BASIC LIFE SUPPORT
CPR TRAINING

An initiative by the

INDIAN MEDICAL ASSOCIATION

CARDIOPULMONARY RESUSCITATION

- **CPR SAVES LIVES**
- **SHOULD BE OF HIGH QUALITY**
- **"C-A-B" – COMPRESSION, AIRWAY, BREATHING**
- **NEED PROPER UNDERSTANDING & PRACTICE**

C-A-B

Compressions **A**irway **B**reaths

Chain of survival

Objectives

- Recognize Cardiac Arrest
- Activate Emergency Response System early
- Learn the skills of high quality CPR
- Respond quickly and confidently

Symptoms of heart attack

Chest discomfort
Pressure, squeezing, fullness or pain, burning or heaviness

Sweating

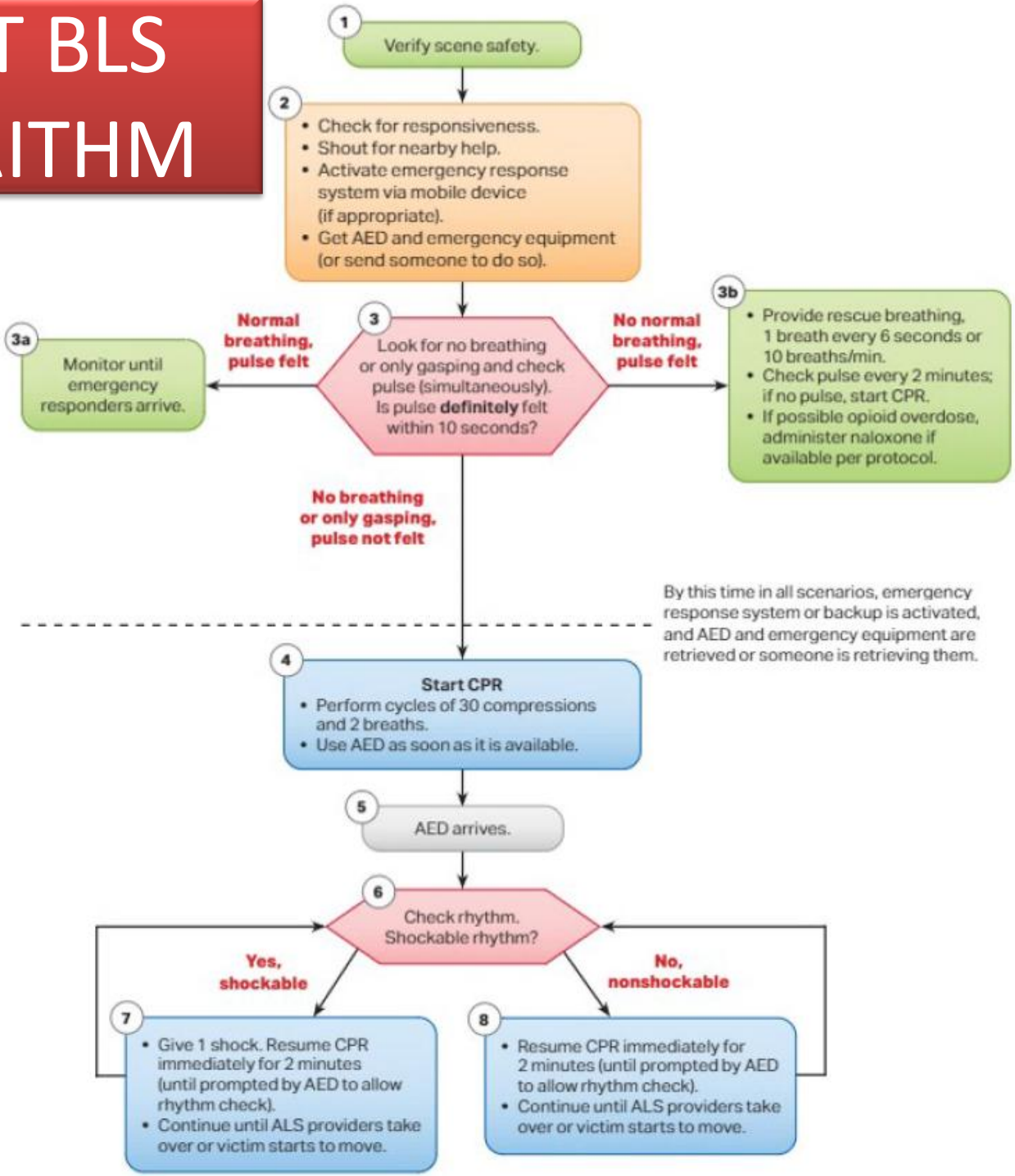
Upper body discomfort
Neck, jaw, shoulder, arms, back

Nausea

Shortness of breath

Light-headedness

ADULT BLS ALGORITHM



Verify Scene Safety

- Make Sure the area is safe for you and the victim.

Check for responsiveness

- Tap on the victims shoulders
- Ask loudly **“Are you ok?”**

Shout for help

- Call bystanders for help.
- Helps in calling ambulance, helping in CPR etc.
- Helps to bring AED if available.

Activate Emergency Response System (ERS)

- Dial **108**
- In hospital- **Code Blue**

Activating Emergency Response System

Activating Emergency Response System

Assess Breathing and Pulse

- Look for absence of breathing or only gasping and check pulse simultaneously
- Do it within 10 seconds
- Carotid pulse
- If not breathing normally or only gasping and no pulse start high quality CPR

Assess Breathing and Pulse

- If victim is breathing normally and pulse is felt, monitor the victim.
- If victim is not breathing properly but pulse is felt
  - Provide rescue breathing at the rate of 1 breath every 6 seconds or 10 breaths per minute
  - Check for pulse every 2 minutes, if pulse in not felt, begin high quality CPR

Check pulse and breathing at the same time

Locating Carotid pulse

- Locate the wind pipe (trachea) using 2 or 3 fingers.
- Slide those fingers into the groove between trachea and muscles at the side of the neck where you can feel the carotid pulse.

Brachial pulse in infants

Carotid or femoral pulse in children

Position of victim

- Victim should be paced face up on a firm hard surface like the floor or a backboard
- This will ensure chest compressions are more effective.
- If victim is face down, carefully roll the person over.
- If you suspect head or neck injury, try to keep the **head, neck and torso in line while rolling** the victim to a face-up position with help of someone.

CHEST COMPRESSION

- Start within 10 seconds of recognition of cardiac arrest
- Push hard, push fast
- **Rate:** 100-120 per minute
- **DEPTH**
- ***Adults***- atleast 5 cms
- ***Children-*** atleast 1/3rd the depth of the chest (5cms)
- ***Infants-*** atleast 1/3rd the depth of the chest (4 cms)

CHEST COMPRESSION

HAND PLACEMENT

- *Adults & children-* 2 hands on the lower half of the breast bone
- *Infants-* 2 fingers or two thumbs in the centre of the chest below the nipple line.

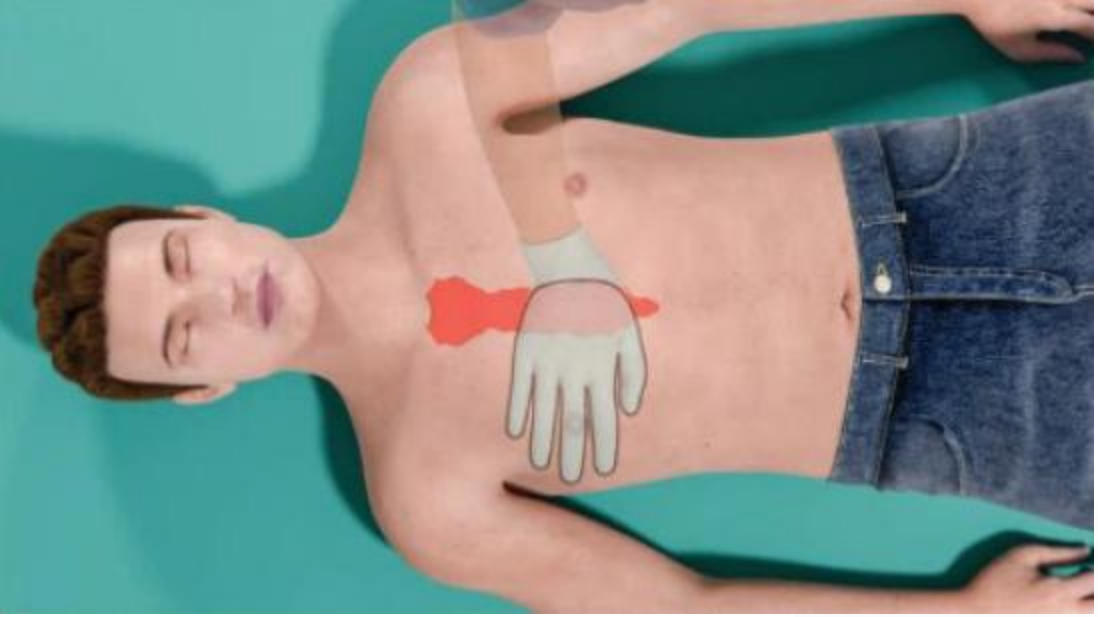
RECOIL:

- Allow complete recoil of the chest after each compression (do not lean over chest after each compression)
- Chest recoil allows the blood to flow into the heart.
- Minimise interruption in compressions (less than 10 secs)

RATIO: 30 COMPRESSIONS AND 2 BREATHS (30:2)

Positioning and technique

- Position yourself on the side of victim.
- Place the heel of one hand in the centre of the victims chest, on the lower half of the breast bone (sternum).
- Put the heel of your hand on the top of the other hand.
- Straighten your arms and position your shoulders directly over your hands.



INFANT: 2 FINGER TECHNIQUE

INFANT:

2 fingers encircling hands technique

Infants – 2 finger technique

- With the infant on a firm flat surface, place 2 fingers on the infant's chest, just below the nipple line, on the lower half of the breast bone.
- Do not press the tip of the breast bone.
- Give compressions at rate of 100-120/min
- Compress at least 1/3rd of the antero-posterior diameter of the chest (4cm of 1 1/2 inches)
- Allow for recoil at the end of each compression
- Equal times for compression and recoil
- **30 compression: 2 breaths**

Infants – 2 Thumbs encircling hands technique

- Preferable if 2 rescuers are available
- Produces better blood supply to heart muscle
- Helps ensures consistent depth and force of chest compressions
- May generate higher blood pressures
- Place both thumbs side by side on the infant's chest, on the lower half of the breast bone. They may overlap in very small infants.
- With the fingers of both hands, encircle the infant's chest and support the infant's back.
- With hands encircling the chest, use both thumbs to depress the breast bone at 100- 120/min
- **If 1 rescuer; 30 compressions: 2 breaths**
- **If 2 rescuers; 15 compressions: 2 breaths**

Airway

- For breaths to be effective, victim's airway must be open.
- 2 methods of opening airway
  - Head tilt- Chin lift
  - Jaw thrust

Head tilt Chin Lift method

- Place one hand on the victim's forehead and push with your palm to tilt the head back.
- Place the fingers of the other hand, under the bony part of the lower jaw, near the chin
- Lift the jaw to bring the chin forward.
- Avoid pressing deeply into the soft tissues of the chin because this might block the airway.
- Do not close the victim's mouth completely.

Head tilt- Chin lift method

- When the victim is unresponsive, the tongue can block the upper airway.
- Head tilt - Chin lift manoeuvre lifts the tongue relieving the obstruction.

Jaw thrust method

- Done when Head Tilt- Chin Lift method does not work or when we suspect a spinal injury.
- Position yourself at the victim's head.
- Place one hand on each side of the victim's head.
- You may rest your elbows on the surface where the victim is lying.
- Place your fingers under the angle of the victim's lower jaw and lift both hands, displacing the jaw forward.
- If the victim's lips close, push the lower lip with your thumbs to open the lips.

Jaw Thrust

Breathing

- Deliver each breath over one second.
- Ensure visible chest rise with each breath.
- Resume chest compressions in less than 10 seconds.
- Oxygen in air we breathe in 21%.
- Oxygen in air we breathe out 17%.
- So the air which rescuer breathes out still contains plenty of oxygen for the victim.

Mouth to mouth breathing

- Hold the victim's airway open with a head tilt chin lift.
- Pinch the nose closed with your thumb and the index finger, with your hand on the forehead.
- Take a regular breath and seal your lips around the victim's mouth, creating an airtight seal.
- Deliver 1 breath over 1 second, watch for the chest to rise.
- If the chest does not rise, repeat the head tilt chin lift.
- Give a second breath, watch for the chest to rise.
- If you are unable ventilate the victim after 2 attempts, promptly return to chest compressions.

Mouth to mouth breaths

Mouth-to-mouth and nose breaths for infant victim

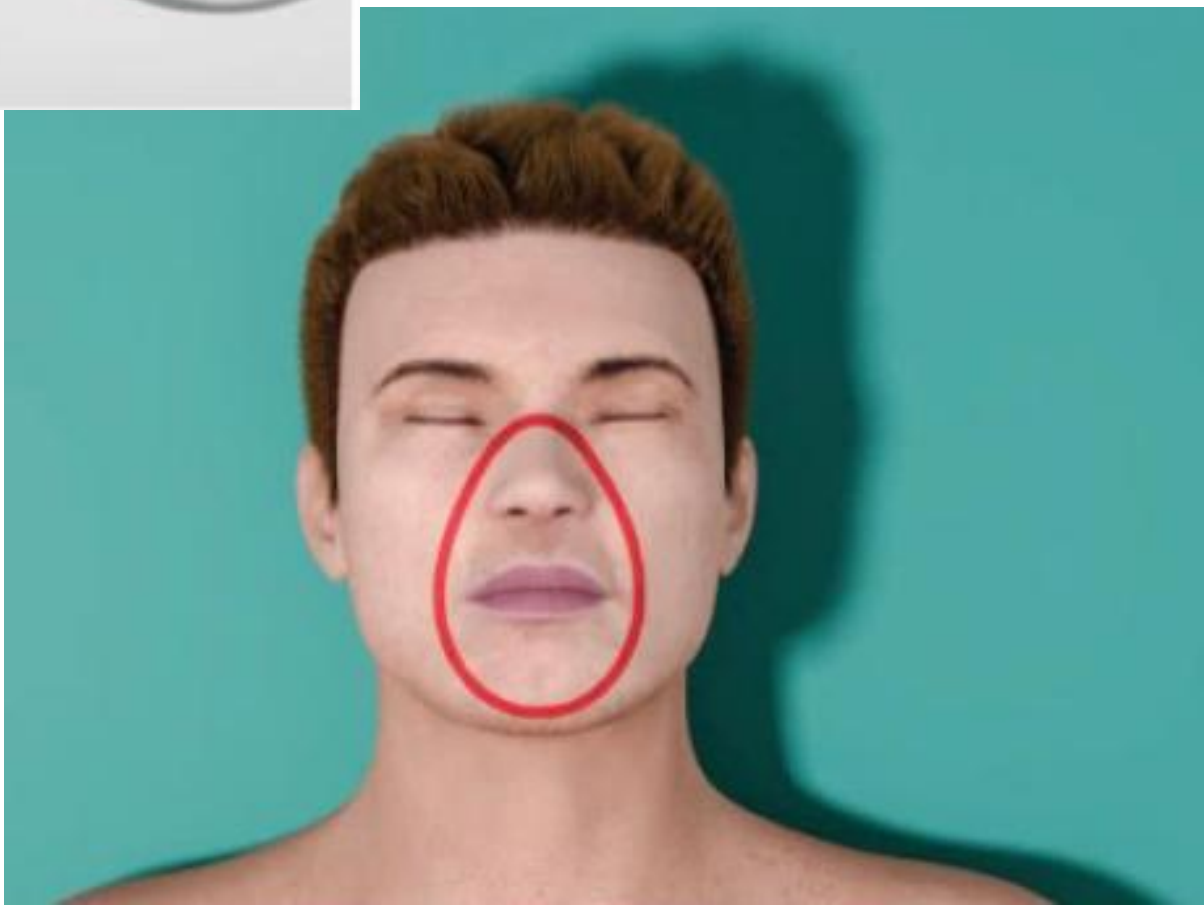
Mouth-to-mouth and nose breaths for infant victim

- Maintain head tilt-chin lift to keep airway open.
- Place your mouth over the infant's mouth and nose and create an airtight seal.
- Blow into the infant's nose and mouth (pausing to inhale between breaths) just enough to make the chest rise with each breath.
- It may be necessary to move the infant's head through a range of positions to provide effective breaths.

Barrier devices for giving breaths

- Pocket masks
- Face shields
- Pocket masks usually have a one-way valve that diverts exhaled air, blood or bodily fluids away from the rescuer.

Press firmly and completely around the outside edge of the mask to seal the pocket mask against the face



Using a pocket mask

- Place the pocket mask on the victim's face, using the bridge of the nose as a guide for correct positioning.
- Using your hand that is closer to the top of the victim's head, place your index finger and thumb along the top edge of the mask.
- Place the thumb of your other hand at the bottom edge of the mask.
- Place the remaining fingers of your second hand along the bony margin of the jaw and lift the jaw.
- Perform a head tilt-chin lift to open the airway.
- While you lift the jaw, press firmly and completely around the outside edge of the mask to seal the pocket mask against the face.

E-C clamp technique of holding the mask while lifting the jaw.

- Use the **thumb and index finger** of one hand to make a **“C”** on the side of the mask, pressing the edges of the mask to the face.
- Use the remaining 3 fingers to lift the angle of the jaw **(3 fingers form an E).** Open the airway and press the face to the mask.

2 rescuer bag-mask ventilation

Multiple rescuers CPR

Automated External Defibrillator- AED

- Light weight
- Portable
- Computerized device
- Can identify an abnormal heart rhythm as shockable or non-shockable.
- If shockable, it can deliver a electric shock that can stop the abnormal rhythm and allow the heart's normal rhythm to return- **Defibrillation**
- Simple to operate

AED

- Once abnormal rhythm is converted to normal, effective circulation returns as the heart muscle is now able to once again pump blood.
- The victim will have a heart beat that produces a palpable pulse.
- This is called ***Return of Spontaneous Circulation- ROSC.***
- Signs of ROSC include breathing, coughing or movement and a palpable pulse or a measurable blood pressure.
- Early defibrillation increases the chance of survival from cardiac arrest that is caused by an abnormal or irregular heart rhythm.
- 2 life-threatening shockable rhythms are
  - **Pulseless Ventricular Tachycardia**
  - **Ventricular fibrillation**

Operating an AED- Universal Steps

- Open the carrying case and **Power ON** the AED
- Follow AED prompts
- **Attach the adhesive AED Pads** to the victims bare Chest after peeling the backing away from the pads.
- **Attach the AED connecting cables** to the AED device.
- **Clear the victim** and **allow the AED to analyze the rhythm.**

Operating an AED- Universal Steps

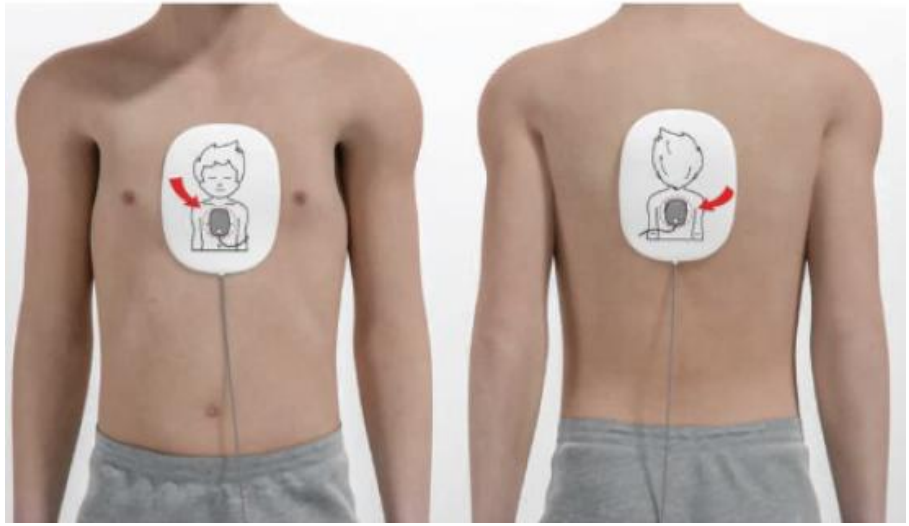
- If the AED advises a shock, it will tell you to clear the victim.
- Loudly state **Everybody Clear.**
- Check that no one is in contact with the victim.
- **Press the Shock button.**
- The shock will produce a sudden contraction of the victim's muscles.
- Once the shock is delivered, **immediately resume CPR**, starting with chest compressions.
- After about 5 cycles or 2 minutes of CPR, AED will prompt you to clear victim to analyze rhythm.
- If AED prompts that no shock is advised immediately resume CPR.

AED Pads

- 1st PAD below the right collar bone
- 2nd PAD to the side of the left nipple- with the top edge of the pad 7-8 cms below the arm pit.

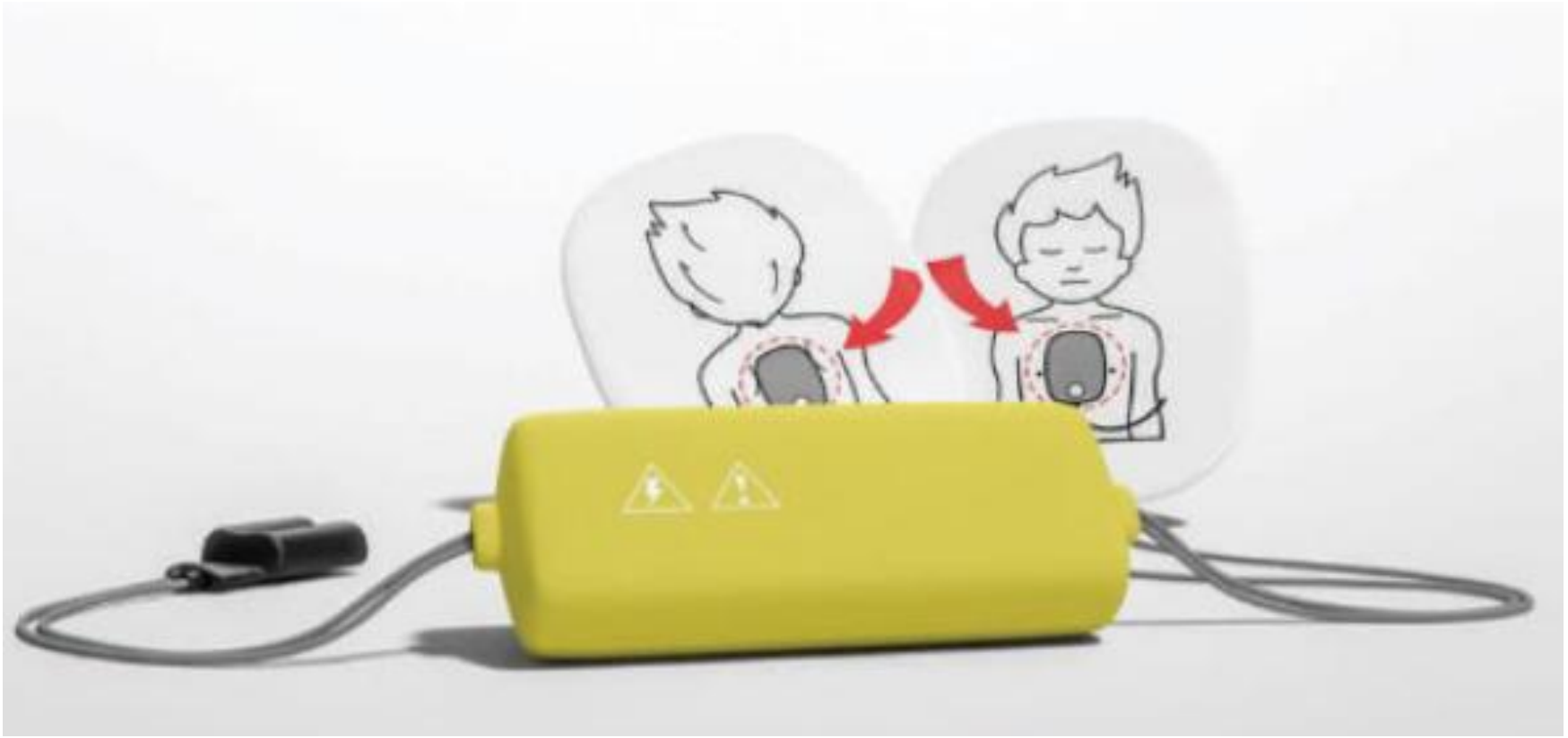
Hairy chest- use Razor from AED case to shave
Water or sweat on chest- Wipe it dry before attaching Pads
ICDs or Pacemaker- avoid placing the Pad directly over the device
Transdermal medication patch – remove patch, wipe and then apply Pads.

AED Pads



Antero-posterior placement of Pads in children

Pediatric dose attenuator reduces the shock dose an AED delivers



Choking

- Choking due to foreign body obstruction of the airway is a medical emergency.
- Signs and symptoms depend on the severity of the obstruction.
- We need to recognize the **universal choking sign.**
- **Abdominal thrusts** are given to relieve foreign body obstruction.

Signs of Foreign Body airway obstruction & rescuer actions

Type of Obstruction	Signs	Rescuer Actions
Mild Airway Obstruction	• Good air exchange • Can cough forcefully • May wheeze between coughs	• As long as good air exchange continues, encourage the victim to continue coughing • Do not interfere with the victim's own attempts to relieve the obstruction. Stay with the victim and monitor the condition • If mild airway obstruction continues or progresses to signs of severe airway obstruction, activate the emergency response system (ERS)
Severe Airway Obstruction	• Clutching the throat with the thumb and fingers, making the **universal choking sign** • Unable to speak or cry • Poor or no air exchange • Weak, ineffective cough or no cough at all • High-pitched noise while inhaling or no noise at all • Increased respiratory difficulty • Possible cyanosis- blue lips or skin	• Ask an adult or child victim, **Are you choking?** If the victim nods "yes" and can't talk, severe airway obstruction is present • Act immediately to relieve obstruction • If severe airway obstruction continues and victim becomes unresponsiveness, start CPR • If you are alone provide at least 2 min of CPR before you leave to activate ERS. • If you have help around ask them to activate ERS

Universal Choking Sign

Abdominal thrusts

Chest thrusts in Pregnant women

Abdominal thrusts

- Used in responsive adults or children and NOT in infants.
- It may be necessary to repeat it several times.
- Stand or kneel behind the victim and wrap your arms around the victim's waist.
- Make a fist with one hand.
- Place the thumb side of your fist against the victim's abdomen, in the midline, slightly above the navel and well below the breast bone.
- Grasp your fist with your other hand and press your fist into the victim's abdomen with a quick forceful upward thrust.
- Repeat thrusts until the object is expelled from the airway or the victim becomes unresponsive.
- Give each new thrust with a separate distinct movement to relieve obstruction.

Chest thrusts in Pregnancy

- Done in pregnant women if unable to perform abdominal thrust due to unable to fully reach around the victims abdomen.
- Stand or kneel behind the victim and wrap your arms around the victim's chest.
- Make a fist with one hand.
- Place the thumb side of your fist against the victim's chest, in the centre, on the lower half of the breast bone.
- Grasp your fist with your other hand and press your fist into the victim's chest with a quick forceful thrust straight back.

Choking relief in an unresponsive adult or child

- Shout for help. If someone is available ask them to activate ERS.
- Gently lower the victim to the ground if you see that they are becoming unresponsive.
- Begin CPR starting with chest compressions.
- Do not check for a pulse.
- Each time you open the airway to give breaths, open the victims mouth wide and look for the object.
  - If you see the object that looks easy to remove, remove it with your fingers.
  - If you do not see the object, continue CPR.
- After about 5 cycles or 2 minutes of CPR, activate the ERS if someone has already not done so.

Choking relief in Responsive Infants

- Use **back slaps** and **chest thrusts**.
- Kneel or sit with the infant in your lap.
- Hold the infant face down with the head slightly lower than the chest, resting on your forearm.
- Support the infant's head and jaw with your hand. Take care to avoid compressing the soft tissues of the infant's throat.
- Rest your forearm on your lap or thigh to support the infant.
- With the heel of your hand, deliver upto 5 forceful back slaps between the infant's shoulder blades.
- Deliver each slap with enough force to attempt to dislodge the foreign body.

Choking relief in Responsive Infants

- After 5 back slaps, turn the infant face up with your forearm resting on your thigh.
- Keep the infants head lower than the trunk.
- Provide upto 5 quick downward chest thrusts in the middle of the chest, over the lower half of the breast bone.
- Deliver chest thrusts at the rate of about 1 per second.
- If the infant victim becomes unresponsive, stop giving back slaps and start CPR.
- ***Do not perform a blind finger sweep*** because it may push the foreign body back into the airway, causing further obstruction or injury.

Black slaps

Chest thrusts

Adults and adolescents	Children (age 1 year to puberty)	Infants (age less than 1 year)
1. Ask "Are you choking?" If the victim nods yes and cannot talk, severe airway obstruction is present. Take steps immediately to relieve the obstruction.	1. Ask "Are you choking?" If the victim nods yes and cannot talk, severe airway obstruction is present. Take steps immediately to relieve the obstruction.	1. If the victim cannot make any sounds or breathe, severe airway obstruction is present.
2. Give abdominal thrusts to a victim who is standing or sitting or chest thrusts for pregnant or obese victims, or those whose abdomen you cannot fully reach around.	2. Give abdominal thrusts to a victim who is standing or sitting or chest thrusts for obese victims, or those whose abdomen you cannot fully reach around.	2. Give up to 5 back slaps and up to 5 chest thrusts.
3. Repeat thrusts until effective or the victim becomes unresponsive.	3. Repeat thrusts until effective or the victim becomes unresponsive.	3. Repeat step 2 until effective or the victim becomes unresponsive.

Victim becomes unresponsive

4. Activate the emergency response system via mobile device (if appropriate) or send someone to do so. After about 2 minutes of CPR, if you are alone with no mobile device, leave the victim to activate the emergency response system (if no one has already done so).
5. Lower the victim to the floor. Begin CPR, starting with chest compressions. Do not check for a pulse.
6. Before you deliver breaths, look into the mouth. If you see a foreign body that can be easily removed, remove it.
7. Continue CPR until advanced providers arrive.

Summary of choking management in adults, children and infants

Step 1: Verify Scene Safety

Make sure that the scene is safe for you and the victim.

Step 2: Check for Responsiveness and Get Help

1. Tap the victim's shoulders and shout, "Are you OK?"
2. If the victim is not responsive, activate the emergency response system via mobile device. Get the AED or send someone to do so.

Step 3: Assess for Breathing and a Pulse

Next, assess the victim for normal breathing and a pulse (Figure 5) to determine next actions.

To minimize delay in starting CPR, you should assess breathing and pulse at the same time. This should take no more than 10 seconds.

For detailed instructions on checking for breathing and a pulse in an adult, see Part 3.

Steps 3a and 3b: Determine Next Actions

Determine next actions based on whether breathing is normal and if a pulse is felt.

- **If the victim is breathing normally and a pulse is felt,** monitor the victim until emergency responders arrive.
- **If the victim is not breathing normally but a pulse is felt:**
  - Provide rescue breathing at a rate of 1 breath every 6 seconds, or 10 breaths per minute (see Rescue Breathing in Part 8).
  - Check for a pulse about every 2 minutes. Perform high-quality CPR if you do not feel a pulse.
  - If you suspect opioid use, give naloxone if available and follow your local protocols (see Part 9 for more information).
- **If the victim is not breathing normally or is only gasping and has no pulse,** begin high-quality CPR (Step 4).

Step 4: Start High-Quality CPR

Start cycles of CPR with 30 chest compressions followed by 2 breaths (see Critical Concepts: High-Quality CPR in Part 1 and Perform High-Quality Chest Compressions in Part 3). Remove bulky clothing from the victim's chest so that you can locate appropriate hand placement for compressions. Removing the clothing will also aid in more rapi AED pad placement when the AED arrives.

Steps 5 and 6: Use the AED as Soon as It Is Available

Follow the AED directions to check the rhythm (see Part 4).

Step 7: If the AED Detects a Shockable Rhythm, Give a Shock

Give 1 shock. Resume CPR immediately until prompted by the AED to allow a rhythm check, about every 2 minutes Continue CPR and using the AED until advanced life support providers take over or the victim begins to breathe, move, or otherwise react.

Step 8: If the AED Detects a Nonshockable Rhythm, Resume High-Quality CPR

Resume high-quality CPR until prompted by the AED to allow a rhythm check, about every 2 minutes. Continue CPR and using the AED until advanced life support providers take over or the victim begins to breathe, move, or otherwise react.

Stepwise summary of Basic Life Support

Component	Adults and adolescents	Children (age 1 year to puberty)	Infants (age less than 1 year, excluding newborns)
Verifying scene safety	Make sure the environment is safe for rescuers and victim		
Recognizing cardiac arrest	Check for responsiveness No breathing or only gasping (i.e., no normal breathing) No definite pulse felt within 10 seconds (Breathing and pulse check can be performed simultaneously in less than 10 seconds)		
Activating emergency response system	***If a mobile device is available, phone emergency medical services (9-1-1)***		
	If you are alone with no mobile phone, leave the victim to activate the emergency response system and get the AED before beginning CPR Otherwise, send someone and begin CPR immediately; use the AED as soon as it is available	***Witnessed collapse*** Follow steps for adults and adolescents on the left ***Unwitnessed collapse*** Give 2 minutes of CPR Leave the victim to activate the emergency response system and get the AED Return to the child or infant and resume CPR; use the AED as soon as it is available	
Compression-ventilation ratio *without advanced airway*	***1 or 2 rescuers*** 30:2	***1 rescuer*** 30:2 ***2 or more rescuers*** 15:2	
Compression-ventilation ratio *with advanced airway*	Continuous compressions at a rate of 100-120/min Give 1 breath every 6 seconds (10 breaths/min)	Continuous compressions at a rate of 100-120/min Give 1 breath every 2-3 seconds (20-30 breaths/min)	
Compression rate	100-120/min		
Compression depth	At least 5 cm (2 inches)*	At least one third AP diameter of chest Approximately 5 cm (2 inches)	At least one third AP diameter of chest Approximately 4 cm (1½ inches)
Hand placement	2 hands on the lower half of the breastbone (sternum)	2 hands or 1 hand (optional for very small child) on the lower half of the breastbone (sternum)	***1 rescuer*** 2 fingers or 2 thumbs in the centre of the chest, just below the nipple line ***2 or more rescuers*** 2 thumb–encircling hands in the centre of the chest, just below the nipple line If the rescuer is unable to achieve the recommended depth, it may be reasonable to use the heel of one hand
Chest recoil	Allow complete recoil of chest after each compression; do not lean on the chest after each compression		
Minimizing interruptions	Limit interruptions in chest compressions to 10 seconds or less with a CCF goal of greater than 80%		

Summary of Basic Life Support in adults, children and infants