CARDIO-PULMONARY RESUSCITATION (CPR)

Adult
Module 4 ADULT CARDIO-PULMONARY RESUSCITATION (CPR)

4.1 DEFINITION

Cardio-Pulmonary Resuscitation (CPR) includes a series of assessments and interventions that support cardiac and pulmonary functions. When cardiac arrest occurs, the heart stops beating and circulation ceases. Unless the circulation is re-started quickly, organ death will begin to occur. The most sensitive organ is the brain and if its circulation to the brain is not re-started within 4 to 6 minutes, permanent and irreversible damage can occur. It is therefore important to start CPR as quickly as possible.

Air contains approximately 21% oxygen at sea level. During its passage through the body, only about 5% of the oxygen is utilised and hence exhaled air contains approximately 16% oxygen. When mouth to mouth ventilation is done during CPR, there is just sufficient oxygen in the exhaled air to keep the victim alive. Chest compression squeezes the heart between the breastbone and the spine and thereby helps to circulate the blood and deliver this oxygen to the vital organs, especially the brain, heart and kidneys.

If CPR is performed promptly and correctly,
1) heart function may be restored, and
2) circulation may be maintained until institution of other life support measures.

The next section takes you step-by-step through the procedures needed to perform CPR or cardio-pulmonary resuscitation – the basic skill needed to save life in the event of cardiac arrest.

4.2 STEPS FOR ADULT ONE-MAN CPR

**STEP 1 CHECK FOR DANGER**

- Look out for unsafe environment eg, electrical current, fire, possible explosion, construction works or poisonous gas.
- Ensure that the scene is safe for you to help.
STEP 2  ASSESS UNRESPONSIVENESS

Quickly assess and determine whether the victim is responsive. The rescuer should tap or gently shake the victim on his / her shoulders and ask loudly: “Hello! Hello! Are you OK?”

Avoid violent shaking of the victim as this might result in injury. Also, avoid unnecessary movements of the neck in the event of injury to the head and neck.

If the victim does not respond, he / she is likely to be unconscious. Unconsciousness may be due to:
- An airway that is obstructed (blocked) by food, secretions or a tongue that has fallen backwards.
- Breathing that has stopped.
- A heart that has stopped beating, usually because of a heart attack.
STEP 3 SHOUT FOR HELP & ACTIVATE EMERGENCY MEDICAL SERVICES (EMS)

If the victim does not respond, call loudly for help and immediately dial 995 for an emergency ambulance.

The rescuer should activate the Emergency Medical Services (EMS) as soon as he has determined that an adult victim is unconscious and requires emergency care.

If there is another person around, ask him / her to do the calling. When calling the EMS, state:

- Location of victim.
- The telephone number you are calling from.
- What happened (e.g. that someone is having a heart attack / is unconscious).
- Number of victims.
- Hang up only after instructed to do so by the dispatcher.

In addition, there is an increasing number of AEDs (automated external defibrillators) that are currently being deployed in public areas. These can also be life saving. Thus call for an AED. Say loudly “Help! Call Ambulance 995, Get AED”.

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STEP 4 POSITION THE VICTIM

For CPR to be effective, the victim must lie on a firm, flat surface. If the victim is lying face down, or on his / her side, you will need to roll the victim over onto his / her back.

Do take care that the head, neck and body are supported and turned simultaneously during re-positioning.

STEP 5 OPEN THE AIRWAY

Perform a **Head tilt-chin lift Manoeuvre** to open the airway. In the unresponsive victim, muscle tone is impaired resulting in the tongue falling back and obstructing the airway. As the tongue is attached to the lower jaw, moving the lower jaw forward will lift the tongue away from the back of the throat and open the airway.
• Place one hand on the victim’s forehead and apply firm backward pressure with your palm to tilt the head back.
• Place the fingers of your other hand under the bony part of the lower jaw to lift the jaw forward.

Caution
• Do not press deeply into the soft tissues under the chin because this might obstruct the airway.
• Perform a gentle chin lift if head or neck injury is suspected.

STEP 6 CHECK FOR NORMAL BREATHING
Place your ear and cheek over the victim’s mouth and nose and assess for breathing (up to 10 seconds):
  - Look for the rise and fall of the chest.
  - Listen for air escaping during exhalation.
  - Feel for the flow of air from the victim’s mouth and nose moving past your cheeks.

* Gasping is NOT considered as normal breathing.
**STEP 7  ASSESS FOR PULSE (FOR HEALTHCARE PROVIDERS ONLY)**

- Maintain head tilt, locate the Adam’s apple or centre of the throat of the victim with the index and middle fingers.
- Slide your fingers down into the groove at the side of the neck near you (This is the location of the carotid pulse).
- Apply gentle pressure and feel for the carotid pulse up to 10 seconds.
- If the victim has no pulse or if unsure of the presence of normal breathing or pulse within 10 seconds, start chest compressions.

* For laypersons, it is not necessary to check for pulse. If victim has no breathing, start chest compressions.
STEP 8 LOCATE HAND POSITION FOR CHEST COMPRESSION

Chest compression technique consists of serial, rhythmic applications of pressure over the lower half of the sternum (breastbone). To locate the correct hand position for chest compression:

- Maintain head tilt, run your middle finger from the lower margin of the victim’s rib cage till you reach the Xiphi Sternum.

- Place your index finger next to the middle finger.

- Place the heel of one hand next to the index finger.
STEP 9A PERFORM CHEST COMPRESSION

- Remove the index and middle fingers.
- Place the heel of the other hand on top of the hand on the sternum.

- Interlace the fingers of both hands and lift the fingers off the chest wall.
- Straighten both elbows and lock them in position.
- Position your shoulder directly over the victim’s chest.

- Use your body weight to compress the victim’s chest by at least 5cm.
- Count your compressions:
  1 and 2 and 3 and 4 and 5 and
  1 and 2 and 3 and 4 and 10 and
  1 and 2 and 3 and 4 and 15
  1 and 2 and 3 and 4 and 20
  1 and 2 and 3 and 4 and 25
  1 and 2 and 3 and 4 and 30.

- Perform chest compressions at a rate of at least 100 per minute. Allow complete recoil of the chest wall after each compression.
- The ratio of compression and ventilation is 30 compressions: 2 breaths.
- **Healthcare Providers** – Check pulse after 5 cycles of 30 compressions : 2 ventilations. If no pulse or unsure presence of pulse, resume CPR.
- **Laypersons** – Continue performing CPR until help arrives or victim starts moving.
GUIDELINES FOR PROPER COMPRESSION

DO’s
- Maintain your hands on the sternum (breastbone) during each upstroke.
- Release the pressure on the chest after each compression to allow blood to flow into the chest and heart.
- Use your body weight to perform the chest compression.
- Keep the fingers off the chest wall.
- Compress at rate of at least 100 per minute.

DON’T’s
- Do not lift the hands from the sternum (breastbone), otherwise correct hand position may be lost.
- Do not bounce or jerk during compressions as these movements may cause injuries.

STEP 9B MOUTH-TO-MOUTH BREATHING

To perform mouth-to-mouth-breathing:
- Maintain head tilt-chin lift.
- Pinch the nose with your thumb and index finger to prevent air from escaping through the victim’s nose.
- Seal your mouth over the victim’s mouth and give 2 short breaths in quick succession one after the other.
- Release the nostrils to allow exhalation after each breath.
- Each rescue breath should make the chest rise.
- The duration for each breath is 1 second.
- Ventilation volume is between 400 to 600 ml.

Note:
Too great a volume of air is likely to cause air to enter the stomach and result in gastric distension.
**STEP 10** RE-ASSESSMENT (FOR HEALTHCARE PROVIDERS ONLY)

- Assess the victim for pulse and breathing after every 5 cycles of CPR 30:2.
- If pulse is absent (if unsure of pulse and victim has no breathing, assume cardiac arrest), continue CPR 30:2.
- If both the pulse and breathing are present, position the victim in the recovery position.
- Continue to monitor the victim’s pulse and breathing every few minutes as these can stop suddenly.

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**D**
- **CHECK DANGER**
  - **UNRESPONSIVE?**
    - Tap shoulder firmly
    - Ask loudly

**R**
- **SHOUT “HELP! CALL AMBULANCE 995, GET AED” Activate EMS**

**S**
- **OPEN AIRWAY**
  - Head tilt, chin lift

**A**
- **NOT BREATHING NORMALLY?**
  - Look, Listen, Feel
  - Up to 10 sec
  - No

**B**
- **30 CHEST COMPRESSIONS**
  - Centre of chest / lower half of sternum
  - Depth at least 5 cm
  - Rate at least 100 per min
  - Allow complete chest recoil
  - No

**C**
- **OPEN AIRWAY**
  - Head tilt, chin lift

- **2 BREATHS**
  - 1 sec per breath, tidal volume
  - 400-600 ml till chest just rises

- **CHECK CAROTID PULSE**
  - For healthcare providers only
  - Define pulse and normal breathing within 10 sec
  - No

- **HEALTHCARE PROVIDERS –**
  - Check pulse after 5 cycles of 30 compressions:
    - 2 ventilations. If No pulse or unsure of presence of pulse, resume CPR

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**IF UNABLE / UNWILLING TO DO MOUTH-TO-MOUTH FOR ANY REASON DO CONTINUOUS CHEST COMPRESSIONS AT LEAST 100 / MINUTE**