Basic Life Support Study Guide

Taking the right action quickly and confidently can make the difference between life and death for a person dealing with cardiac arrest!

General Concepts of Basic Life Support

According to the Centers for Disease Control (CDC), heart disease continues to be the leading cause of death in the United States. Research continues to improve how we respond with life-saving techniques to emergencies. These techniques are organized into a systematic response called the Chain of Survival, which begins with Basic Life Support (BLS). The Chain of Survival provides the victim the best chance to receive the care needed and return to a healthy life.

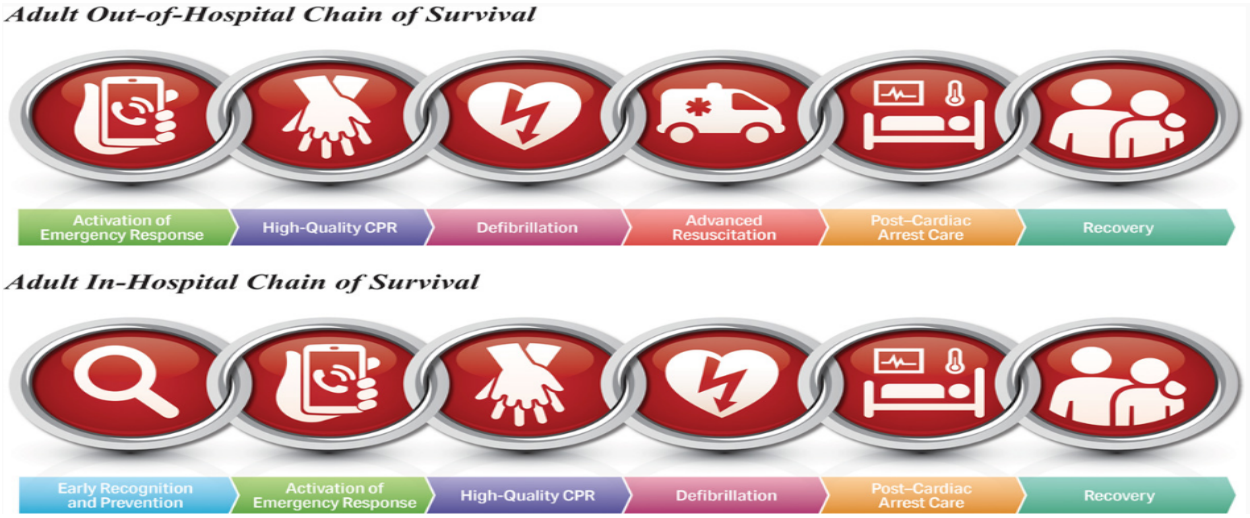
The heart pumps blood through the lungs, where blood takes in oxygen and releases carbon dioxide. This blood then returns to the heart and is pumped to vital organs. When the heart stops, blood flow stops, and the person quickly becomes unconscious. Without blood flow, the heart and the brain soon become damaged due to a lack of oxygen. The actions that make up BLS try to prevent or slow the damage until the cause of the problem can be corrected. BLS improves a person's chance of surviving until advanced care becomes available.

Keys for BLS:

- Quickly start the Chain of Survival.
- Deliver high-quality chest compressions to circulate oxygen to the brain and vital organs.
- Know when and how to use an Automated External Defibrillator (AED).
- Provide rescue breathing.
- Understand how to work with other rescuers as part of a team.
- Know how to treat choking.

Initiating Chain of Survival

Early initiation of BLS has been shown to increase the probability of survival for a person in cardiac arrest. The rescuer should follow the Adult Chain of Survival steps to increase the odds of surviving a cardiac event. The steps vary based on out-of-hospital cardiac arrest vs. in-hospital cardiac arrest.



BLS for Adults

One Rescuer BLS/CPR for Adults

- Be Safe
    - Make sure the scene is safe before proceeding.
    - Move the person out of traffic.
    - Move the person out of water and dry the person.
    - Be sure you do not become injured yourself.

- Assess the Person
    - Shake the person, tap their shoulder hard, and talk to them loudly.

- Check for a pulse and see if the person is breathing.
    - Agonal breathing and occasional gasping do not count as breathing.
    - Check for the pulse on the carotid artery, preferably the side closest to you.

- Call EMS
    - Send someone for help and to get an AED if available.
    - If alone, call for help while assessing for breathing and pulse.
    - Cell phones are available in many situations; most have built-in speakerphones. Call for help without leaving the person.

- CPR
    - Begin sets of compressions and rescue breaths.
    - Attach the AED pads when available.

ADULT CPR STEPS

- Check for the carotid pulse on the side of the neck and look for breathing.
    - Remember not to waste time trying to feel for a pulse; feel for no more than 10 seconds. If you are not sure you feel a pulse, begin CPR.

- Start chest compress
    - Use the heel of one hand on the lower half of the sternum in the middle of the chest.
    - Put your other hand on top of the first hand.
    - Straighten your arms and press straight down.
    - Compressions should be 2 to 2.4″ (5 to 6 cm) into the person's chest and at 100 to 120 compressions per minute.

- After 30 compressions, stop compressions and open the airway by tilting the head and lifting the chin.
    - Put your hand on the person's forehead and tilt the head back.
    - Lift the person's jaw by placing your index and middle fingers on the lower jaw.

- Give a breath while watching the chest rise. Repeat while giving a second breath. Breaths should be delivered over one second.

- Resume chest compressions. Switch quickly between compressions and rescue breaths to minimize interruptions in chest compressions.

Stop pressing the chest between each compression and allow the chest wall to return to its natural position. Leaning or resting on the chest between compressions can keep the heart from refilling in between each compression and make CPR less effective.

Do not perform the head tilt/chin-lift if you suspect the person may have a neck injury. In that case, the jaw thrust is used.

For the jaw-thrust maneuver, grasp the angles of the lower jaw and lift it with both hands, one on each side, moving the jaw forward. If their lips are closed, open the lower lip using your thumb.

Two-Rescuer BLS/CPR for Adults.

A second person will often be available to act as a rescuer. Cell phones are available everywhere now, and most have built-in speakerphones. Direct the second rescuer to call 911 or Emergency Medical Services (EMS) without leaving the person while you begin CPR. This second rescuer can also find an AED while you stay with the person. When the second rescuer returns, the CPR tasks can be shared:

- The second rescuer prepares the AED for use.
- You begin chest compressions and count the compressions out loud.
- The second rescuer applies the AED pads.
- The second rescuer opens the person's airway and gives rescue breaths.
- Switch roles after every five cycles of compressions and breaths. One cycle consists of 30 compressions and two breaths.
- Rescuers who become tired may tend to lean on the chest more during compressions; switching roles helps rescuers perform high-quality compressions.
- Quickly switch between roles to minimize interruptions in delivering chest compressions.
- When the AED is connected, minimize interruptions of CPR by switching rescuers while the AED analyzes the heart rhythm. Resume CPR as soon as possible.

Adult Mouth-to-Mask and Bag-Mask Ventilation

ADULT MOUTH-TO-MASK VENTILATION

In one-rescuer CPR, breaths should be supplied using a pocket mask, if available.

- Seal the mask against the person's face by placing four fingers of one hand across the top and the thumb of the other hand along the bottom edge of the mask.
- Using the fingers of your hand on the bottom of the mask, open the airway using the head-tilt/chin-lift maneuver.
    - Do not do this if you suspect the person may have a neck injury.
- Press firmly around the edges of the mask and ventilate by delivering a breath over one second as you watch the person's chest rise.

ADULT BAG-MASK VENTILATION IN TWO-RESCUER CPR

If two people are present and a bag-mask device is available, the second rescuer is positioned at the victim's head while the other rescuer performs high-quality chest compressions. Give 30 high-quality chest compressions.

- The second rescuer holds the bag mask with one hand using the thumb and index finger in the shape of a "C" on one side of the mask to form a seal between the mask and the face, while the other fingers open the airway by lifting the person's lower jaw.
- The second rescuer gives two breaths over one second each as you watch the person's chest rise.

Practice using the bag-valve-mask; it is essential to forming a tight seal and delivering effective breaths!

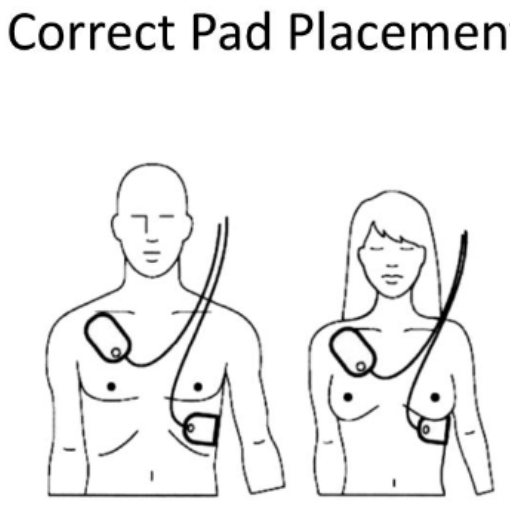
Automated External Defibrillator (AED)

Ventricular fibrillation, caused by disorganized electrical activity in the heart's main pumping chambers, is a common cause of cardiac arrest. The treatment for ventricular fibrillation is defibrillation, or the delivery of an electric shock to the heart through the person's chest wall. This shock stops the disorganized electrical activity and resumes the heart's normal rhythm.

The automated external defibrillator (AED) is a device that recognizes ventricular fibrillation and other dysrhythmias and delivers an electric shock at the right time. The AED has become a common sight in public buildings. The AED is nearly foolproof and will not allow you to make a mistake. It is safe for anyone to use. In a witnessed cardiac arrest, where the person is observed to collapse suddenly, the most common cause is likely to be ventricular fibrillation, and a defibrillator should analyze the person's cardiac rhythm as soon as possible.

AED STEPS

- Retrieve the AED.
- Open the case.
- Turn on the AED.
- Expose the person's chest.
- Open the AED pads.
- Peel off the backing.
- Apply the pads.
- Apply one pad on the upper right chest above the breast.
- Apply the second pad on the lower left chest below the armpit.
- Let AED analyze the rhythm.
- If the AED message reads "Shock advised,"
- Ensure the person is "clear" by ensuring no one is touching them.
- Press and hold the "shock" button until the AED delivers the shock
- Resume CPR.



BLS for Children 1 – Puberty

Many similarities exist between the BLS guidelines for Adults and Children. The main differences between the two are:

- For children, the compression-to-breath ratio is 30:2 for one rescuer and 15:2 for two rescuers for all age groups.

- The depth of compression may be different. For a child, compress the chest at least one-third of the depth of the chest. This may be less than two inches for small children but approximately two inches for larger children (4-5 cm).

- In children, primary cardiac events are not common. Respiratory problems most commonly precede cardiac arrest. Survival rates improve with early intervention for respiratory issues. Remember that prevention is the first link in the Pediatric Chain of Survival.

Emergencies in children and infants are not usually caused by the heart. Children and infants most often have breathing problems that trigger cardiac arrest. The first and most important step of the Pediatric Chain of Survival is prevention.

Pediatric Out-of-Hospital Chain of Survival

Pediatric In-Hospital Chain of Survival

BLS for Infants (0 to 12 months old)

BLS for children and infants is similar. The following are the main differences between BLS for children and BLS for infants:

- Check the pulse in the infant using the brachial artery on the inside of the upper arm between the infant's elbow and shoulder.

- During CPR, compressions can be performed on an infant using two fingers if only one rescuer or with two thumb-encircling hands if there are two rescuers and the rescuer's hands are big enough to go around the infant's chest.

- Compression depth should be one-third of the chest depth; for most infants, this is about 1.5 inches (4cm).

- In infants, primary cardiac events are not common. Usually, cardiac arrest will be preceded by respiratory problems. Survival rates improve when you intervene with respiratory issues as early as possible. Remember that prevention is the first step in the Pediatric Chain of Survival.

Automated External Defibrillator (AED) Infants & Children

An AED can be used on infants and children. They should be used as early as possible for the best chance of improving the chance of survival. Check the AED when it arrives at the scene. Pediatric pads should be used if the person is under eight years old or under 55 pounds (25 kg). Standard (adult) pads may be used if pediatric pads are unavailable. Do not let the pads touch if using standard (adult) pads. A manual defibrillator should be used if available for infants under a year old. If a manual defibrillator is not available, an AED may be used. Some AEDs have a switch that can be set to deliver a pediatric shock. If the AED cannot deliver a pediatric shock, an adult shock should be given. It is important to remember that an electric shock may treat a fatal heart rhythm.

Relief of Choking For Adults, Children, and Infants

Choking is a common preventable cause of cardiac arrest. The correct response for a choking person depends on the degree of airway obstruction, whether the person is responsive, and age.

Choking In Adults And Children

DEGREE OF OBSTRUCTION	PERSON'S RESPONSE	RESCUERS ACTION
Mild Obstruction	● Breathing but may also be wheezing. ● Coughing and making noise.	● Stay with the person, try to keep them calm, ● Encourage them to cough, ● Call 911/EMS if the person seems to get worse.
Severe Obstruction	● Clutching the neck. ● Weak or no cough. ● Unable to make noise or talk; may make high-pitched noise. ● Little or no breathing. ● Appears cyanotic (blue around lips and fingertips).	● Use abdominal thrusts to attempt to remove the obstruction. ● Call 911/EMS ● Begin BLS if the person becomes unresponsive.

Abdominal Thrusts
These steps should only be used when a person is responsive and older than one year old.

- To properly perform the abdominal thrusts, do the following:
- Stand behind the responsive person. Wrap your arms around their waist under their ribcage.
- Put the side of your fist above the person's navel in the middle of their belly. Do not press on the lower part of the sternum.
- With your other hand, hold the first fist and press forcefully into the person's abdomen and up toward their chest.
- Continue performing these thrusts until the obstruction is relieved or until the person becomes unresponsive.

If you can see a foreign object in the individual's mouth and easily remove it, do it. Watch and feel for breathing to begin. If the individual does not begin breathing, continue to provide CPR and rescue breaths until help arrives.

Choking In Infants

DEGREE OF OBSTRUCTION	INFANTS' RESPONSE	RESCUERS ACTION
Mild Obstruction	● Breathing but may also be wheezing ● Coughing and making noise.	● Stay with the infant, and try to keep them calm. ● Do not do a blind finger sweep. ● Call 911/EMS if the infant does not quickly clear the obstruction
Severe Obstruction	● Weak or no cough ● Unable to make noise; may make high-pitched noise. ● Little or no breathing ● Appears cyanotic (blue around lips and fingertips)	● Use back blows/chest thrusts to attempt to remove obstruction ● Call 911/EMS ● Begin BLS if the infant becomes unresponsive. ● Assess if the obstruction is visible; if so, remove it.

Choking In Infants

In a choking but responsive infant less than one year old, back blows, and chest thrusts are used instead of abdominal thrusts. To provide back blows and chest thrusts, do the following:

- Hold the infant in your lap.
- Put the infant with their face down and their head lower than their chest; they should rest on your forearm. Put your forearm on your thigh.
- Support the infant's head and neck with your hand, and avoid putting pressure on their throat.
- Using the heel of your free hand, deliver five back blows between the infant's shoulder blades.
- Using both hands and arms, turn the infant face up so they are resting on your other arm; this arm should now be resting on your thigh.
- Make sure the infant's head is lower than their chest.
- Using the fingers of your free hand, provide up to five quick downward chest thrusts over the lower half of the breastbone.
- If the obstruction is not relieved, turn the infant face down on your other forearm and repeat the process.
- Continue doing these steps until the infant begins to breathe or becomes unresponsive.

References:

GENERAL CONCEPTS OF BASIC LIFE SUPPORT.
https://nhcps.com/lesson/general-concepts-basic-life-support/

Basic Life Support For Children 1-8 Years Old.
https://nhcps.com/lesson/bls-for-children-1-8-years-old/

(BLS) Relief Of Choking In Adults, Children & Infants.
https://nhcps.com/lesson/relief-of-choking-for-adults-children-infants/

2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000918