

Basic Life Support for Infants

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Early recognition and treatment of sudden cardiac arrest improve survival for children. Basic Life Support (BSL) involves a systematic approach to initial patient assessment, activation of emergency medical services, and the initiation of cardio pulmonary resuscitation (CPR) including defibrillation. The key components of effective CPR include adequate ventilation and chest compressions.

Epidemiology

Cardiopulmonary arrest among infants and children is typically caused by progressive tissue hypoxia and acidosis as the result of respiratory failure or shock causes of respiratory failure and shock leading to CPR in these age groups include trauma, sudden infant death syndrome, respiratory distress and sepsis.

Definitions

Basic Life Support (BLS) is a level of medical care which is used for victims of life threatening illnesses or injuries until they can be given full medical care at a hospital. It can be provided by trained medical personnel including emergency medical technicians, paramedics and by qualified by-standers.

Emergency procedures performed to sustain life include cardio pulmonary resuscitation, control of bleeding, treatment of shock, stabilisation of injuries and wounds and first aid.

Basic Life Support skills are very similar to those used for child and adult CPR. The key differences for infant BLS are:

- The location of pulse check: brachial artery in infants
- Technique of delivering compressions: 2 fingers for single rescuer and 2 thumb-encircling hands technique for 2 rescuers
- Compression depth: at least one third the chest depth, approximately 4 cm (1½ inches)
- Compression-ventilation rate and ratio for 2 rescuers child – 15:2 ratio for 2 rescuers.

Locating the Brachial Artery Pulse

To perform a pulse check in an infant, palpate a brachial pulse, it can be difficult for healthcare provid-

ers to determine the presence or absence of pulse in any victim, but it can be particularly difficult in an infant. The BLS algorithm for infants is shown in Fig 1.

If an infant is unresponsive and not breathing or only gasping and does not definitely feel a pulse within 10 seconds, start CPR. It is important to begin with chest compressions if the infant does not definitely feel a pulse within 10 seconds.

Follow these steps to locate the brachial artery pulse:

Step 1: Place 2 or 3 fingers on the inside of the upper arm, between the infant's elbow and shoulder.

Step 2: Press the index and middle fingers gently on the inside of the upper arm for at least 5 but no more than 10 seconds when attempting to feel the pulse.

Compression Depth in Infants

In infants, the recommended compression depth is at least one-third of the anterior-posterior depth of the infant's chest, or approximately 4 cm (1½ inches). This is different from compression depth for both adults (at least 5 cm or 2 inches) and children (at least one-third the depth of the chest, approximately 5 cm (2 inches)).

Compression Rate and Ratio for Lone Rescuer

The lone rescuer should use the universal compression-ventilation ratio of 30 compressions to 2 breaths when giving CPR to victims of all ages. The term universal represents an attempt to develop a consistent ratio for lone rescuers.

1-Rescuer Infant BLS Sequence

Follow these steps to perform 1- rescuer BLS for an infant

Step and Action

- 1 Check the infant for a response and check breathing. If there is no response and no breathing or only gasping, shout for help.
- 2 If someone responds, send that person to activate the emergency response system and get the AED (or defibrillator).
- 3 Check the infant's brachial pulse (take at least 5 but no more than 10 seconds).
- 4 If there is no pulse or if, despite adequate oxygenation and ventilation, the heart rate is <60/

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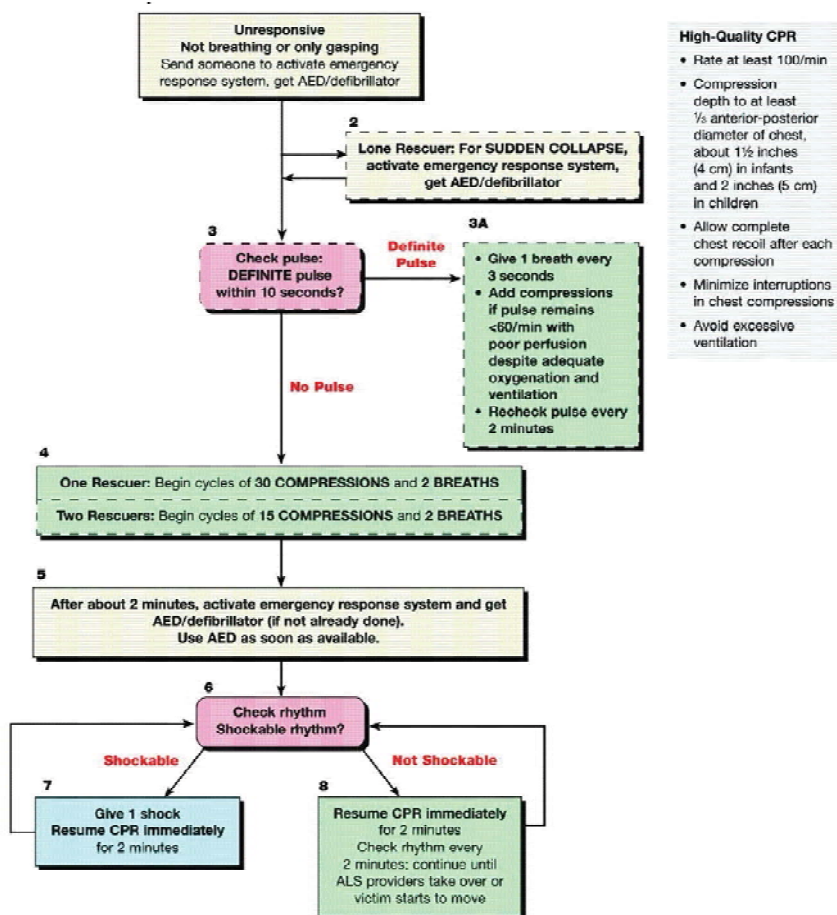


Fig 1: Paediatric BLS algorithm

min with signs of poor perfusion, perform cycles of compressions and breaths (30:2 ratio), starting with compressions.

- After 5 cycles, if someone has not already done so, activate the emergency response system and get the AED (or defibrillator).

2-Finger Chest Compressions Technique: Follow these steps to give chest compressions to an infant using the 2-finger technique.

Step and Action

- Place the infant on a firm, flat surface.
- Place 2 fingers in the centre of the infant's chest just below the nipple line. Do not press on the bottom of the breast bone (Fig 2)
- Push hard and fast. To give chest compressions, press the infant's breast bone down at least one third the depth of the chest (approximately 4 cm or 1 1/2 inches). Deliver compression in a smooth fashion at a rate of at least 100/min.
- At the end of each compression, make sure allow the chest to recoil (re-expand) completely. Chest recoil allows blood to flow into the heart and is necessary to create blood flow during chest

compressions. Incomplete chest recoil will reduce the blood flow created by chest compressions. Chest compression and chest recoil/relaxation times should be approximately equal.

- Minimise interruptions in chest compressions.

Infant Ventilation with barrier devices

To provide bag-mask ventilation, select a bag and mask of appropriate size. The mask must be able to cover the infant's mouth and nose completely without covering the eyes or overlapping the chin. Select the bag and mask, perform a head tilt-chin lift to open the victim's airway. Press the mask to the infant's face and lift the infant's jaw, making a seal between the infant's face and the mask. Connect supplementary oxygen to the mask when available.

Why breaths are important for infants of children in cardiac arrest?

When sudden cardiac arrest occurs (i.e. typical cardiac arrest), the oxygen content of the blood is typically normal, so compressions alone may maintain adequate oxygen delivery to the heart and brain for

the first few minutes after arrest.

In contrast, infants and children who develop cardiac arrest often have respiratory failure or shock that reduces the oxygen content in the blood even before the onset of arrest. As a result, for most infants and children in cardiac arrest, chest compressions alone are not as effective for delivering oxygen to the heart and brain as the combination of compressions plus breaths. For this reason, it is very important to give both compressions and breaths for infants and children during CPR.

Caution

Keep head in neutral position if tilt (extend) an



Fig 2: CPR being given to infant

infant's head beyond the neutral (sniffing) position, the infant's airway may become blocked. Maximize airway patency by positioning the infant with the neck in a neutral position so that the external ear canal is level with the top of the infant's shoulder.

Rescuer Infant CPR

2-Thumb-Encircling Hands Chest Compression Technique is the preferred 2-rescuer chest compression technique for healthcare providers who can fit their hands around the infant's chest (Fig 3). This technique produces blood flow by compressing the chest with both the thumbs. The 2 thumb-encircling hand technique produces better blood flow, more consistently results in appropriate depth or force of compression, and may generate higher blood pressures than the 2-finger technique.

Follow these steps to give chest compressions to an infant using the 2 thumb-encircling hand technique.

Step and Action

- 1 Place both thumbs side by side in the centre of the infant's chest on the lower half of the breastbone. The thumbs may overlap in very small infants.
- 2 Encircle the infant's chest and support the infant's back with the fingers of both hands.
- 3 With help of hands encircling the chest, use both thumbs to depress the breastbone approximately one-third the depth of the infant's chest (approximately 4 cm or 1½ inches).
- 4 Deliver compressions in a smooth fashion at a rate of at least 100/min.
- 5 After each compression, completely release the pressure on the breast bone and allow the chest to recoil completely.
- 6 After every 15 compressions, pause briefly for the second rescuer to open the airway with a head tilt-chin lift and give 2 breaths. The chest should rise with each breath.



Fig 3: 2-Thumb chest compression technique

2 – Rescuer infant BLS sequence

Follow these steps for 2-rescuer BLS for infants.

Step and Action

- 1 Check the victim for a response and for breathing.
- 2 If there is no response and no breathing or only gasping, send the second rescuer to activate the emergency response system and get the AED (or defibrillator).
- 3 Check the infant's brachial pulse (take at least 5 but no more than 10 seconds).
- 4 If there is no pulse or if despite adequate oxygenation and ventilation, the heart rate (pulse) is < 60/min with signs of poor perfusion, perform cycles of compressions and breaths (30:2 ratio), starting with compressions. When the second rescuer arrives and can perform CPR, use a compression-ventilation ratio of 15:2.
- 5 Use the AED (or defibrillator) as soon as it is available.

Conclusion

Basic Life Support training programmes are becoming more widespread and represent an important change in the focus of CPR training. The value of early CPR is that it can buy time for the primary cardiac arrest patient by producing enough blood flow to the brain and heart to maintain temporary viability. BLS is not an end. It is the beginning of surviving a person under arrest.

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