UNIT 1  BASIC LIFE SUPPORT (BLS)

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1.0  INTRODUCTION

In the previous block we have discussed basic tests which are carried out for identification and confirmation of the common conditions. You may come across wide variety of health problems such as a person suddenly stopped breathing or had fainting attack, semi-conscious or in state of coma. Hence, in this unit we will discuss how to provide basic life support, indications, steps to be followed and care. We will also distinguish between respiratory attack and cardiac arrest.

1.1  OBJECTIVES

After completing this unit, you should be able to:

- define Basic Life Support;
- define the adult cardiac chain of support;
- enlist the indications for CPR;
- discuss the methods of opening the airway;
- practice and apply the steps while giving CPR; and
- perform CPR.

1.2  MEANING AND CONCEPT OF BASIC LIFE SUPPORT (BLS)

Let us now discuss meaning and concept of Basic life support (BLS), indications, steps and primary assessment in details as given below:
Basic life support is the care provided to the patient who is experiencing respiratory arrest, cardiac arrest or airway obstruction. It refers to maintaining airway patency and supporting breathing and the circulation without the use of equipment other than a protective device. BLS takes into considerations the psychomotor skills for performing high-quality cardiopulmonary resuscitation (CPR), using an automated external defibrillator (AED) and relieving an obstructed airway for patients of all ages. It generally does not include the use of drugs or invasive skills. It consists of a number of life-saving techniques focused on the mnemonics ‘CAB’ i.e. Circulation, Airway, and Breathing (previously known as ABC).

- **C**: Circulation - It is providing an adequate blood supply to the tissues, especially critical organs, so as to deliver oxygen to all cells and remove metabolic waste, by means of the perfusion of blood throughout the body.
- **A**: Airway - It involves the protection and maintenance of a clear passageway for gases (principally oxygen and carbon dioxide) to pass between the lungs and the atmosphere.
- **B**: Breathing - It is inflation and deflation of the lungs (respiration) through the airway.

### 1.3 INDICATIONS FOR BASIC LIFE SUPPORT (BLS)

Let us go through the indication for basic life support which are classified as respiratory and cardiac arrest as given below.

#### 1.3.1 Respiratory Arrest

Respiratory arrest may occur in the following situations:

- Drowning
- Stroke
- Choking/Foreign Body in Throat
- Smoke inhalation
- Drug Overdose
- Electrocution/injury by lightning
- Suffocation
- Accident/injury
- Coma
- Epiglottic Paralysis

#### 1.3.2 Cardiac Arrest

The indications of cardiac arrest are depicted in Table 1.1.
1.4 STEPS OF BASIC LIFE SUPPORT

First it is very important to make a primary assessment of the patients to know whether it is respiratory arrest or cardiac arrest, so that the patient is managed accordingly.

1.4.1 Primary Assessment of the Unresponsive Adult Patient

This involves assessment of three major areas: assessing the level of consciousness (LOC), breathing and circulation.

Level of Consciousness (LOC)

To check for responsiveness, tap the patient on the shoulder and shout, “Are you okay?” (Fig. 1.1) Use the person’s name if you know it. Speak loudly. If the patient is not awake, alert and oriented or does not respond, call for help immediately.
**Airway**

Once the patient’s level of consciousness has been assessed, evaluate his/her airway. For a patient who is unresponsive, make sure that he or she is in a supine (face-up) position to effectively evaluate the airway. If the patient is face-down, roll the patient onto his or her back. Take care not to create or worsen an injury. If the patient is unresponsive and his or her airway is not open, the airway must be opened immediately.

The two commonly used methods to open the airway are

- Head-tilt/chin-lift technique
- Jaw-thrust method

a) **Head-tilt/chin-lift technique (Fig. 1.2)**

To perform the head-tilt/chin lift technique on an adult

- Press down on the forehead while pulling up on the bony part of the chin with two to three fingers of the other hand.
- Avoid hyperextension of the neck.

![Fig. 1.2 : Head tilt and chin lift method](image)

b) **Jaw-thrust method (Fig. 1.3)**

The jaw-thrust method is used to open the airway when a patient is suspected of having a head, neck or spinal injury. To perform this manoeuver on an adult,

- Kneel above the patient’s head and:
- Put one hand on each side of the patient’s head with the thumbs near the corners of the mouth pointed toward the chin, using the elbows for support.
- Slide the fingers into position under the angles of the patient’s jawbone without moving the head or neck.
• Thrust the jaw upward without moving the head or neck to lift the jaw and open the airway.

Simultaneous Breathing and Pulse Check

Once the airway is open, simultaneously check for breathing and a carotid pulse, for at least 5 but no more than 10 seconds. When checking for breathing, look to see if the patient's chest rises and falls, listen for escaping air and feel for it against the side of your cheek. Normal breathing is quiet, regular and effortless. (Fig. 1.4).

When checking the pulse on an adult patient, palpate the carotid artery by sliding two fingers into the groove of the patient's neck, being careful not to reach across the neck and obstruct the airway. (Fig. 1.5) As an alternative, one may check the femoral artery for a pulse by palpating the area between the hip and groin.

![Fig. 1.4: Look, Listen and Feel technique](image1)

![Fig. 1.5: Palpating carotid](image2)

Results of Primary Assessment

Throughout the primary assessment, we are gathering information about the patient and the situation. The results of the primary assessment determine the immediate course of action.

1.4.2 Respiratory Arrest

If the patient is not breathing but has a definitive pulse, the patient is in respiratory arrest. Such patients must be given ventilations immediately. Giving ventilations is a technique to supply oxygen to a patient who is in respiratory arrest. Give 1 ventilation every 5 to 6 seconds for an adult patient, with each ventilation lasting about 1 second and making the chest rise.

When giving ventilations, it is important to avoid over ventilation and hyperventilation of a patient. The patient should not be given ventilations at a rate and volume greater than recommended; that is, more than 1 ventilation every 5 to 6 seconds or for longer than 1 second each. One must continue giving ventilation until:

• The patient begins to breathe on his or her own.

• Another trained rescuer takes over.

• The patient has no pulse. In that case one should begin CPR or use an AED if it is available and ready to use.
1.4.3 Cardiac Arrest

If there is no breathing, no pulse and the patient is unresponsive, the patient is in cardiac arrest. Cardiac arrest is a life-threatening situation in which the electrical and/or mechanical system of the heart malfunctions resulting in complete cessation of the heart’s ability to function and circulate blood efficiently.

1.4.4 Adult Cardiac Chain of Survival

The adult cardiac chain of survival emphasises that optimum results following a cardiac arrest can be achieved with the following five elements. (Fig. 1.6)

- Recognition of cardiac arrest and activation of the emergency response system.
- Early CPR to keep oxygen-rich blood flowing and to help delay brain damage and death.
- Early defibrillation with an automated external defibrillator (AED) to help restore an effective heart rhythm and significantly increase the patient’s chance for survival.
- Advanced cardiac life support using advanced medical personnel who can provide the proper tools and medication needed to continue the life saving care.
- Integrated post-cardiac arrest care to optimise ventilation and oxygenation and treat hypertension immediately after the return of spontaneous circulation.

Fig. 1.6: Adult Cardiac Chain of Survival

1.4.5 Providing CPR for Adults

Cardiopulmonary resuscitation circulates blood that contains oxygen to the vital organs of a patient in cardiac arrest when the heart and breathing have stopped. It includes chest compressions and ventilations as well as the use of an automated external defibrillator if available. Let us now discuss both the components of CPR i.e. compression and ventilation as given below:

Compression - One of the components of CPR is chest compressions. To ensure optimal patient outcomes, high-quality CPR must be performed. The following are the steps of CPR:

- Position the patient in supine, on a firm, flat surface to allow for adequate compression. In a non-healthcare setting this would typically be on the floor or ground, while in a healthcare setting this may be on a stretcher or bed with a CPR board.
- Expose the chest to ensure proper hand placement and the ability to visualise chest recoil.
- Rescuer should take a kneeling position on one side of patient’s chest.
- Locate the xiphoid process over patient’s chest and identify the mid portion of lower half of the sternum (Fig. 1.7)
**Fig. 1.7: Location of xiphoid process over patient’s chest**

- Draw imaginary line over patient’s chest from right to left nipple, locate the area 2 inches above from the lower tip of the xiphoid sternum, now place the heel/palm of one hand on the lower end of the sternum (i.e. at located area) and the other hand is placed on the top of hand on the sternum so that the hands are parallel. (Fig. 1.8)

**Fig. 1.8: Locating compression site at patient’s sternum**

- Rescuer interlaces the fingers of both the hands and locks the elbows in position. Interlacing their fingers makes it easier to provide compressions while keeping the fingers off the chest. (Fig. 1.9)

**Fig. 1.9: a, b, c : Interlacing of fingers & locked elbows of the rescuer**
Arms are as straight as possible, with the shoulders directly over the hands to promote effective compressions. Locking elbows will help maintain straight arms.

- Compressions rate should be atleast 100 compressions/ minute. Each set of 30 compressions in 18 seconds or less (30 compressions rather 2 ventilations leads to a shorter delay to first compression and thus increases the survival rate of the patient) or approximately 5 cycles for 2 minutes.

- Compression depth for adults should be 2 inches (about 5 cms) (as compressions create blood flow primarily by increasing the intra-thoracic pressure & directly compressing the heart. Compressions also generate critical blood flow, oxygen & energy delivery to heart & brain.

- The chest must be allowed to fully recoil between each compression to allow blood to flow back into the heart following the compression.

- Rescuer must keep in mind to “Push Hard & Push Fast” on the centre of chest while delivering compressions till the return of patient’s pulses.

**Ventilations** - Ventilation is another component of CPR.

- Briefly check for breathing response of the patient quickly.

- After first set of i.e. 30 chest compressions, the airway is opened and rescuer delivers 2 breaths.

- Clear up if any artificial dentures/secretions etc are present in patient’s mouth
  - Open the airway by head-tilt chin lift or jaw thrust manoeuvre as already discussed.
  - Start rescue breathings by mouth-to-mouth/mouth-to-nose/Bag-valve-mask (BVM) resuscitator.

**Mouth-to-mouth breathing (Fig. 1.10)**

**NOTE:** Only if there is no choice and also use a barrier to prevent infection.

- Pinch the nostrils closed using thumb and index finger of the hand which is placed in the forehead.

- Take a deep breath, open your mouth wide, place it around outside edge of patient’s mouth to create an airtight seal.

- Ventilate the patient with two full breaths. Take a break between breaths by breaking the seal slightly between ventilations and then taking a breath before re-sealing over the mouth.

- When giving ventilations, if the chest does not rise after the first breath, reopen the airway, make a seal and try a second breath.

- If the breath is not successful, move directly back to compressions and check the airway for an obstruction before attempting subsequent ventilations. If an obstruction is found, remove it and attempt ventilations.

**Mouth to nose ventilation (Fig. 1.11)**

In certain situations mouth to mouth ventilation is not possible. Then we need to
give mouth to nose ventilation. In this case the rescuer needs to close the mouth of the patient to provide an effective ventilation. Otherwise the technique of taking in the breath and blowing in patient’s nose remain the same.

**Fig. 1.10 : Mouth to mouth ventilation**  
**Fig. 1.11: Mouth to nose ventilation**

**Bag-Valve-Mask Resuscitator**

A bag-valve-mask (BVM) resuscitator (Fig. 1.12) is a handheld device used to ventilate patients and administer higher concentrations of oxygen than a pocket mask. While often used by a single rescuer, evidence shows that two rescuers are needed to effectively operate a BVM. One rescuer opens and maintains the airway and ensures the BVM mask seal, while the second rescuer delivers ventilations by squeezing the bag slowly with both hands at the correct intervals to the point of creating chest rise.

The technique of using the BVM is as follows:

- Assemble the BVM as needed.
- Open the airway.
- Use an E-C hand position (first rescuer): (Fig. 1.13)
- Place both hands around the mask, forming an E with the last three fingers on each and a C with the thumb and index finger around both sides of the mask.
- Seal the mask completely around the patient’s mouth and nose by lifting the jaw into the mask while maintaining an open airway.
- Provide ventilations (second rescuer):
  - Depress the bag about halfway to deliver between 400 to 700 milliliters of volume to make the chest rise.
  - Give smooth and effortless ventilations that last about 1 second.
  - After first set of i.e. 30 chest compressions, the airway is opened and rescuer delivers 2 breaths.
  - When giving ventilations, if the chest does not rise after the first breath, reopen the airway, make a seal and try a second breath.
  - If the breath is not successful, move directly back to compressions and check the airway for an obstruction before attempting subsequent ventilations. If an obstruction is found, remove it and attempt ventilations.
  - Rescuer must ventilate the patient during the chest recoil with the artificial breaths.
- Recheck the pulse every 2 minutes, if still no pulse is felt, start again cycles of 30 compressions & 2 breaths till AED arrives.

**Fig. 1.12**: Bag-valve-mask (BVM) resuscitator

**Fig. 1.13**: E-C hand position

**Basic Life Support (BLS): Adult Algorithm**

1) Check responsiveness; if none, follow steps below
   - Activate emergency response system
   - Get automated external defibrillator (AED)

2) Check pulse for < 10 seconds; if no pulse, follow steps below
   - Start high-quality cardiopulmonary resuscitation (CPR) at a compressions-to-breaths ratio of 30:2
   - Every 2 minutes, check pulse, check rhythm, and switch compressors
   - High-quality CPR and changing rescuers every 2 minutes improves a victim’s chance of survival

3) Attach AED as soon as available; if shockable rhythm, defibrillate and then immediately start CPR

**Compressions**

See the list below:

- Check pulse at carotid artery
- Compression landmarks: Lower half of sternum between the nipples
- Compression method: Heel of one hand, other hand on top
- Depth: At least 2 in (5 cm)
- Allow complete chest recoil after each compression
- Compression rate: At least 100/min
- Compression-to-ventilations ratio, 30:2
- Continuous compressions if advanced airway present
- Rotate compressor every 2 minutes
- Minimise interruptions in compressions to < 10 seconds
- Avoid excessive ventilation
- If end-tidal carbon dioxide tension (PETCO₂) < 10 mm Hg, attempt to improve CPR quality
- If diastolic pressure < 20 mm Hg, attempt to improve CPR quality

Adult CPR algorithm is shown in Fig. 1.14.

Fig. 1.14 : Simplified Adult BLS Algorithm

Source: Highlights of 2010 AHA Guidelines for CPR & ECC

Stopping CPR
Once started, continue CPR with 30 compressions followed by 2 ventilations (1 cycle = 30:2) until:
- You see signs of return of spontaneous circulation (ROSC) such as patient movement or breathing.
- An AED is ready to analyze the patient’s heart rhythm.
- Other trained rescuers take over and relieve you from compression or ventilation responsibilities.
- You are presented with a valid do not resuscitate (DNR) order.
- You are alone and too exhausted to continue.
- The scene becomes unsafe.
1.5 LET US SUM UP

In this practical block, the indication and steps of cardio pulmonary resuscitation has been highlighted. It is important to have the knowledge and practice of CPR and teach the lay persons in the community in recognising and providing basic life support in case of need.

1.6 ACTIVITY

Prepare a teaching plan for adolescents, and adults from your community on recognising the need and providing basic life support to clients who may have developed cardiac arrest or respiratory arrest.

1.7 REFERENCES


3) Highlights of 2010 AHA Guidelines for CPR & ECC.