ACLS
MEDICAL TRAINING

BLS

Basic Life Support

Provider Manual

2020-2025
EDITION

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Unit One: General Concepts of Basic Life Support

Basic Life Support (BLS) has changed dramatically over the years to make it more accessible to the general public and more effective for the victim of cardiac arrest. Cardiac arrest is the leading cause of death in the world; individuals with a knowledge of BLS can intervene early and possibly prevent a death associated with sudden cardiac arrest. This training provides you with the knowledge to:

- Initiate the chain of survival as soon as a possible problem is identified
- Initiate immediate high-quality chest compressions for any victim
- Provide early defibrillation with an Automated External Defibrillator (AED) as soon as one is available
- Initiate rescue breathing when respiration is inadequate
- Perform BLS as a team
- Relieve a choking episode.

Delivering the Most Up-to-Date Guidelines Available

The International Liaison Committee on Resuscitation (ILCOR) has been the definitive source for resuscitation guidelines for decades. ILCOR recommendations are based on cutting edge biomedical and clinical research. Organizations such as the American Heart Association (AHA) and the European Resuscitation Council (ERC) contribute to Consensus on Science and Treatment Recommendations (CoSTR) and then publish their findings in the journals *Circulation* and *Resuscitation*, respectively.

BLS Manual Updates At-A-Glance: 2020 to 2025

Current Recommendations - Guideline Updates
Dispatchers should provide chest compression-only CPR instructions to callers for adults with suspected out-of-hospital cardiac arrest (OHCA)
Bystanders should perform chest compressions for all patients in cardiac arrest
Bystanders who are trained, able, and willing to give rescue breaths and chest compressions should do so for all adult patients in cardiac arrest
Bystanders should provide CPR with ventilation for infants and children less than 18 years of age with OHCA
Bystanders who cannot provide rescue breaths as part of CPR for infants and children less than 18 years of age with OHCA, should at least provide chest compressions
EMS dispatchers should offer dispatcher-assisted CPR instructions for presumed pediatric cardiac arrest
EMS dispatchers should offer dispatcher-assisted CPR instructions for pediatric cardiac arrest when no bystander CPR is in progress
For EMS systems, a reasonable alternative to conventional CPR for witnessed shockable OHCA is minimally interrupted cardiac resuscitation
Before placement of an advanced airway (supraglottic airway or tracheal tube), EMS providers should perform CPR with cycles of 30 compressions and 2 breaths
EMS providers should perform CPR with 30 compressions to 2 ventilations or continuous chest compressions with positive-pressure ventilation (PPV) without pausing chest compressions until a tracheal tube or supraglottic device is placed
Whenever an advanced airway (tracheal tube or supraglottic device) is inserted during CPR, it may be reasonable for providers to perform continuous compressions with PPV delivered without pausing chest compressions
After placement of an advanced airway in adults, it may be reasonable for the provider to deliver 1 breath every 6 seconds (10 breaths per minute) while continuous chest compressions are being performed
For infants and children receiving CPR with an advanced airway or who have a pulse but are undergoing rescue breathing, the recommended respiratory rate has been increased to 20 to 30 breaths per minute (1 breath every 2 to 3 seconds). Previously 1 breath every 6 to 8 seconds with advanced airway or 3 to 5 seconds during CPR without advanced airway
For pediatric patients with cardiac arrest due to pulseless electrical activity or asystole, the initial dose of epinephrine should be given as soon as possible during CPR to improve the chance of survival
For pediatric patients with suspected opioid overdose, naloxone administration is reasonable in addition to BLS/PALS; however, resuscitative measures for cardiac arrest (e.g., high quality CPR) should take priority over naloxone administration
The Suspected Opioid Poisoning algorithm has been updated (Figure 16)

Table 1: BLS Manual Updates At-A-Glance: 2020 to 2025

Initiating the Chain of Survival

Research shows that BLS can increase the rate of survival for certain victims of cardiac arrest. Typically, pediatric victims begin the collapse process after suffering dehydration or respiratory problems. This population rarely experiences primary cardiac arrest. If respiratory events and dehydration can be prevented, cardiac arrest can often be avoided. Therefore, it is critical to prevent the need for resuscitation in infants and children.

Figure 1: Pediatric Chain of Survival

For adult victims it is critical that the Adult Cardiac Arrest Chain of Survival is initiated quickly and performed effectively. The Adult Cardiac Arrest Chain of Survival has been updated to include a different response whether the cardiac arrest takes place inside or outside of the hospital.

Figure 2: In-Hospital Adult Cardiac Arrest Chain of Survival

Figure 3: Outside-of-Hospital Adult Cardiac Arrest Chain of Survival

Unit Two: BLS for Adults

The BLS process for adults teaches one-rescuer CPR but also recognizes that there may be more rescuers available to help. In the BLS course, students learn both one- and two-rescuer CPR.

One-Rescuer Adult BLS

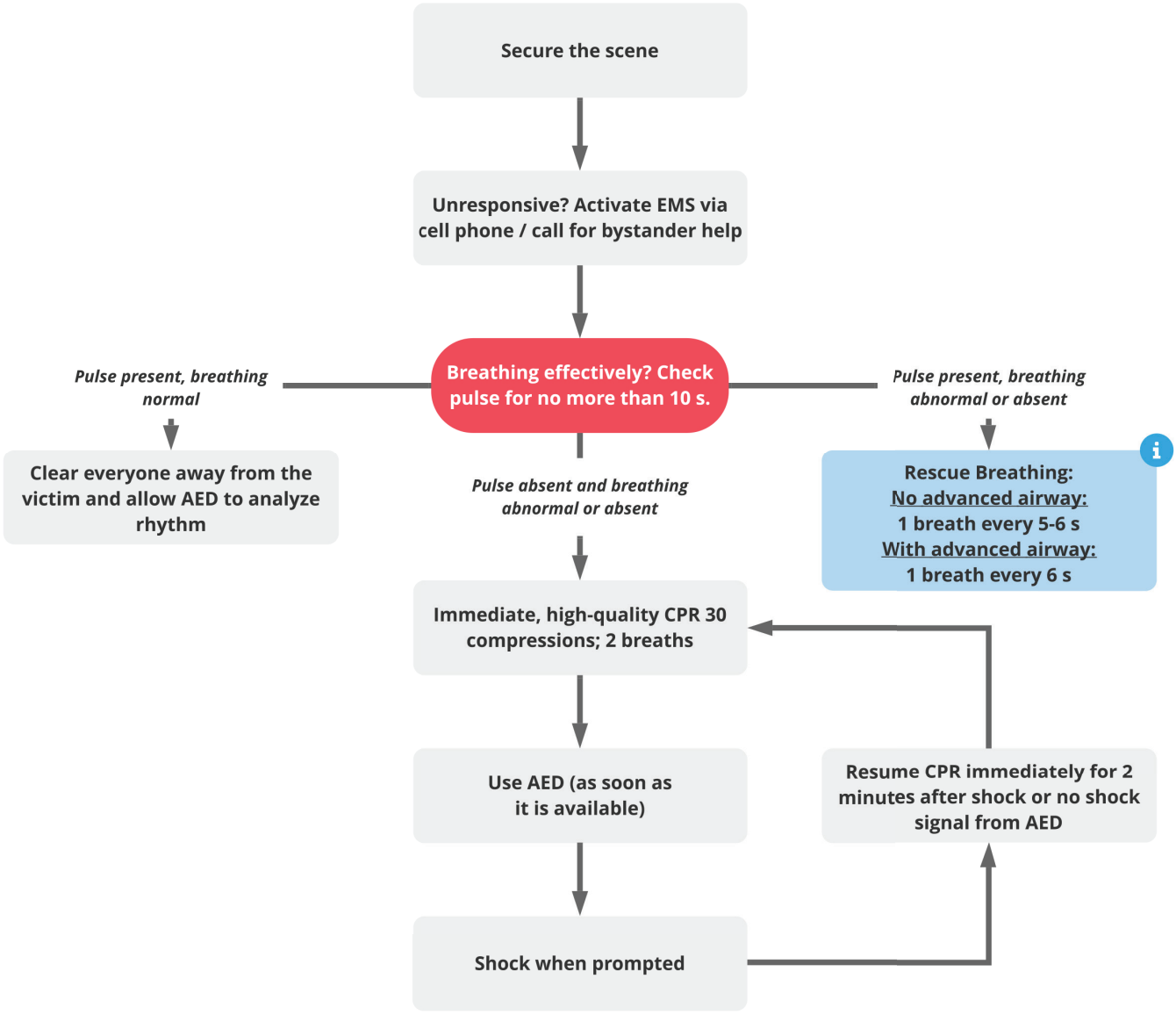

Figure 4: BLS Adult Algorithm

One-Rescuer CPR

Once the assessment is complete and you have determined that the victim is not responsive, does not have a pulse, and is not breathing, it is important to start CPR.

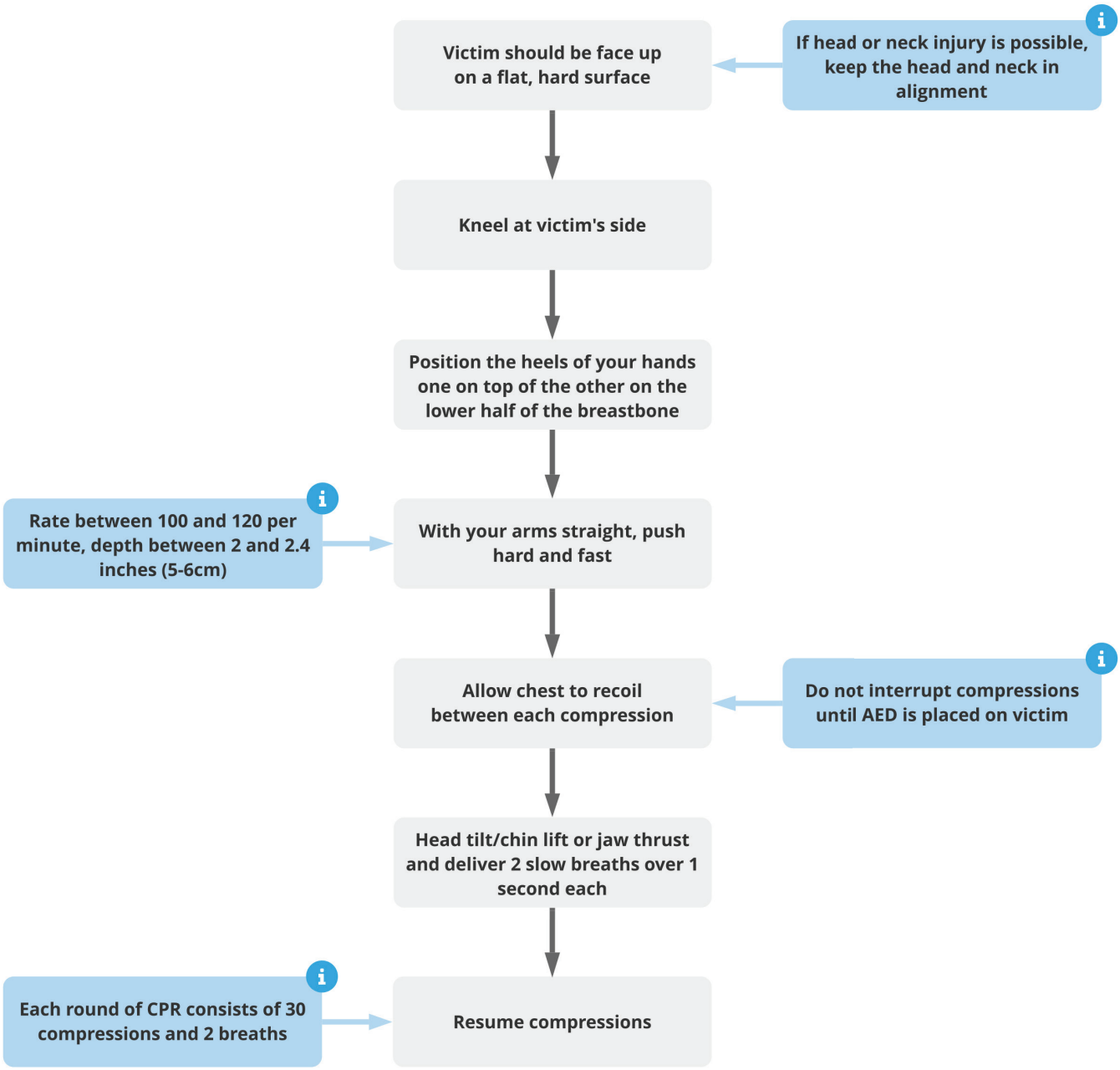

Figure 5: BLS CPR Algorithm

Two-Rescuer Adult BLS/CPR

Sometimes there will be more than one person available to perform CPR. If a second person is available, the steps of CPR do not change, but the tasks can be shared by the team:

- Send the second person to activate EMS and retrieve an AED if one is readily available. At the same time, the first rescuer begins CPR.
- When the second rescuer returns, have them prepare the AED for use. The first person continues CPR, counting compressions aloud.
- When the AED is open and ready, continue CPR while applying the pads.
- Stop CPR to allow the AED device to analyze the victim's cardiac rhythm and to provide shocks, if needed.
- The second rescuer ensures that the victim's airway is open then gives 2 rescue breaths, each lasting 1 second.
- The rescuers should switch positions every 2 minutes (5 cycles of 30 compressions and 2 breaths) to ensure compressions do not become ineffective due to fatigue.
- Whenever an advanced airway (tracheal tube or supraglottic device) is inserted during CPR, providers should perform continuous compressions with positive-pressure ventilation (without pausing chest compressions).

Adult Mouth-to-Mask Ventilation

When performing one-rescuer CPR, rescue breaths should be supplied using a mask if available.

1. Perform 30 chest compressions between 2 and 2.4 inches (5 to 6 cm) deep at a rate between 100 and 120 per minute.
2. Seal the mask against the victim's face by forming your hand in a "C-E" shape and pressing down on the top and bottom edges of the mask. The thumb and index fingers form the "C" while the other three fingers form the "E."
3. Unless you think the victim may have a neck injury, open the airway using the head tilt/chin lift.
4. If you suspect the victim may have a neck injury, open the airway using a jaw thrust.
5. Give 2 breaths, each over 1 second, that cause the victim's chest to rise.

Many rescuers feel uncomfortable or unable to provide mouth-to-mouth ventilations. Because of this they hesitate to perform CPR. Simply providing chest compressions to someone in cardiac arrest is better than not helping at all. In fact, if ventilations cannot be delivered properly and/or in a timely manner, rescue time is better spent delivering chest compressions only. Compression-only CPR is recommended for rescuers who cannot or will not deliver ventilations.

The large majority of cases of pediatric arrest are due to pulmonary issues rather than cardiac problems. When possible and appropriate, it is better to deliver ventilations than compressions only. Nevertheless, if the rescuer of a pediatric victim cannot or will not give ventilations, compression-only CPR is better than not helping at all.

Adult Bag-Mask Ventilation in Two-Rescuer CPR

If two or more rescuers are available with a bag-mask device, one rescuer should continue compressions while the second rescuer seals the mask over the victim's face and delivers two rescue breaths after every 30 compressions. Ventilations should be delivered over 1 second, regardless of age.

Unit Three: BLS for Infants and Children

One-Rescuer BLS for Infants and Children

If you are alone and an infant (0-12 months) or a child (1 year to puberty) is unresponsive, follow the BLS Infant and Child Algorithm:

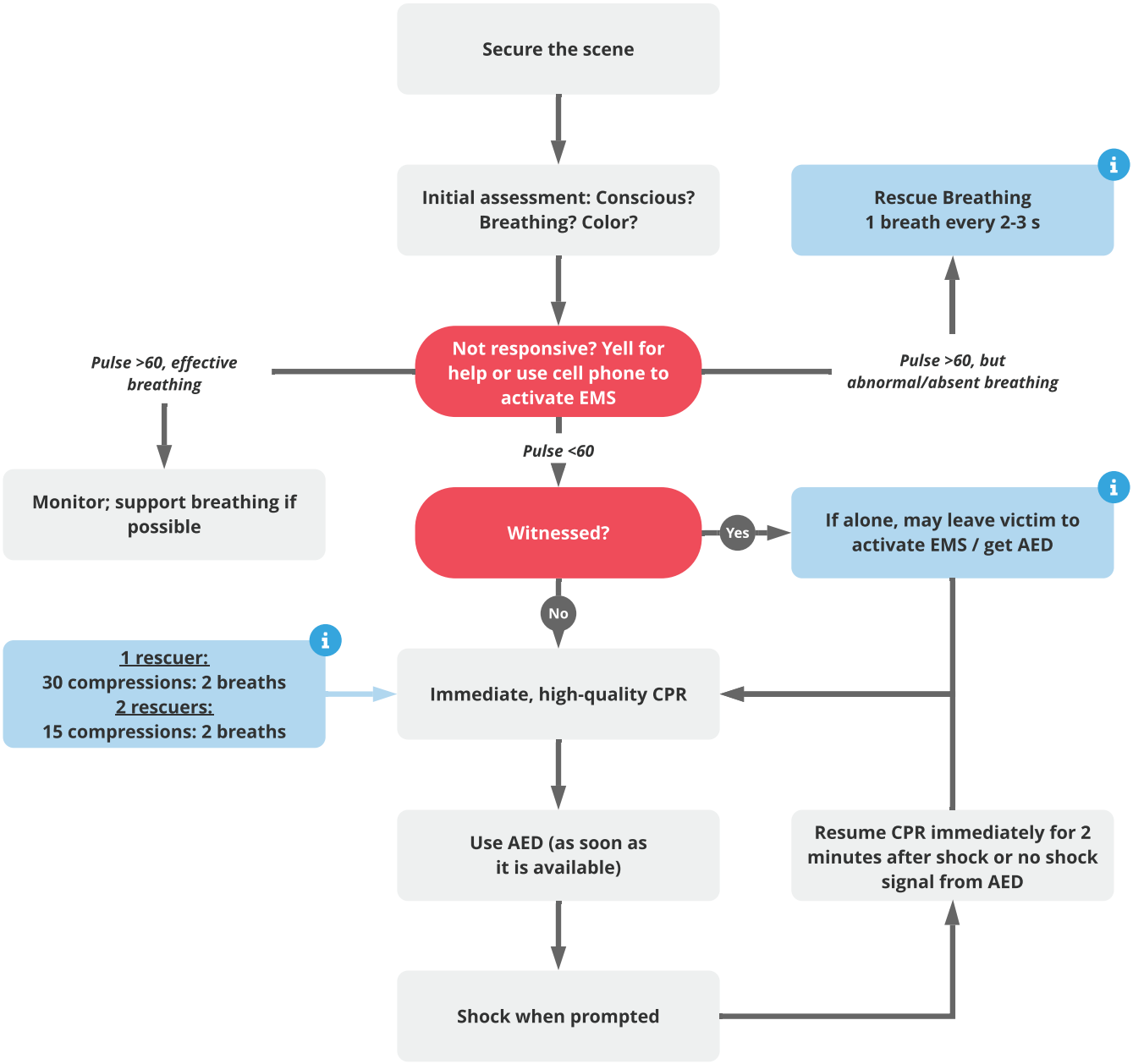

Figure 6: BLS Infant and Child Algorithm

BLS for children and adults are very similar, but there are differences. The differences are:

Guideline	Adult and Adolescents	Child (1 year to puberty)
Compression to breath ratio for 2 rescuers	30 compressions : 2 breaths	15 compressions : 2 breaths
Compression to breath ratio for 1 rescuer	30 compressions : 2 breaths	30 compressions : 2 breaths
Chest compressions	Always use 2 hands	For small children, may use 1 hand
Compression depth	Between 2 and 2.4 inches	1/3 of the depth of the chest (about 1.5 to 2 inches)
Unwitnessed arrest (alone, no cell phone)	Leave victim to activate EMS	Perform 2 minutes of CPR then leave victim to activate EMS/get AED
Unwitnessed arrest (alone, with cell phone)	Activate EMS immediately	Activate EMS immediately
Witnessed arrest (alone, no cell phone)	Leave victim to activate EMS	Leave victim to activate EMS
Witnessed arrest (alone, with cell phone)	Activate EMS immediately	Activate EMS immediately

Table 2: Differences in BLS for Adults and Children

Likewise, there are differences between BLS for children and infants. The differences are:

Guideline	Child (1 year to puberty)	Infant (0 to 12 months)
Checking the pulse	Carotid or femoral artery (femoral is better for smaller/younger children; carotid is better for larger/older children)	Brachial artery on inside of upper arm
CPR	For small children, may use 1 hand for compressions	May use 2 fingers or 2 thumbs by the encircling hands technique; the 2-finger approach is preferred for one rescuer; the 2-thumb technique is preferred for two or more rescuers
Compression depth	1/3 of the depth of the chest (1.5 to 2 inches)	1/3 of the depth of the chest (about 1.5 inches)

Table 3: Differences in BLS for Children and Infants

Two-Rescuer BLS for Infants and Children

If two rescuers are available:

- As soon as it is determined that the child is not breathing and responsive, the second rescuer should immediately activate the EMS and find an AED.
- As soon as another rescuer arrives, change the compression to ventilation ratio from 30:2 to 15:2 (i.e., give 2 breaths after every 15 compressions).

Child Ventilation

Adult masks should not be used for small children. If the mask covers the eyes or chin of the child, it is too big, and ventilations will not be optimal. Breaths for a child will typically not be as deep as for adults but should still be administered over 1 second and should result in a visible rise of the child's chest. Unless a neck injury is suspected, open the airway using the head tilt/chin lift technique. If a neck injury is suspected, open the airway using a jaw thrust.

Unit Four: Critical Concepts in BLS

Rescue Breathing

Early recognition of, and intervention for, respiratory distress may prevent deterioration into cardiac arrest. During assessment, if the victim has a strong pulse but has ineffective breathing, open the airway using the head tilt/chin lift technique and begin rescue breathing.

Victim Age	Breathing Rate	# Breaths/Minute	Length of Breath	Evaluation
Adult	Every 5-6 seconds	10-12 per minute	Each breath should be given over 1 second	Check for chest rise and breathing. Check pulse, begin CPR if victim pulseless
Child or Infant	Every 2-3 seconds	20-30 per minute		

Table 4: Rescue Breathing

CPR with an Advanced Airway

An advanced airway includes supraglottic airways, laryngeal mask airways, or endotracheal tubes. These airways should be initiated as soon as available since they offer a better way of providing ventilations for any age. If these advanced airways are not available, continue to use mouth-to-mouth, mouth-to-mask, or bag-mask for breathing in an arrest situation. If an advanced airway is in place, the compression/breath ratio should be as described below.

Guideline	No Advanced Airway	With Advanced Airway
Adult Compression to Breath Ratio	30 compressions: 2 breaths	Continuous compressions and ventilations; Deliver 1 breath every 6 seconds (10 breaths per minute)
Child/Infant Compression to Breath Ratio	One Rescuer - 30 compressions: 2 breaths Two Rescuers - 15 compressions: 2 breaths	Deliver 1 breath every 2-3 seconds (20 to 30 breaths per minute)

Table 5: Compression to Breath Ratios with/without Advanced Airway

Ventilation

If a mask or advanced airway is not available, be ready to provide mouth-to-mouth rescue breathing during CPR. Avoid over-ventilation, which can fill the stomach with air and prevent proper lung expansion.

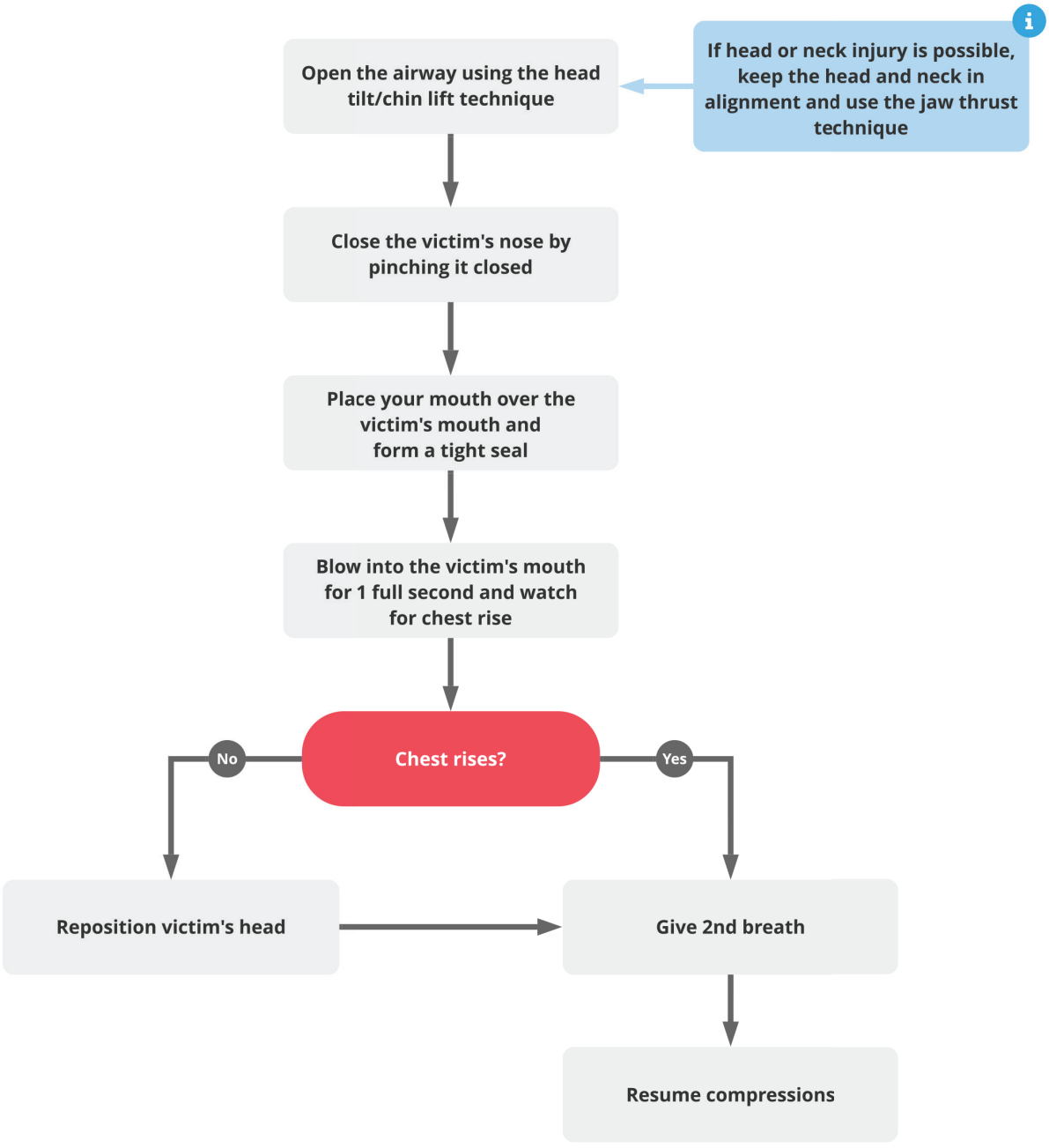

Figure 7: BLS Rescue Breathing Adult or Child Algorithm

Infant Mouth-to-Mouth or Mouth-to-Nose

Ventilation techniques for an infant are the same as for children and adults with the following exceptions:

- If the infant is small enough, the rescuer can cover the infant's nose and mouth with their mouth and create a good seal. It is not necessary to pinch the infant's nose.
- Be aware that an infant's lungs are very small so a smaller volume of air will be necessary to inflate the infant's lungs. Every breath should still be given over 1 second, but with less volume.

Automated External Defibrillator Use

One of the most common causes of cardiac arrest is ventricular fibrillation. The Automated External Defibrillator (AED) is the most effective treatment for this disorder. The AED analyzes the heart rhythm and advises a shock only when it is appropriate. The AED is safe for anyone to use since it will talk you through the process and will not allow you to make a mistake. Research indicates that an AED should be used as early as possible in any arrest situation for any age. In fact, survival is increased if an AED can be used (in appropriate cases) within 3 to 5 minutes of collapse outside of a hospital.

If the AED has pediatric pads and a pediatric attenuator, use them for an infant or child less than 8 years old. If pediatric pads are not available, adult pads can be used as long as they are applied so that they do not touch each other. Typically, you will see an adult/pediatric attenuator switch. If this switch is not available, deliver an "adult" shock.

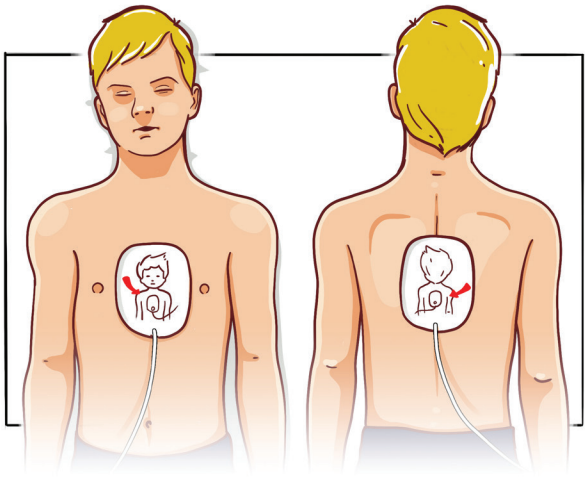

Figure 8: Child AED Placement

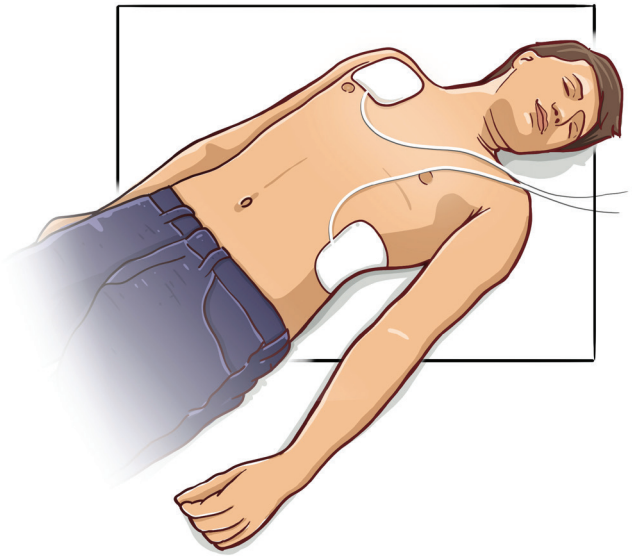

Figure 9: Adult AED Placement

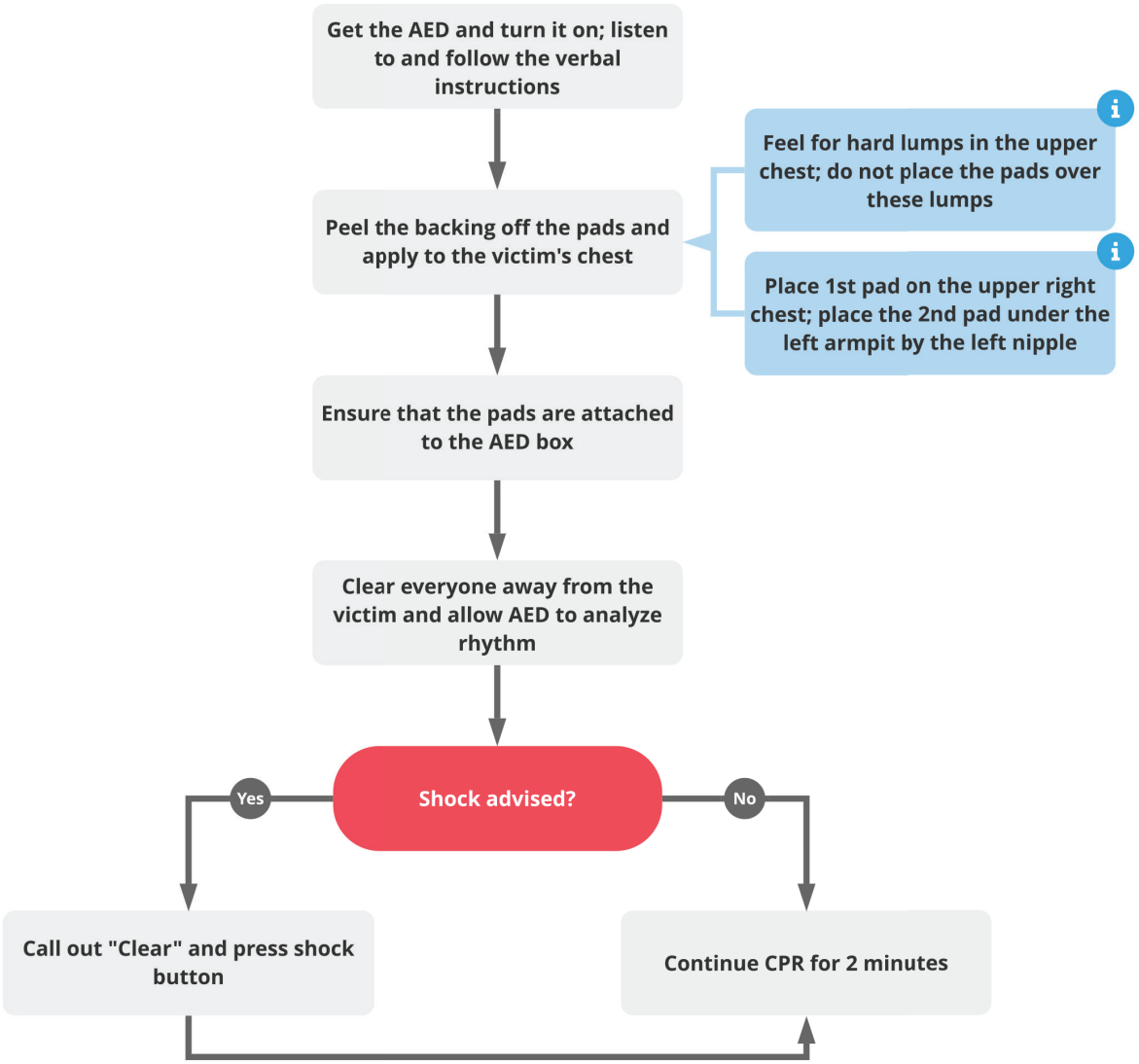

Figure 10: BLS AED Algorithm

Unit Five: Relief of Choking

If a victim is choking, the condition may deteriorate into respiratory arrest and cardiac arrest. Early and proper intervention can prevent this series of events. Proper intervention depends on the age of the victim and the amount of obstruction of the airway.

Choking in an Adult or Child Older than One Year

Amount of Airway Obstruction	Symptoms	Recommended Actions
Mild	• Breathing may be accompanied by wheezing • Coughing and making noise	• Remain with victim and continue to monitor • Encourage the victim to cough • Call EMS if choking gets worse
Severe	• Exhibiting universal sign of choking (holding neck and throat) • Weak or absent cough • May be making high-pitched noise but unable to talk • Ineffective or no breathing • Skin may be blue around lips and finger tips	• Attempt abdominal thrusts to relieve obstruction • If you see the obstruction in the victim's mouth and can remove it, do so. Do not perform blind finger sweeps of the mouth • Call EMS • Begin CPR if victim is unresponsive and pulseless

Table 6: Adult and Child Airway Obstruction

Abdominal Thrusts (Heimlich Maneuver)

If the choking victim is older than one year and is responsive, perform abdominal thrusts in an attempt to relieve choking.

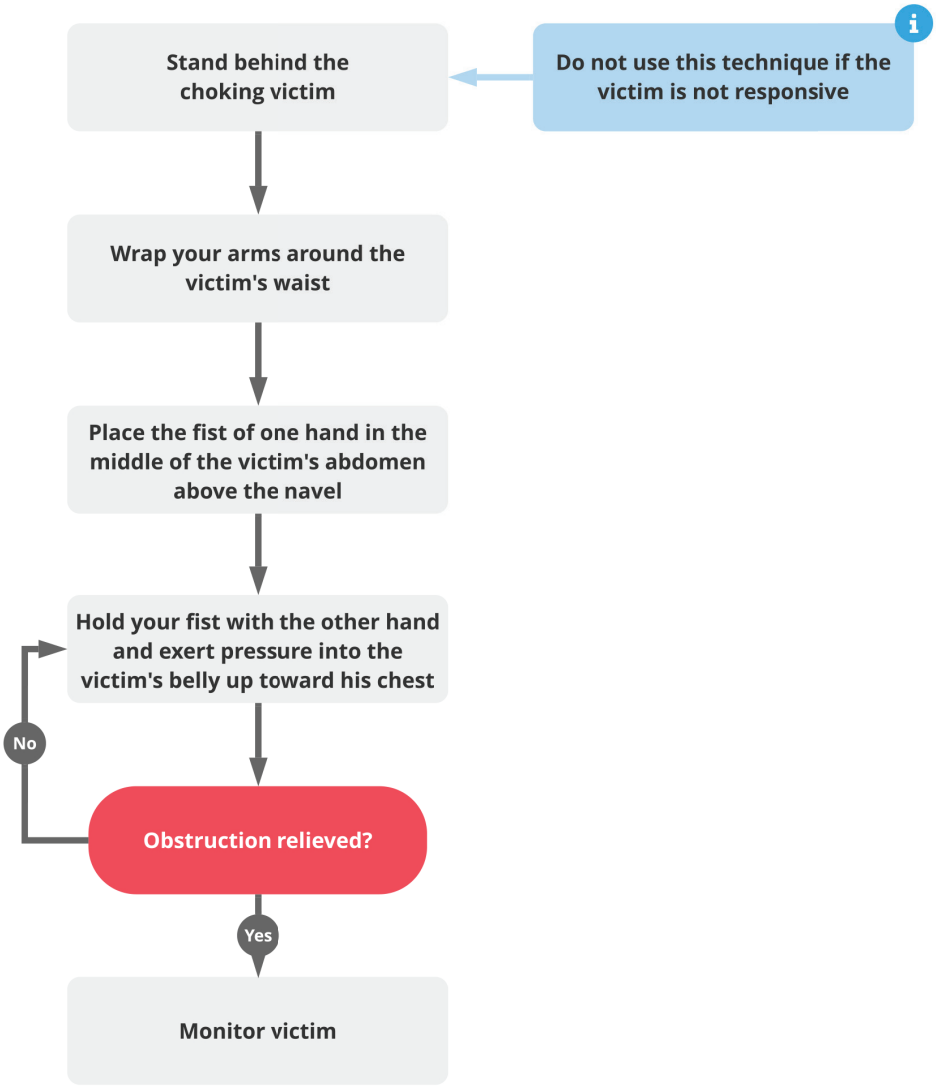

Figure 11: BLS Choking Adult or Child Algorithm

Figure 12: Abdominal Thrusts in a Child

Figure 13: Abdominal Thrusts in an Adult

Choking in Infants (0–12 months)

Amount of Airway Obstruction	Symptoms	Recommended Actions
Mild	• Breathing may be accompanied by wheezing • Coughing and making noise	• Remain with infant and continue to monitor • Do not do a blind finger sweep in an attempt to remove an unseen obstruction • Call EMS if infant begins to deteriorate
Severe	• Weak or absent cough • May be making high-pitched noise but unable to cry • Ineffective or no breathing • Skin may be blue around lips and fingertips	• Attempt back blows/chest thrusts to relieve obstruction • If you see the obstruction in the victim's mouth and can remove it, do so. Do not perform blind sweeps of the mouth as this may force the obstruction lower into the airway • Call EMS • Begin CPR if infant becomes unresponsive and/or pulseless

Table 7: Infant Airway Obstruction

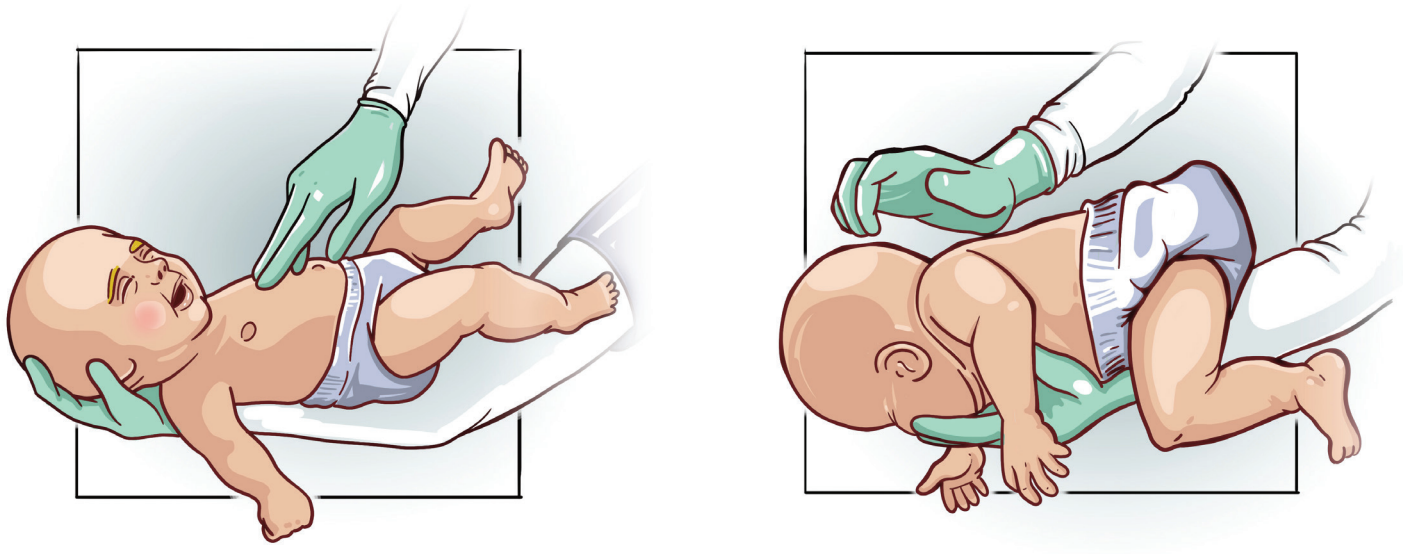

Figure 14: Choking in Infants

If an infant less than 12 months old is choking but responsive, provide back blows and chest thrusts to relieve an obstruction.

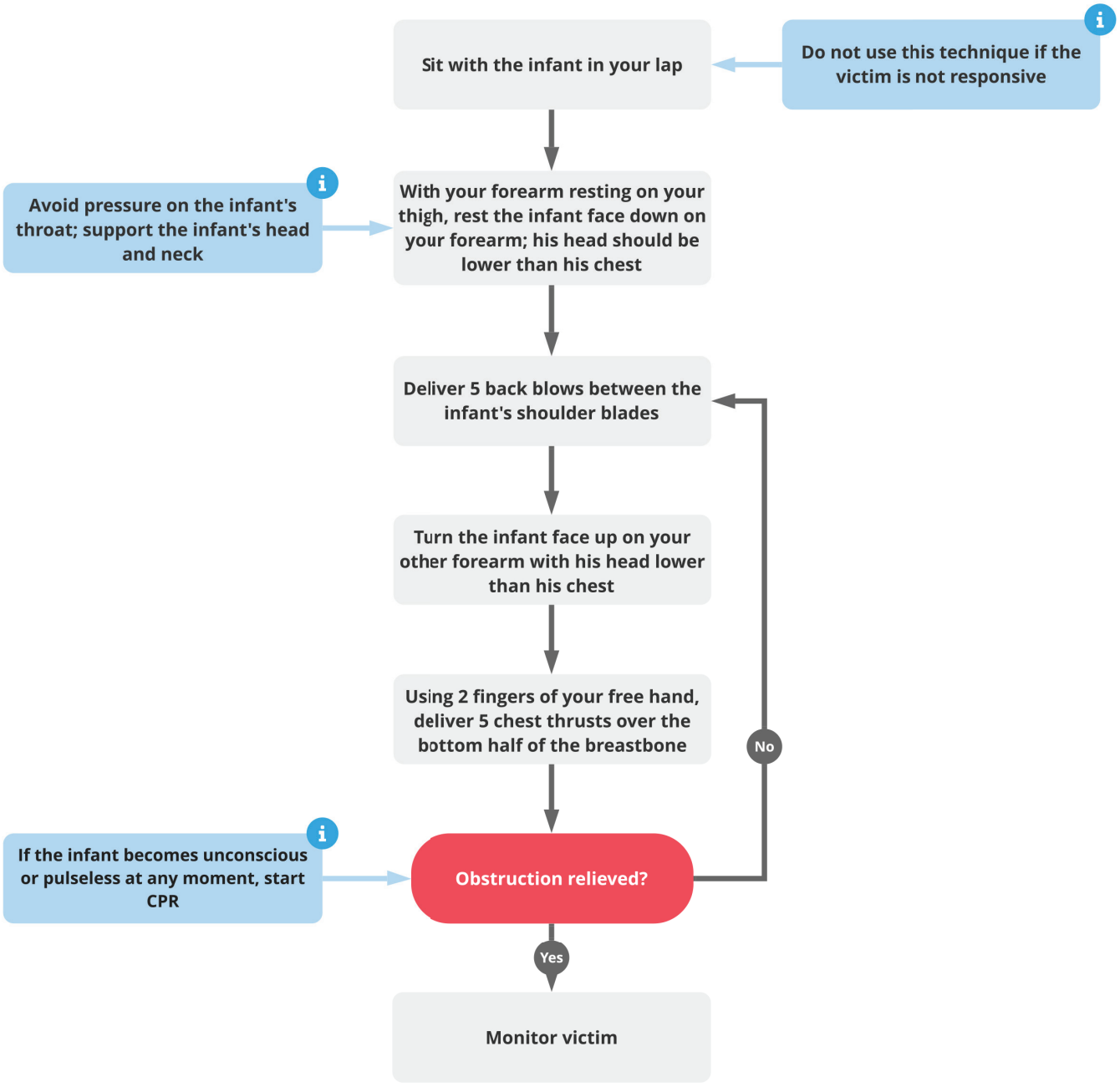

Figure 15: BLS Choking Infant Algorithm

Unit Six: Respiratory Arrest due to Opioids – Bystander Use of Naloxone

As of 2015, bystanders may administer naloxone to individuals suspected to be suffering from respiratory depression due to opioid overdose. Timely administration of naloxone (2 mg intranasal or 0.4 mg intramuscular) can be life-saving for these individuals.

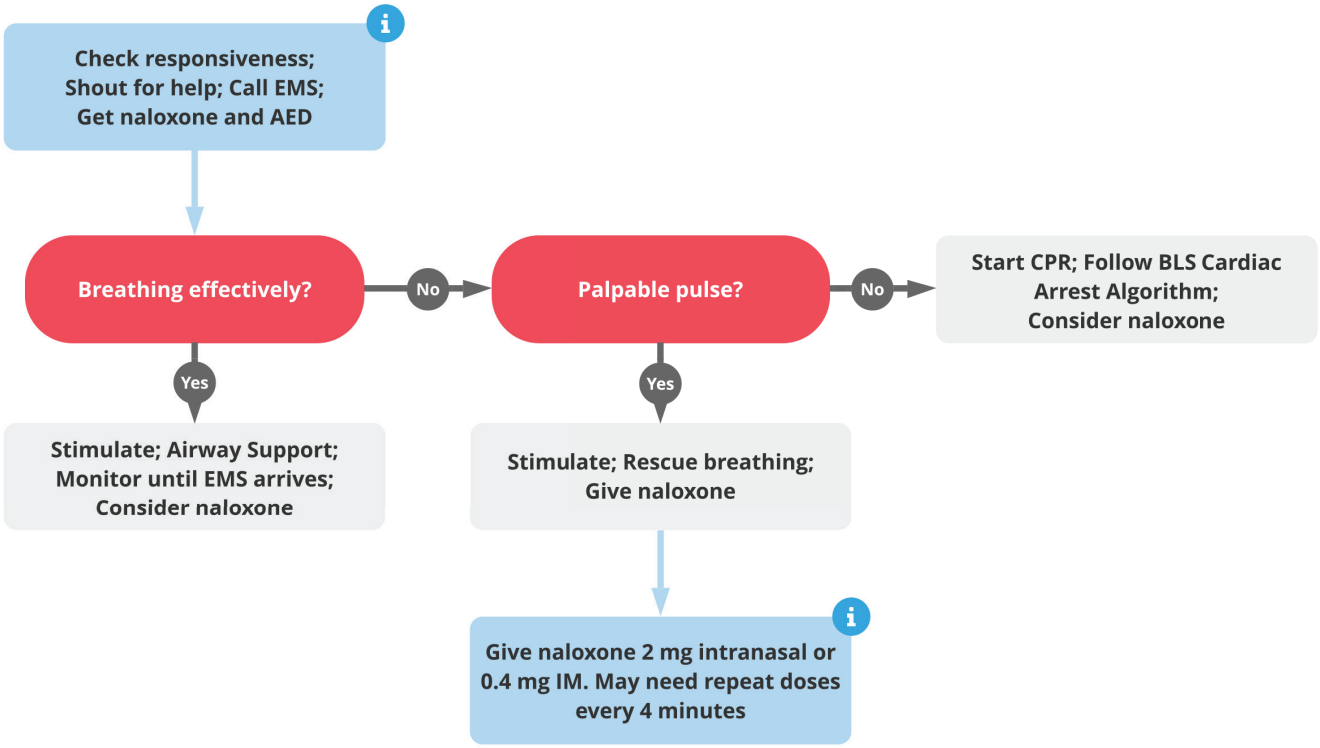

Figure 16: Suspected Opioid Poisoning Algorithm

References

1. Kleinman ME, Goldberger ZD, Rea T, et al. 2017 American Heart Association Focused Update on Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2018;137(1):e7-e13. 10.1161/CIR.0000000000000539
2. Olasveengen TM, de Caen AR, Mancini ME, et al. 2017 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations summary. Circulation. 2017;136(23):e424-e440.
3. Atkins DL, de Caen AR, Berger S, et al. 2017 American Heart Association Focused Update on Pediatric Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2018;137(1):e1-e6. 10.1161/CIR.0000000000000540
4. Duff JP, Topjian A, Berg MD, et al. 2018 American Heart Association Focused Update on Pediatric Advanced Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2018;138(23):e731-e739. 10.1161/CIR.0000000000000612
5. Panchal AR, Berg KM, Kudenchuk PJ, et al. 2018 American Heart Association Focused Update on Advanced Cardiovascular Life Support Use of Antiarrhythmic Drugs During and Immediately After Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2018;138(23):e740-e749. 10.1161/CIR.0000000000000613
6. Duff JP, Topjian AA, Berg MD, et al. 2019 American Heart Association Focused Update on Pediatric Advanced Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2019;140(24):e904-e914. 10.1161/CIR.0000000000000731
7. Duff JP, Topjian AA, Berg MD, et al. 2019 American Heart Association Focused Update on Pediatric Basic Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2019;140(24):e915-e921. 10.1161/CIR.0000000000000736
8. Duff JP, Topjian AA, Berg MD, et al. 2019 American Heart Association Focused Update on Pediatric Basic Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Pediatrics. 2020;145(1). 10.1542/peds.2019-1358
9. Duff JP, Topjian AA, Berg MD, et al. 2019 American Heart Association Focused Update on Pediatric Advanced Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Pediatrics. 2020;145(1). 10.1542/peds.2019-1361
10. Escobedo MB, Aziz K, Kapadia VS, et al. 2019 American Heart Association Focused Update on Neonatal Resuscitation: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2019;140(24):e922-e930. 10.1161/CIR.0000000000000729
11. Panchal AR, Berg KM, Cabanas JG, et al. 2019 American Heart Association Focused Update on Systems of Care: Dispatcher-Assisted Cardiopulmonary Resuscitation and Cardiac Arrest Centers: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2019;140(24):e895-e903. 10.1161/CIR.0000000000000733