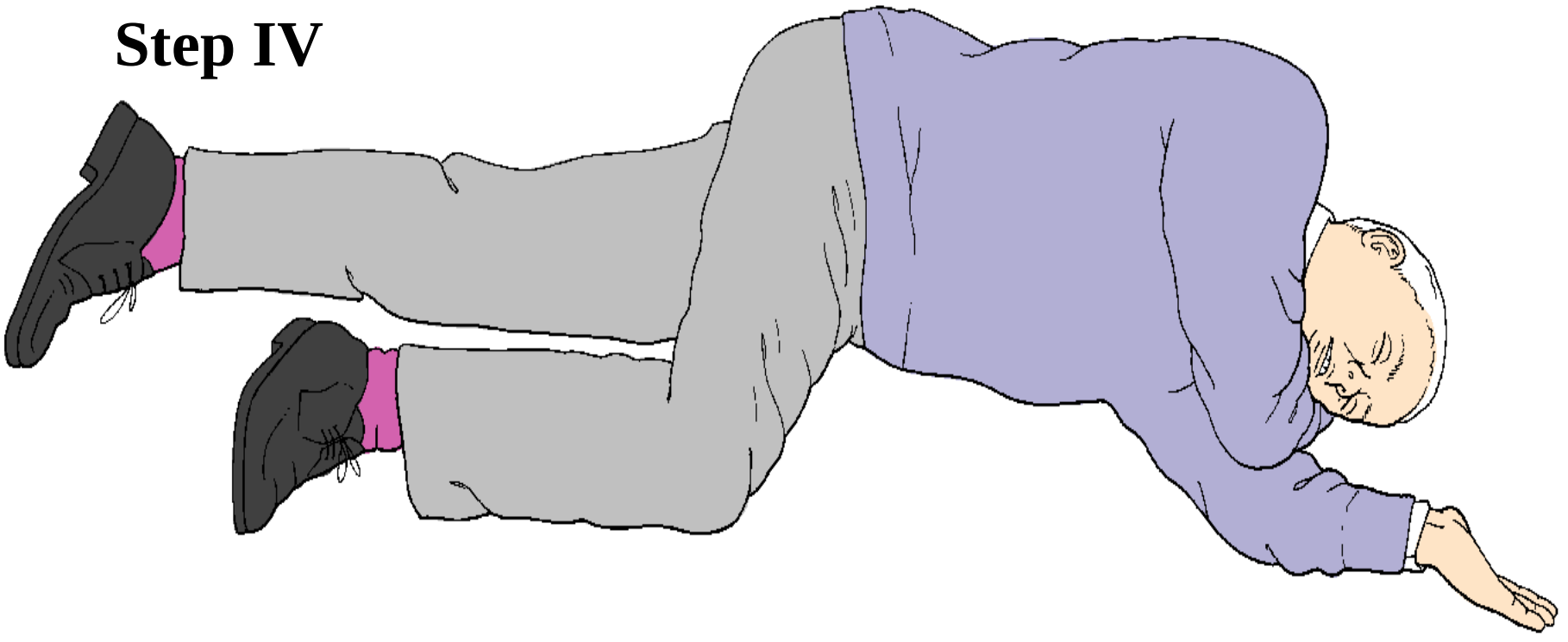
Step III



With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground

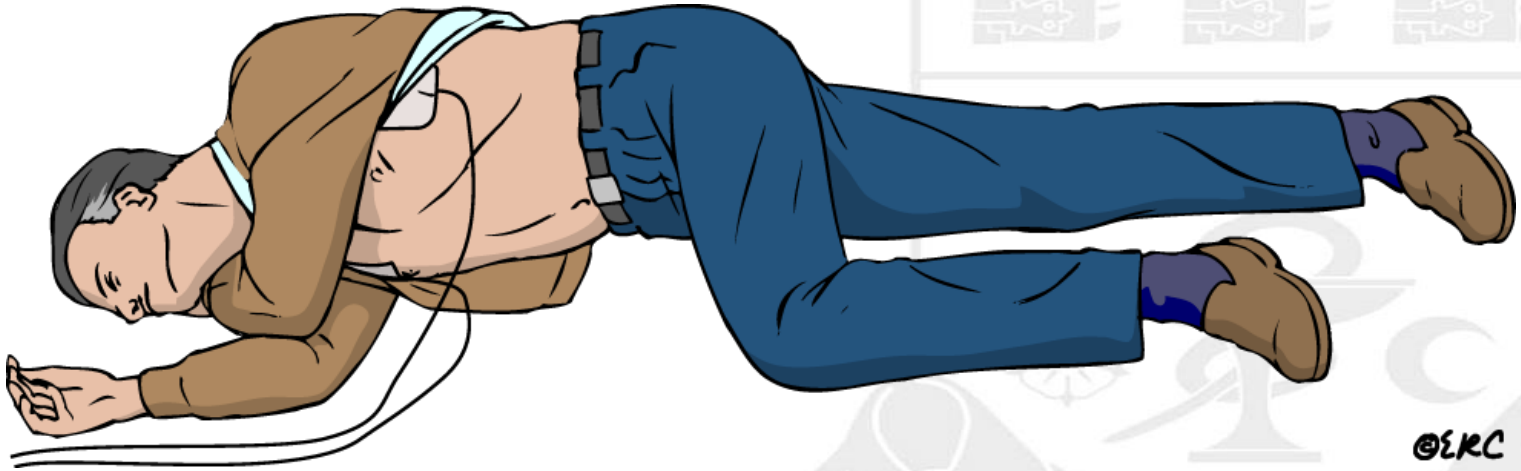
B. Lateral Recovery Position

Step IV

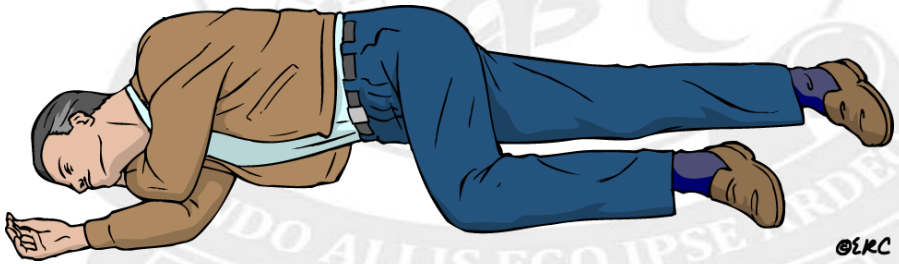


The recovery position

IF VICTIM STARTS TO BREATHE NORMALLY PLACE IN RECOVERY POSITION



IF VICTIM STARTS TO BREATHE NORMALLY PLACE IN RECOVERY POSITION

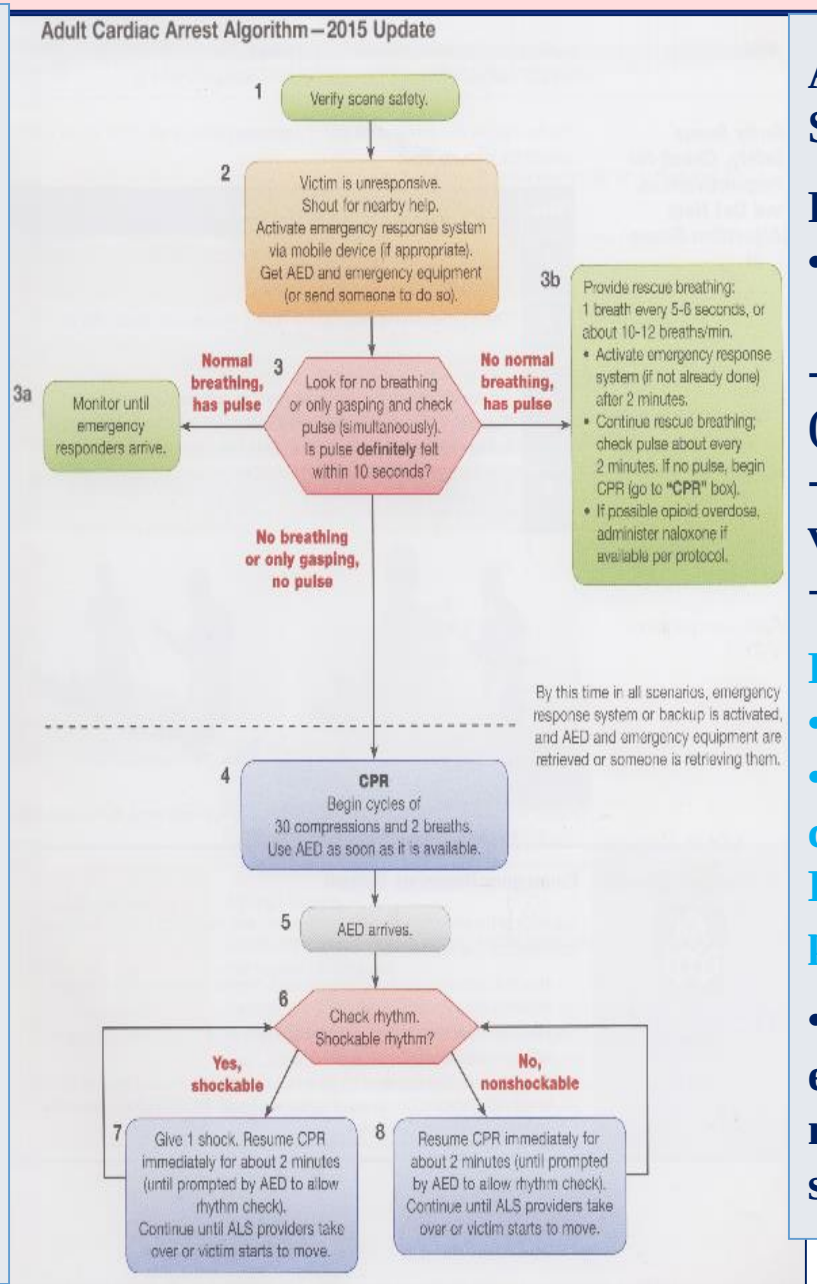


Adult Cardiac Arrest Algorithm

ADULT 1-RESCUER BLS SEQUENCE

- **Hands-Only CPR. A single rescuer with little training and limited equipment who *witnesses* a cardiac arrest in a middle-aged man might provide only chest compressions until help arrives.**

- **30:2 CPR. A *lifeguard* who rescues a drowning young child or an adult in cardiac arrest will provide both chest compressions and breaths, using a ratio of 30 compressions to 2 breaths.**



ADULT 2-RESCUER BLS SEQUENCE

Rescuer 1 (compressions)

- **Perform chest compressions:**
  - **at a rate of 100 to 120/min.**
  - **the chest at least 2-2,4 inches (5-6 cm) for adults.**
  - **Use a compression-to-ventilation ratio of 30:2.**
  - **Count compressions out loud.**

Rescuer 2 (breaths)

- **Maintain an open airway**
- **Give breaths, watching for chest rise.**

Encourage the first rescuer to perform compressions.

- **Switch compressors about every 5 cycles or every 2 minutes. Take less than 5 seconds to switch.**

Slide

- a. Decapitation: The head is separated from the rest of the body. There is obviously no chance of saving the patient.
- b. Rigor mortis: The temporary stiffening of muscles that occurs several hours after death. The presence of this stiffening indicates the patient is dead and cannot be resuscitated.
- c.Evidence of tissue decomposition: Actual flesh decay occurs only after a person has been dead for more than a day.
- d. Dependent lividity: The red or purple color that occurs on the parts of the patient's body that are closest to the ground. It is caused by blood seeping into the tissues on the dependent, or lower, part of the person's body. Dependent lividity: occurs after a person has been dead for several hours.

SPECIAL CIRCUMSTANCES

- Special circumstances may require the rescuer to take additional actions when placing AED pads for a victim who:
- • Has a hairy chest
- • Is immersed in water or has water covering the chest
-
- • Has an implanted defibrillator or pacemaker
- • Has a transdermal medication patch or other object on the surface of the skin where the AED pads are to be placed

HAIRY CHEST

- If the victim has a hairy chest, the AED pads may stick to the hair and not to the skin on the chest. If this occurs, the AED will not be able to analyze the victim's heart rhythm. The AED will display a "check electrodes" or "check electrode pads" message.

- Remember to note whether or not the victim has a hairy chest before you amply the pads. Then you can shave the area where you will place the pads by using the razor from the AED carrying case.

- If you have a second set of pads, you can use the first set to remove the hair. Apply the first set of pads, press them down so they stick as much as possible, and quickly pull them off. Then apply the new second set of pads

WATER

- Water is a good conductor of electricity. Do not use an AED in water.
- • If the victim is in water, pull the victim out at the water.
- • If the chest is covered with water, quickly wipe the chest before attaching the AED pads.
- • If the victim is lying on snow or in a small puddle, you may use the AED after quickly wiping the chest.

IMPLANTED DEFIBRILLATORS AND PACEMAKERS

- Victims with a high risk for sudden cardiac arrest may have implanted defibrillators or pacemakers that automatically deliver shocks directly to the heart. If you place an AED pad directly over an implanted medical device, the implanted device may block delivery of the shock to the heart.

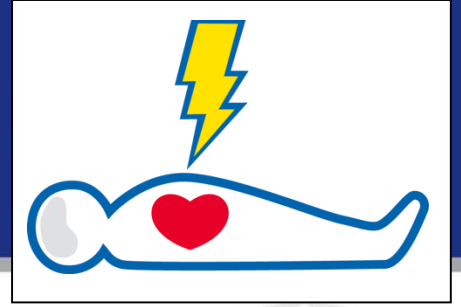
- These devices are easy to identify because they create a hard lump beneath the skin of the upper chest or abdomen. The lump is about half the size of a deck of playing cards.

- If you identify an implanted defibrillator/pacemaker:
- • If possible, avoid placing the AED pad directly over the implanted device.
- • Follow the normal steps for operating an AED.

TRANSDERMAL MEDICATION PATCHES

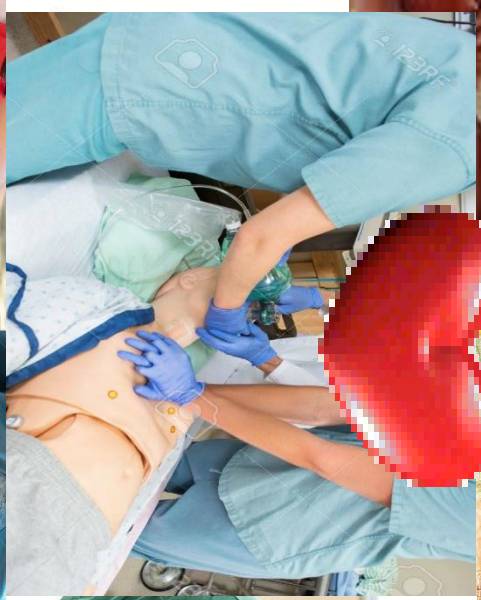
- Do not place AED pads directly, on top of a medication patch. The medication patch may block the transfer of energy from the AED pad to the heart and also cause small burns to the skin. Examples of medication patches are nitroglycerin, nicotine, pain medication, and hormone replacement therapy patches.

- If it does not delay delivery, remove the patch and wipe the area before attaching the AED pad.



Approach safely	Approach safely
Check response	Check response
Shout for help	Shout for help
Open airway	Open airway
Check breathing Check pulse	Check breathing Check pulse
Call 112	Call 112
30 chest compressions	Attach AED
2 rescue breaths	Follow voice prompts

Slide



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APPLE OF EYE of THE MEDICINE - IS THE EMERGENCY MEDICINE

ALL OF THEM "HIT THE GROUND RUNNING" –
THIS MEANS THAT THEY ARE THE BEST SPECIALISTS in THE WORLD

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- Out-of-hospital cardiac arrest (OHCA)
- American Heart Association (AHA)
- Cardiopulmonary Resuscitation (CPR)
- Emergency Cardiovascular Care (ECC)
- Basic life support (BLS)
- International Liaison Committee on Resuscitation (ILCOR)
- In-hospital cardiac arrest (IHCA)
- Compressions, airway, breathing (C-A-B)
- Airway, breathing, compressions (A-B-C)
- Foreign-Body Airway Obstruction (Choking) (FBAO)
- Allow Natural Death (AND)
- Do Not Attempt Resuscitation (DNAR)
- Personal protective equipment (PPE)
- Use the remaining fingers to lift the angles of the jaw (3 fingers form an “E”),
- Use the thumb and index finger of one hand to make a “C”

BASIC LIFE SUPPORT