Chapter 14

BLS Resuscitation

Unit Summary

After students complete this chapter and the related course work, they will have reviewed the basic life support (BLS) procedures for adults, infants, and children. Please note that BLS knowledge is a prerequisite for the course and that this chapter should serve as a review.

National EMS Education Standard Competencies

Shock and Resuscitation

Applies a fundamental knowledge of the causes, pathophysiology, and management of shock, respiratory failure or arrest, cardiac failure or arrest, and postresuscitation management.

Knowledge Objectives

1. Explain the elements of basic life support (BLS), how it differs from advanced life support (ALS), and why BLS must be applied rapidly. (pp 557–559)

2. Explain the goals of cardiopulmonary resuscitation (CPR) and when it should be performed on a patient. (p 559)

3. Explain the components of CPR, the five links in the American Heart Association (AHA) chain of survival, and how each one relates to maximizing the survival of a patient. (pp 559–560)

4. Discuss guidelines for circumstances that require the use of an automated external defibrillator (AED) on both adult and pediatric patients experiencing cardiac arrest. (pp 561–562)

5. Explain three special situations related to the use of an AED. (p 562)

6. Describe the proper way to position an adult patient to receive BLS care. (pp 562–563)

7. Describe the purpose of external chest compressions. (p 563)

8. Describe the two techniques EMTs may use to open an adult patient’s airway and the circumstances that would determine when each technique would be used. (pp 566–567)

9. Describe the recovery position and circumstances that would warrant its use, as well as situations in which it would be contraindicated. (pp 567–568)

10. Describe the process of providing artificial ventilations to an adult patient, ways to avoid gastric distention, and modifications required for a patient with a stoma. (pp 568–569)

11. Explain the steps in providing single-rescuer adult CPR. (pp 569–571)

12. Explain the steps in providing two-rescuer adult CPR, including the method for switching positions during the process. (pp 571–573)

13. Describe the different mechanical devices that are available to assist emergency care providers in delivering improved circulatory efforts during CPR. (pp 573, 575–577)

14. Describe the different possible causes of cardiopulmonary arrest in children. (p 577)

15. Explain the four steps of pediatric BLS procedures and how they differ from BLS procedures used in an adult patient. (pp 577–584)

16. Describe the ethical issues related to patient resuscitation, including examples of when not to start CPR on a patient. (pp 584–586)

17. Explain the various factors involved in the decision to stop CPR after it has been started on a patient. (pp 586–587)

18. Explain common causes of foreign body airway obstruction in both children and adults and how to distinguish mild or partial airway obstruction from complete airway obstruction. (pp 587–588)

19. Describe the different methods for removing a foreign body airway obstruction in an infant, child, and adult, including the procedure for a patient with an obstruction who becomes unresponsive. (pp 588–593)

20. Discuss how to provide grief support for a patient’s family members and loved ones after resuscitation has ended. (pp 594–595)

21. Discuss the importance of frequent CPR training for EMTs, as well as public education programs that teach compression-only CPR. (p 595)

Skills Objectives

1. Demonstrate how to position an unresponsive adult for CPR. (pp 562–563)

2. Demonstrate how to check for a pulse at the carotid artery in an unresponsive child or adult. (p 563)

3. Demonstrate how to perform external chest compressions on an adult. (pp 563–565, Skill Drill 14-1)

4. Demonstrate how to perform a head tilt–chin lift maneuver on an adult. (p 566)

5. Demonstrate how to perform a jaw-thrust maneuver on an adult. (pp 566–567)

6. Demonstrate how to place a patient in the recovery position. (pp 567–568)

7. Demonstrate how to perform rescue breathing in an adult. (p 568)

8. Demonstrate how to perform one-rescuer adult CPR. (pp 569–571, Skill Drill 14-2)

9. Demonstrate how to perform two-rescuer adult CPR. (pp 571–573, Skill Drill 14-3)

10. Demonstrate the use of mechanical devices that assist emergency responders in delivering improved circulatory efforts during CPR. (pp 573–577)

11. Demonstrate how to check for a pulse at the brachial artery in an unresponsive infant (p 579)

12. Demonstrate how to perform external chest compressions on an infant. (pp 579–580, Skill Drill 14-4)

13. Demonstrate how to perform CPR in a child who is between 1 year of age and the onset of puberty. (pp 580–582, Skill Drill 14-5)

14. Demonstrate how to perform a head tilt–chin lift maneuver on a pediatric patient. (p 582)

15. Demonstrate how to perform a jaw-thrust maneuver on a pediatric patient. (pp 582–583)

16. Demonstrate how to perform rescue breathing on a child. (p 583)

17. Demonstrate how to perform rescue breathing on an infant. (p 583)

18. Demonstrate how to remove a foreign body airway obstruction in a responsive adult patient using abdominal thrusts (Heimlich maneuver). (p 588)

19. Demonstrate how to remove a foreign body airway obstruction in a responsive pregnant or obese patient using chest thrusts. (p 588–591)

20. Demonstrate how to remove a foreign body airway obstruction in a responsive child older than 1 year using abdominal thrusts (Heimlich maneuver). (pp 590–591)

21. Demonstrate how to remove a foreign body airway obstruction in an unresponsive child. (pp 591–592, Skill Drill 14-6)

22. Demonstrate how to remove a foreign body airway obstruction in an infant. (pp 591, 593)

Readings and Preparation

Review all instructional materials including ***Emergency Care and Transportation of the Sick and Injured,* Twelfth Edition**, Chapter 14, and all related presentation support materials.

• Review current American Heart Association standards for basic life support (CPR) for adults, children, and infants.

Support Materials

• Lecture PowerPoint presentation

• Skill Drill PowerPoint presentations

* Skill Drill 14-1, Performing Chest Compressions PowerPoint presentation
* Skill Drill 14-2, Performing One-Rescuer Adult CPR PowerPoint presentation
* Skill Drill 14-3, Performing Two-Rescuer Adult CPR PowerPoint presentation
* Skill Drill 14-4, Performing Infant Chest Compressions PowerPoint presentation
* Skill Drill 14-5, Performing CPR on a Child PowerPoint presentation
* Skill Drill 14-6, Removing a Foreign Body Airway Obstruction in an Unresponsive Child PowerPoint presentation

• Equipment needed to perform the psychomotor skills presented in this chapter.

• Skill Evaluation Sheets

* Skill Drill 14-1, Performing Chest Compressions
* Skill Drill 14-2, Performing One-Rescuer Adult CPR
* Skill Drill 14-3, Performing Two-Rescuer Adult CPR
* Skill Drill 14-4, Performing Infant Chest Compressions
* Skill Drill 14-5, Performing CPR on a Child
* Skill Drill 14-6, Removing a Foreign Body Airway Obstruction in an Unresponsive Child

Enhancements

• Direct students to visit Navigate.

• Contact a local survivor of cardiac arrest and ask this person to give a brief presentation to the students on the events that transpired, explaining how the prehospital providers made a difference in his or her life.

• Contact the local American Heart Association representative and ask him or her to discuss the statistics relating to cardiac arrest for your local jurisdiction.

• **Content connections:** Students should be able to relate cardiac arrest to its specific causes, such as sudden cardiac arrest, drowning, and overdoses. Specific causes of cardiac arrest are discussed in depth in their respective chapters.

• **Cultural considerations:** Students need to be made aware of the religious or cultural beliefs in the setting of resuscitation—specifically, how certain cultural groups (such as Native Americans) wish to have a prayer ceremony prior to the victim being transported to the hospital.

Teaching Tips

• BLS (CPR) is a prerequisite to the National EMS Educations Standards; therefore, this lesson should serve as a review. However, the allotted time allows for presentation of the certified course if necessary.

• Several skills listed for this lesson can be found in Chapter 35, “Pediatric Emergencies.” They are listed here as they relate to BLS review for infants and children.

• Use of the AED is covered in Chapter 17, “Cardiovascular Emergencies.”

Unit Activities

**Writing assignments:** Assign students to complete a research paper on the topic of controversies in the administration of positive pressure ventilation to patients suffering from sudden cardiac arrest. Does current research support or discount the administration of positive pressure ventilation versus free-flowing oxygen?

**Student presentations:** Ask students to give a presentation to the class discussing one link in the cardiac chain of survival.

**Group activities:** Ask each group to develop a cardiac arrest scenario and practice the management for their scenario.

**Visual thinking:** Present the students with equipment, such as masks, oral and nasal airways, and bag-mask devices. Ask them to describe the indications and contraindications of each device.

Pre-Lecture

### You are the Provider

“You are the Provider” is a progressive case study that encourages critical thinking skills.

### Instructor Directions

1. Direct students to read the “You are the Provider” scenario found throughout Chapter 14.

2. You may wish to assign students to a partner or a group. Direct them to review the discussion questions at the end of the scenario and prepare a response to each question. Facilitate a class dialogue centered on the discussion questions and the Patient Care Report.

3. You may also use this as an individual activity and ask students to turn in their comments on a separate piece of paper.

Lecture

I. Introduction

A. The principles of basic life support (BLS) were introduced in 1960.

B. Since then, the specific techniques have been reviewed and revised regularly.

C. The goal is to produce the best recommendations possible given the available scientific evidence and to maximize the chance of successful resuscitation.

D. Reviews are conducted ad published conducted by the International Liaison Committee on Resuscitation (ILCOR).

II. Elements of BLS

A. BLS is noninvasive emergency life-saving care that is used to treat medical conditions, including:

1. Airway obstruction

2. Respiratory arrest

3. Cardiac arrest

B. Focus is on the ABCs

C. If the patient is in cardiac arrest, then a CAB sequence is used because chest compressions are essential and must be started as quickly as possible.

D. Only seconds should pass between the time you recognize that a patient needs BLS and the start of treatment.

1. Permanent brain damage is possible if brain is without oxygen for more than 4 to 6 minutes.

E. Cardiopulmonary resuscitation (CPR)

1. Reestablishes circulation and artificial ventilation in a patient who is not breathing and has no pulse

2. CPR steps:

a. Restore circulation by performing high-quality chest compressions to circulate the blood.

b. Open the airway.

c. Restore breathing by providing rescue breathing.

i. Administer two breaths while visualizing for chest rise.

F. BLS differs from advanced life support (ALS), which involves advanced procedures such as:

1. Cardiac monitoring

2. Administration of intravenous (IV) fluids and medications

3. Use of advanced airway adjuncts

G. When done correctly, BLS can maintain life for a short time until ALS measures can be started.

III. The Components of CPR

A. Chain of survival

1. The American Heart Association’s (AHA) chain of survival:

a. Recognition and activation of the emergency response system

b. Immediate, high-quality CPR

c. Rapid defibrillation

d. Basic and advanced emergency medical services

e. ALS and postarrest care

f. Recovery

B. If any one of the links in the chain is absent, the patient is more likely to die.

IV. Assessing the Need for BLS

A. Always begin by surveying the scene.

B. Complete the primary assessment as soon as possible in order to evaluate the patient’s ABCs.

1. First step is determining unresponsiveness:

a. A responsive patient does not need CPR.

b. An unresponsive patient may or may not need CPR.

2. This step should take no more than 10 seconds.

C. The basic principles of BLS are the same for infants, children, and adults.

D. Although cardiac arrest in adults usually occurs before respiratory arrest, the reverse is true in infants and children.

V. Automated External Defibrillation

A. AED use is a vital link in the chain of survival.

B. AED should be applied to a cardiac arrest patient as soon as available.

C. If you witness cardiac arrest, begin CPR and apply the AED as soon as available.

D. AED use in children

1. Use pediatric-size pads and a dose attenuating system.

2. Apply after the first five cycles of CPR.

3. If adult-size AED pads are used on an infant or small child, do not cut the pads to adjust the size. Use the anterior-posterior placement.

E. Special situations

1. Pacemakers and implanted defibrillators

a. Place electrodes at least 1 inch (2.5 cm) away from the device.

2. Wet patients

a. If the patient is in water, pull the patient out and dry the skin before attaching the AED pads.

b. If the patient is in a small puddle of water or in the snow, the AED can be used, but the patient’s chest should be dried as much as possible.

3. Transdermal medication patches

a. Remove the patch and wipe the skin to remove any residue prior to attaching the AED pad.

VI. Positioning the Patient

A. For CPR to be effective, the patient must be lying supine on a firm, flat surface.

1. Ensure enough space around the patient for two rescuers to perform CPR.

2. If possible, log roll the patient onto a long backboard.

VII. Check for Breathing and a Pulse

A. Quickly check for breathing and a pulse simultaneously.

1. These assessments occur simultaneously and take no longer than 10 seconds total.

a. Visualize the chest for signs of breathing while palpating for a carotid pulse.

B. Provide external chest compressions.

1. Apply rhythmic pressure and relaxation to the lower half of the sternum.

2. Compressions squeeze the heart, acting as a pump to circulate blood.

3. Avoid leaning on the chest in between chest compressions.

C. Proper hand position and compression technique

1. See **Skill Drill 14-1**.

2. Injuries can be minimized by proper technique and hand placement.

VIII. Opening the Airway and Providing Artificial Ventilation

A. Opening the airway in adults

1. Head tilt–chin lift maneuver

a. Remove any foreign materials in the mouth.

2. Jaw-thrust maneuver

B. If the patient is breathing adequately on his or her own and has no signs of injury to the spine, hip, or pelvis, place him or her in the recovery position.

C. A lack of oxygen (hypoxia), combined with too much carbon dioxide in the blood (hypercarbia), is lethal.

1. Provide slow, deliberate ventilations that last 1 second.

D. If patient is not breathing, ventilations can be given by one or two EMS providers.

1. Use a barrier device, such as a pocket mask, one-way valve, or bag-mask device.

2. Use devices that supply supplemental oxygen when possible.

E. For a patient with a stoma, place a bag-mask device or pocket mask device directly over the stoma.

F. Artificial ventilation may result in gastric distention.

1. Have a suction unit available in case the patient vomits.

IX. One-Rescuer Adult CPR

A. When providing CPR alone, you must provide a continuous cycle of 30 chest compressions followed by 2 artificial ventilations (see Skill Drill 14-2).

1. The ratio of compressions to ventilations is 30:2.

X. Two-Rescuer Adult CPR

A. Always preferable to one-rescuer CPR (see Skill Drill 14-3)

1. Less tiring and facilitates effective chest compressions

B. Switching rescuers during CPR is critical to maintain high-quality compressions.

1. It is recommended to switch positions every 2 minutes.

XI. Devices and Techniques to Assist Circulation

A. Active compression-decompression CPR

1. Involves compressing the chest and then actively pulling it back up to its neutral position or beyond

2. May increase the amount of blood returning to the heart

B. Impedance threshold device (ITD)

1. Designed to limit the air entering the lungs during the recoil phase between chest compressions

2. Not currently recommended for use with conventional CPR

C. Mechanical piston device

1. Allows the rescuer to configure the depth and rate of compressions

D. Load-distributing band CPR or vest CPR

E. Manual chest compressions remain the standard of care.

XII. Infant and Child CPR

A. In most cases, cardiac arrest in infants and children follows respiratory arrest, which triggers hypoxia and ischemia of the heart.

1. Airway and breathing are the focus of pediatric BLS.

B. Causes of respiratory problems leading to cardiopulmonary arrest in children

1. Injury, both blunt and penetrating

2. Infections of the respiratory tract or another organ system (croup, epiglottitis)

3. Foreign body in the airway

4. Submersion (drowning)

5. Electrocution

6. Poisoning or drug overdose

7. Sudden infant death syndrome

C. Determining responsiveness

1. Gently tap child on shoulder and speak loudly.

a. If you find an unresponsive, apneic, pulseless child, while alone and off duty, perform CPR for 5 cycles (about 2 minutes) and then call the EMS system.

D. Check for breathing and a pulse.

1. Palpate the brachial artery in infants.

2. The infant or child must be lying on a hard, flat surface for effective chest compressions.

3. Only use two fingers to compress an infant’s chest.

4. If two rescuers are performing CPR on an infant, use the two-thumb-encircling-hands technique to deliver chest compressions.

5. In children, especially those older than 8 years, you can use the heel of one or both hands to compress the chest.

6. Follow the steps in **Skill Drill 14-4** to perform infant chest compressions.

7. Follow the steps in **Skill Drill 14-5** for performing CPR in children between 1 year and the onset of puberty.

E. Airway

1. Foreign body obstruction in children is common.

a. Place an unresponsive, breathing child in the recovery position unless you suspect injury to the spine, hips, or pelvis.

b. The two common techniques for manually opening a child’s airway are modified for pediatric patients.

c. Place a wedge of padding under a child’s upper chest and shoulders to avoid partially obstructing the airway.

F. Provide rescue breathing.

1. If the child is not breathing but has a pulse, then open the airway and deliver one breath every 2 to 3 seconds (20 to 30 breaths/min).

2. If the child is not breathing and does not have a pulse, then deliver 2 rescue breaths after every 30 chest compressions (15 chest compressions if two rescuers are present).

3. If an infant or small child is breathing, then provide prompt transport.

a. Allow the child to stay in whatever position is most comfortable.

4. In a child with a tracheostomy tube in the neck, remove the mask from the bag-mask device and connect it directly to the tracheostomy tube to ventilate the child.

a. A face mask with one-way valve or other barrier device over the tracheostomy site can be used.

XIII. Interrupting CPR

A. CPR is a crucial, life-saving procedure that provides minimal circulation and ventilation until the patient can receive defibrillation, ALS treatment, and definitive care at the ED.

B. No matter how well performed, CPR alone is rarely enough to save a patient’s life.

C. If ALS is not available at the scene:

1. Provide transport based on your local protocols, continuing CPR on the way.

2. Consider requesting rendezvous en route to hospital.

D. Try not to interrupt CPR for more than a few seconds, except when necessary.

E. Chest compression fraction

1. The total percentage of time during a resuscitation attempt in which chest compressions are being performed

2. Try to maintain a chest compression fraction greater than 80%.

XIV. When Not to Start CPR

A. Three general rules regarding when not to start CPR:

1. If the scene is unsafe

2. If the patient has obvious signs of death, which include an absence of pulse and breathing

3. If the patient and physician have previously agreed on do not resuscitate (DNR) orders

XV. When to Stop CPR

A. Once you begin CPR, continue until one of the following occur (using the mnemonic STOP):

1. **S**—Patient *Starts* breathing and has a pulse.

2. **T**—Patient is *Transferred* to another provider of equal or higher-level training.

3. **O**—You are *Out* of strength.

4. **P**—*Physician* directs you to discontinue.

B. “Out of strength” does not just mean tired, but physically unable to continue.

XVI. Foreign Body Airway Obstruction in Adults

A. Recognizing foreign body airway obstruction

1. In adults, foreign body airway obstruction usually occurs during a meal.

2. In children, airway obstruction usually occurs during a meal or at play.

3. Mild airway obstruction

a. Patient is able to exchange adequate amounts of air but still has signs of respiratory distress.

b. Leave these patients alone.

c. Observe for signs of a severe airway obstruction.

B. Responsive patients

1. A sudden, severe obstruction is usually easy to recognize in responsive patients.

a. The person is suddenly unable to speak or cough, grasps his or her throat, turns cyanotic, and makes exaggerated efforts to breathe.

b. Stridor may be present.

C. Unresponsive patients

1. In unresponsive patients, suspect obstruction if maneuvers to open airway and ventilate are ineffective.

D. Removing a foreign body airway obstruction in an adult

1. Abdominal-thrust maneuver (Heimlich maneuver) is recommended in responsive adults and children older than 1 year.

a. Creates an artificial cough

b. If the patient with a severe airway obstruction is unresponsive, then perform chest compressions.

2. Use chest thrusts for women in advanced stages of pregnancy and patients who have obesity.

E. Responsive patients who become unresponsive

1. Lower the patient to the ground and call for help (or send someone for help).

2. Perform 30 chest compressions.

a. Do not check for a pulse before beginning chest compressions.

3. Open the airway and look in the mouth.

a. If you see an object that can be easily removed, remove it with your fingers and attempt to ventilate.

b. If you do not see any object, resume chest compressions.

4. Repeat steps 2 and 3 until the obstruction is relieved or ALS providers take over.

F. Unresponsive patients

1. Determine unresponsiveness and check for breathing and a pulse simultaneously.

2. If pulse is present but breathing is absent, then open the airway and attempt to ventilate.

a. If the first ventilation does not produce visible chest rise, then reposition the airway and reattempt to ventilate.

3. If both ventilation attempts do not produce visible chest rise, then perform 30 compressions, open the airway, and look in the mouth.

a. Attempt to carefully remove any visible object.

XVII. Foreign Body Airway Obstruction in Infants and Children

A. Airway obstruction is a common problem in infants and children.

B. In patients who have signs and symptoms of an airway obstruction, do not waste time trying to dislodge a foreign body.

1. Administer supplemental oxygen if needed and immediately transport the child to the ED.

C. As long as the patient can breathe, cough, or talk, do not interfere with his or her attempts to expel the foreign body.

1. Administer supplemental oxygen if needed (and tolerated) and provide transport to the ED.

D. On a responsive standing or sitting child, perform the Heimlich maneuver but with less force than what would be used on an adult.

E. An unresponsive child older than 1 year who has an airway obstruction is managed in the same manner as an adult (see Skill Drill 14-6).

F. Responsive infants

1. Perform back blows and chest thrusts (compressions).

G. In unresponsive infants, begin CPR beginning with chest compressions.

1. Do not check for a pulse before starting compressions.

2. Open the airway and look in the mouth.

a. If you see an object that can be easily removed, then remove it with your finger and attempt to ventilate.

b. If you do not see an object, then resume chest compressions.

3. Continue the sequence of chest compressions, opening the airway, and looking inside the mouth until the obstruction is relieved or ALS providers take over.

XVIII. Special Resuscitation Circumstances

A. Opioid overdose

1. EMTs may be allowed to administer naloxone (Narcan) to reverse the arrest.

B. Cardiac arrest in pregnancy

1. Priorities are to provide high-quality CPR and relieve pressure off the aorta and vena cava.

2. If the pregnant patient is not in cardiac arrest, then position her on her left side to relieve pressure on the great vessels.

3. If she is in cardiac arrest, and the top of the patient’s uterus can be felt at or above the level of the umbilicus, perform manual displacement of the uterus to the patient’s left to relieve aortocaval compression while CPR is being performed.

XVIV. Grief Support for Family Members and Loved Ones

A. Family members may experience a psychologic crisis that turns into a medical crisis.

B. Family members and loved ones will remember this event in detail for the rest of their lives.

1. Appropriate and supportive care at the onset of grief may positively affect the family’s grieving process.

C. Keep the family informed throughout the resuscitation process.

1. Designate one provider to communicate the patient’s status to family members.

2. Be concise and clear.

D. After resuscitation has stopped, these other measures can be helpful:

1. Take the family to a quiet, private place.

2. Introduce yourself and anyone with you.

3. Use clear language and speak in a warm, sensitive, and caring manner.

4. Try to exhibit calm, reassuring authority.

5. Use the patient’s name.

6. Use eye contact and appropriate touch.

7. Expect that family members will show emotion as they begin the grieving process.

8. While you are still on scene, be supportive but do not hover.

9. Ask if a friend or family member can be called to come and help support them.

10. When you need to leave, turn the family over to someone else.

E. Ensure that children are not ignored.

F. See Chapter 2, “Workforce Safety and Wellness*,*” for a discussion of the emotional aspects of emergency care and stress management.

XX. Education and Training for the EMT

A. CPR skills can deteriorate over time.

1. Practice often using manikin-based training.

2. CPR self-instruction through a video and/or computer-based modules with hands-on practice may be a reasonable alternative to instructor-led courses.

XXI. Education and Training for the Public

A. You are a patient advocate.

1. Not only are you responsible for providing the best possible care for your patient, but you must do your part to facilitate the training of laypeople in the critical skills of CPR and AED operation.

2. If you are asked to train members of your community how to perform compression-only CPR, then you should consider it your professional responsibility and be willing to assist.

Post-Lecture

## Assessment in Action

A. Assessment in Action is available in the Navigate course.