Chapter 7, Airway

- Page 225, Replace text in right-hand column with:

Perform the jaw-thrust maneuver in an adult in the following manner **(Figure 7-13)**:

1. Kneel above the patient's head. Place your fingers behind the angles of the lower jaw, and move the jaw upward. Use your thumbs to help position the lower jaw to allow breathing through the mouth and nose.
2. The completed maneuver should open the airway with the mouth slightly and the jaw jutting forward.

It should be noted that if the jaw-thrust maneuver does not adequately open the airway, you should carefully perform the head tilt-chin lift maneuver. The patient's airway must be patent, regardless of the situation. Once the airway has been opened, the patient may start to breathe on his or her own. Assess whether breathing has returned by using the look, listen, and feel technique (**Figure 7-14**). This assessment should take at least 5 seconds but no more than 10 seconds.

If the patient has a severe airway obstruction, there will be no movement of air. However, your may see the chest and abdomen rise and fall considerably with the patient's frantic attempts to breathe. This is why the presence of chest wall movement alone does not indicate breathing is present. Regular chest wall movement indicates that respiratory effort is present. Observing chest and abdominal movement is often difficult with a fully clothed patient. You may see little, if any, chest movement, even with normal breathing. This is particularly true in some patients with chronic lung disease. You must begin artificial ventilation immediately if you use the three-part approach—look, listen, and feel—and discover that there is no movement of air.

- Page 242, Replace the EMT-B Tips box at the bottom of the left-hand column with:

EMT-B Tips
Ventilation Rates*
Adult 1 breath every 5 to 6 seconds
Child 1 breath every 3 to 5 seconds
Infant 1 breath every 3 to 5 seconds
*For apneic patients with a pulse

- Page 243, Replace the caption for step 2 in the Skill Drill with:

Breathe into the one-way valve until you note visible chest rise.

- Page 243, Replace step 2 in the right-hand column with:

2. Take a deep breath and exhale through the open port of the one-way valve until you note visible chest rise (Step 2).

- Page 244, Replace the second paragraph in the left-hand column with:

To increase the oxygen concentration, connect high-flow oxygen at 15 L/min through the oxygen inlet valve of the mask. This, when combined with your exhaled breath, will deliver approximately 55% oxygen to the patient. Each breath should be given over a period of 1 second, just enough to produce visible chest rise, whether supplemental oxygen is attached to the mask or not. In most adults, a delivered tidal volume of 500 to 600 mL (6 to 7 mL/kg) per breath will produce visible chest rise.

- Page 245, Replace the first and second paragraph in the left-hand column with:

The volume of air (oxygen) that you should deliver to the patient is based on one key observation, visible chest rise. When using a BVM device, whether supplemental oxygen is attached to it or not, you should deliver each breath over a period of 1 second, just enough to produce visible chest rise, at the appropriate rate. Breaths that are delivered too forcefully or too fast can result in two negative effects: gastric distention (and the associated risks of vomiting and aspiration) and decreased blood return to the heart secondary to increased intrathoracic pressure.

As noted earlier, a delivered tidal volume of 500 to 600 mL (6 to 7 mL/kg) per breath will produce visible chest rise in most adults. However, because it is not possible for the EMT-B to accurately measure tidal volumes in milliliters per kilogram for each patient ventilated in the field, the key is to watch for visible rise and fall of the chest—let these observations determine the appropriate amount of volume to deliver.

- Page 245, Replace steps 9 and 10 in the right-hand column with:

9. Hold the mask in place while your partner squeezes the bag with two hands until the patient's chest visibly rises (**Figure 7-32**). If a spinal injury is suspected, stabilize the patient's head and neck with your forearms while maintaining an adequate mask-to-face seal with your hands. Continue squeezing the bag once every 5 to 6 seconds for adults and once every 3 to 5 seconds for infants and children. Deliver each breath over a period of 1 second, just enough to produce visible chest rise.
10. If you are alone, hold your index finger over the lower part of the mask, your thumb over the upper part of the mask, and then use your remaining fingers to pull the lower jaw into the mask. This is known as the C-clamp and will maintain an effective mask-to-face seal (**Figure 7-33**). Use the head tilt-chin lift maneuver to make sure the neck is extended. If spinal injury is suspected, stabilize the patient's head in a neutral in-line position with your knees as you pull the patient's lower jaw into the mask. Squeeze the bag in a rhythmic manner once every 5 to 6 seconds for adults and once every 3 to 5 seconds for infants and children. Deliver each breath over a period of 1 second, just enough to produce visible chest rise.

- Page 247, Replace the EMT-B Tips box with:

EMT-B Tips

Indications That Artificial Ventilation is Adequate

Visible and equal chest rise and fall with each ventilation

Ventilations delivered at the appropriate rate

- 10 to 12 breaths/min for adults*
- 12 to 20 breaths/min for infants and children*

Heart rate returns to a normal range

Indications That Artificial Ventilation is Inadequate

Minimal or no chest rise and fall

Ventilations are delivered too fast or too slow for the patient's age

Heart rate does not return to normal range

*In apneic patients with a pulse

- Page 248, Replace the first paragraph in the left-hand column with:

Special Considerations

Gastric Distention

Gastric distention occurs when artificial ventilation fills the stomach with air. Although it most commonly affects children, it also affects adults. Gastric distention is most likely to occur when you ventilate the patient too forcefully or too fast with a BVM or pocket mask device or when the airway is obstructed as a result of a foreign body or improper head positioning. For this reason, you should give slow, gentle breaths over 1 second when ventilating adults, children, and infants. Slight gastric distention is not of concern; however, severe distention is dangerous because it may cause vomiting and increase the risk of aspiration during CPR. Gastric distention can also significantly reduce the lung volume by elevating the diaphragm, especially in infants and children. Gastric distention is a common complication associated with the use flow-restricted, oxygen-powered ventilation devices—a key reason why this device is not highly recommended.

- Pages 249-250, Replace the section on "Recognition" with:

Recognition

Early recognition of airway obstruction is crucial for the EMT-B to be able to provide emergency medical care effectively. Obstruction from a foreign body can result in a **mild airway obstruction** or a **severe airway obstruction**.

Patients with a mild airway obstruction (eg, the airway is partially obstructed) are still able to exchange air but will have varying degrees of respiratory distress. Great care must be taken to prevent a mild airway obstruction from becoming a severe airway obstruction.

With a mild airway obstruction, the patient can cough forcefully, although you may hear wheezing in between coughs. As long as the patient can breathe, cough forcefully, or talk, you should not interfere with the patient's efforts to expel the foreign object on his or her own. Continue to monitor the patient closely and encourage the patient to continue coughing. Abdominal thrusts are not indicated for patients with a mild airway obstructed. Furthermore, attempts to remove the object manually could force the object farther down into the airway and cause a severe obstruction. Continually reassess the patient's condition and be prepared to provide immediate treatment if the mild obstruction becomes a severe obstruction.

Patients with a severe airway obstruction (ie, the airway is completely obstructed) cannot breathe, talk, or cough. One sure sign of a severe obstruction is the sudden inability to speak or cough immediately after eating. The person may clutch or grasp his or her throat (universal distress signal), begin to turn cyanotic, and make frantic attempts to breathe (**Figure 7-37**). There is little or no air movement. Ask the conscious patient, "Are you choking?" If the patient nods "yes," provide immediate treatment. If the obstruction is not cleared quickly, the amount of oxygen in the patient's blood will decrease dramatically. If not treated, the patient will become unconscious and die.

Some patients with a severe airway obstruction will be unconscious during your initial assessment. You may not know that an airway obstruction is the cause of their condition. There are many other causes of unconsciousness and respiratory distress, including stroke, heart attack, trauma, seizures, and drug overdose. A complete and

thorough patient assessment by you, therefore, is key in providing appropriate emergency medical care.

Any person found unconscious must be managed as if he or she has a compromised airway. You must first open the airway, assess breathing, and provide artificial breathing if the patient is not breathing or is breathing inadequately (**Figure 7-38**). If, after opening the airway, you are unable to ventilate the patient after two attempts (the chest does not visibly rise) or you feel resistance when ventilating, consider the possibility of an airway obstruction. Resistance to ventilation can also be due to poor lung compliance. **Compliance** is the ability of the alveoli to expand when air is drawn in during inhalation; poor lung compliance is the inability of the alveoli to fully expand during inhalation.

- Pages 250-251, Replace the section on "Emergency Medical Care for Foreign Body Airway Obstruction" with:

Emergency Medical Care for Foreign Body Airway Obstruction

Perform the head tilt-chin lift maneuver to clear an obstruction that has been caused by the tongue and throat muscles relaxing back into the airway in any person who is found unconscious, is not breathing or is breathing inadequately, and is not suspected of having spinal trauma. If spinal trauma is suspected, you should open the airway with a jaw-thrust maneuver. Remember, if the jaw-thrust maneuver does not adequately open the patient's airway, *carefully* perform a head tilt-chin lift maneuver, even if spinal trauma is suspected; *the airway must remain patent*. Large pieces of vomited food, mucus, loose dentures, or blood clots in the mouth should be swept forward and out of the mouth with your gloved index finger if they are visible. *Do not perform blind finger sweeps in any patient*; this may force an obstructing object farther down into the airway. When available, suctioning should be used to maintain a clear airway.

The Heimlich maneuver (abdominal thrusts) is the most effective method of dislodging and forcing an object out of the airway of a conscious adult or child. Residual air, which is always present in the lungs, is compressed upward and used to expel the object. Perform the Heimlich maneuver in the conscious adult or child with a severe airway obstruction until the object is expelled or the patient loses consciousness.

If the patient becomes unconscious, place him or her in a supine position on the ground and open the airway. Look in the mouth, remove any objects that are visible, and attempt to ventilate the patient. If your initial attempt to ventilate the patient does not produce visible chest rise, reposition the patient's head and reattempt to ventilate. If both breaths do not produce visible chest rise, perform chest compressions. If you are unable to relieve the obstruction with your initial attempts, begin rapid transport and continue your efforts at relief of the obstruction with chest compressions, opening the airway and looking in the mouth, and attempts to ventilate en route to the hospital.

Patients with a mild airway obstruction who are exchanging adequate amounts of air should be monitored closely for signs of deterioration of their condition (ie, ineffective cough, decreased level of consciousness, cyanosis). If the patient is unable to clear the obstruction and remains conscious with an effective cough, allow the patient to assume a position that is most comfortable for him or her. Provide supplemental oxygen and transport to the hospital.

- Page 253, Replace the second to last bullet in Ready for Review with:
- Foreign body airway obstructions are classified as being mild or severe. Patients with a mild airway obstruction are able to move adequate amounts of air and should be left alone. Patients with a severe airway obstruction cannot move any air at all and require immediate treatment. Perform the Heimlich maneuver on conscious adults and children with a severe airway obstruction. If the patient becomes unconscious, open the airway and look in the mouth (do not perform blind finger sweeps), attempt to ventilate the patient, and perform chest compressions if ventilations are unsuccessful.

- Page 253, Replace "complete airway obstruction" in Vital Vocabulary with:

severe airway obstruction Occurs when a foreign body completely obstructs the patient's airway. The patient cannot breathe, talk, or cough.

- Page 253, Delete "good air exchange" in Vital Vocabulary.

- Page 254, Replace "partial airway obstruction" in Vital Vocabulary with:

mild airway obstruction Occurs when a foreign body partially obstructs the patient's airway. The patient is able to move adequate amounts of air, but also experiences some degree of respiratory distress.

- Page 254, Delete "poor air exchange" in Vital Vocabulary.

Chapter 12, Cardiovascular Emergencies

- Pages 402, Replace the first paragraph in the left-hand column with:

The American Heart Association reports that cardiovascular disease (CVD) claimed 910,614 lives in the United States in 2003. This is 37.3% of all deaths, or 1 of every 2.7 deaths. Heart disease has been the leading killer of Americans since 1900. This statistic is still true today.

- Pages 409, Replace the first two bullets in the left-hand column with:
- Chest pain/discomfort/pressure that is often crushing or squeezing and that does not change with each breath
- Pain/discomfort/pressure in the lower jaw, arms, back, abdomen, or neck

Pages 420, Replace the second paragraph in Pediatric Needs with:

Cardiac arrest in younger children is less common than in older children and is usually caused by a breathing problem. With children from 1 to 8 years of age, an AED that has the settings to work on children is indicated. These AEDs have high specificity to recognize pediatric shockable rhythms and are able to reduce the amount of energy supplied through the pads during a shock. If a pediatric AED is not available, an adult AED and pads should be used on children between 1 and 8 years of age. Teenagers, who may occasionally have a cardiac arrest related to a heart problem, may benefit from and AED.

- Pages 420-421, Replace the last paragraph in the right-hand column with:

AEDs also come equipped to give a monophasic or a biphasic shock. Monophasic means to send energy in one direction, from negative to positive. Current in the biphasic waveform flows in both a positive and negative direction. This two-directional flow of current is reflected by the current going in one direction, the reversing the flow in the opposite direction. The advantage of biphasic shock is that it produces a more efficient defibrillation and requires a lower energy setting. The energy setting for ventricular fibrillation on a monophasic AED is 360 joules for the first shock and all shocks subsequent to that. With biphasic technology, the energy can be set at 120 joules for the first shock and all shocks subsequent to that, or can start at 120 joules for the first shock and then escalate to 200 joules with subsequent shocks. The optimum energy setting for the biphasic AED is still being studied and no recommendation for either is currently supported in the literature. The computer inside the AED is specially programmed to recognize rhythms that require defibrillation to correct, most commonly ventricular fibrillation. AEDs are extremely accurate. It would be extremely rare for the AED to recommend a shock when a shock is not required, and they rarely fail to recommend one would when it would be helpful. Therefore, if the AED recommends a shock, you can believe that it is indicated.

- Page 423, Delete the last two sentences in the continued paragraph from page 422 in left-hand column.

- Page 426, Replace the first paragraph under "Performing Defibrillation" in the left-hand column with:

Performing Defibrillation

If a patient's cardiac arrest is witnessed by you, begin CPR and attach the AED as soon as it is available. However, if the patient's cardiac arrest was not witnessed, especially if the call-to-arrival interval is greater than 5 minutes, you should perform 5 cycles (about 2 minutes) of CPR before applying the AED. The rationale for this is that the heart is more likely to respond to defibrillation within the first few minutes of the onset of ventricular fibrillation. If the arrest interval is prolonged, however, metabolic waste products accumulate within the heart, energy stores are rapidly depleted, and the chance of successful defibrillation is reduced. Therefore, a 2 minute period of CPR before applying the AED in patients with prolonged (> 5 minutes) cardiac arrest can "prime the pump", thus restoring oxygen to the heart, removing metabolic waste products, and increasing the chance of successful defibrillation. The steps for using the AED are listed here and shown in **Skill Drill 12-2**:

- Pages 426-427, Replace steps 13-26 in the right-hand column with:

13. If a shock is not needed, go to step 17 (CPR only). If a shock is advised, make sure that no one is touching the patient. When the patient and area around the patient are clear, push the shock button.
14. After the shock is delivered, immediately begin 5 cycles (approximately 2 minutes) of CPR beginning with chest compressions.
15. After 5 cycles (approximately 2 minutes) of CPR, reanalyze the patient's rhythm.
16. If the AED advises a shock, clear the patient and push the shock button.
17. If no shock is advised, check for a pulse.

18. If the patient has a pulse, check for breathing (at least 5 seconds but no more than 10 seconds).
19. If the patient is breathing adequately, give the patient oxygen via a nonrebreathing mask and transport. If the patient is not breathing adequately, use the necessary airway adjuncts and proper positioning of the head and jaw to ensure an open airway. Provide artificial ventilations with a high concentration of oxygen and transport.
20. If the patient has no pulse, perform 5 cycles (approximately 2 minutes) of CPR.
21. Gather additional information about the arrest event.
22. After 2 minutes of CPR, make sure no one is touching the patient. Push the analyze button.
23. If necessary, repeat Steps 15 and 16 until ALS arrives.
24. Transport and check with medical control.
25. Continue to support the patient as needed. Ventilate until the patient is breathing normally. Continue CPR if needed.

- Page 427, Replace the second and third paragraphs in the left-hand column with:

If the patient has no pulse, resume CPR for 2 minutes, then use the AED to reanalyze the heart rhythm. If the AED advises to shock, deliver one shock followed by 5 cycles (approximately 2 minutes) of CPR beginning with chest compressions. Reanalyze the rhythm. Repeat these steps if needed.

If the AED advises no shock and the patient has no pulse, resume CPR for 5 cycles (approximately 2 minutes), beginning with chest compressions. Stop and reanalyze the patient's rhythm. Shock if advised, followed by 5 cycles of CPR. If no shock is advised, continue CPR. Check with medical control and transport.

- Page 427, Replace the sixth bullet in the right-hand column with:

The machine gives three consecutive messages (separated by 2 minutes of CPR) that no shock is advised.

- Page 428, Replace the caption for step 4 with:

Verbally and visually clear the patient.
Push the Analyze button if there is one.
Wait for the AED to analyze rhythm.
If no shock advised, perform CPR for 2 minutes.
If shock advised, recheck that all are clear and push the Shock button.
Immediately initiate 5 cycles (approximately 2 minutes) of CPR, beginning with chest compressions. Reanalyze rhythm.
Press shock if advised (second shock).
Push the Analyze button, if needed, to analyze rhythm again.
Press Shock if advised (third shock).

- Page 429, Replace the caption for step 6 with:

If breathing adequately, give oxygen and transport. If not, open airway, ventilate, and transport.
If no pulse, perform 5 cycles of CPR (approximately 2 minutes).
Clear the patient and analyze again.

If necessary, repeat one cycle of up to three shocks.
Transport and call medical control.
Continue to support breathing or perform CPR, as needed.

- Page 429, Replace step 4 in the left-hand column with:

4. Deliver shock, if indicated.

- Page 429, Replace steps 5 and 6 in the right-hand column with:

5. Deliver one shock, if indicated.
6. Begin compressions and continue resuscitation according to your local protocol including transporting the patient.

- Page 433, Within the steps for Cardiac Arrest, replace step 3 with:

3. Verify pulselessness and apnea (no more than 10 seconds).

- Page 433, Within the steps for Cardiac Arrest, replace step 13 with:

13. If a shock is not needed, go to step 17. If a shock is advised, ensure that no one is touching the patient, including yourself. Push shock button.

- Page 433, Within the steps for Cardiac Arrest, replace steps 14-26 with:

14. Begin 5 cycles of CPR (approximately 2 minutes).
15. Analyze rhythm.
16. Deliver shock if indicated.
17. If no shock indicated, check pulse.
18. If no pulse present, repeat from step 14.
19. If pulse is present, check breathing.
20. If breathing adequately, give patient oxygen via nonrebreathing mask and transport. If patient is not breathing adequately, open airway and ventilate.
21. Gather additional information on arrest event.
22. Transport and check with medical control.
23. Continue to support patient.

- Page 433, Within the steps for Cardiac Arrest, following step 23, place the following:

Note: *If the patient's cardiac arrest was not witnessed, especially if the call-to-arrival interval is greater than 5 minutes, perform 5 cycles (about 2 minutes) of CPR and then apply the AED. Follow local protocols regarding witnessed versus unwitnessed cardiac arrest and the use of the AED.*

Chapter 32, Pediatric Assessment and Management

- Page 954, Replace the first sentence and four bullets under "Oxygen Delivery Devices" in the right-hand column with:

Oxygen Delivery Devices

In treating infants and children who require more than the usual 21% oxygen found in room air, you have several options:

- Nonrebreathing mask at 10 to 15 L/min provides up to 90% oxygen concentration.
- Blow-by technique at 6 L/min provides more than 21% oxygen concentration.
- Nasal cannula at 1 to 6 L/min provides 24% to 44% oxygen concentration.
- BVM device (with oxygen reservoir) connected to an oxygen source set at 10 to 15 L/min provides 90% oxygen concentration.

- Page 955, Replace the text under "Nonrebreathing Mask" in the left-hand column with:

Nonrebreathing Mask

A nonrebreathing mask delivers up to 90% oxygen to the patient and allows the patient to exhale all carbon dioxide without rebreathing it (**Figure 32-13**). To apply a nonrebreathing mask:

1. **Select the appropriately sized** pediatric nonrebreathing mask. The mask should extend from the bridge of the nose to the cleft of the chin.
3. **Connect the tubing** to an oxygen source set at 10 to 15 L/min.
3. **Adjust oxygen flow** as needed to match the patient's respiratory rate and depth. The oxygen reservoir should neither deflate completely nor fill to capacity during the respiratory cycle.

- Page 955, Replace step 2 under "Blow-by Technique" in the left-hand column with:

2. **Connect tubing to an oxygen source** set at 15 L/min.

- Page 956, Replace the text under "Nasal Cannula" in the left-hand column with:

Nasal Cannula

Some patients prefer this adjunct while others find it uncomfortable. To apply a nasal cannula:

2. **Choose the appropriately sized pediatric nasal cannula** (**Figure 32-15**). The prongs should not fill the nares entirely. If the nares blanch, select a smaller cannula.
2. **Connect the tubing** to an oxygen source set at 1 to 6 L/min.

- Page 958, Replace steps 4-5 in the left-hand column with:

4. **Squeeze the bag**, using the correct ventilation rate of 12 to 20.
5. Each ventilation (squeeze of the bag) should last 1 second (Step 3).

- Page 958, Replace the first paragraph under "Airway Obstruction" in the left-hand column with:

Airway Obstruction

Children, especially those younger than 5 years, can (and do) obstruct their airway with any object that they can fit into their mouth: hot dogs, balloons, grapes, or coins (**Figure 32-17**). In cases of trauma, a child's teeth may have been dislodged into the airway. Blood, vomitus, or other secretions can also cause a mild or severe airway obstruction.

- Page 959, Replace the text under "Emergency Medical Care" in the left-hand column and the first paragraph of "Management of Airway Obstruction in a Cchild" with:

Emergency Medical Care

Treatment of the child with an airway obstruction must begin immediately. If the child is conscious and coughing forcefully and you know for sure that there is a foreign body in the airway—that is, someone actually saw the object go into the child's mouth—encourage the child to continue coughing to clear the airway. If the object in the airway does not completely block the flow of air (eg, mild airway obstruction), the child may be able to breathe adequately on his or her own without any intervention. In such cases, do not intervene except to provide supplemental oxygen (**Figure 32-20**). Allow the child to remain in whatever position is most comfortable, and monitor his or her condition.

If you see signs of a severe airway obstruction, however, you must attempt to clear the airway at once. Signs of a severe airway obstruction include the following:

- Ineffective cough (no sound)
- Inability to speak or cry
- Increasing respiratory difficulty, with stridor
- Cyanosis
- Loss of consciousness

Management of Airway Obstruction in a Child

If there is reason to believe that an unconscious child has a foreign body obstruction, open the airway with the head tilt-chin lift maneuver and look inside the mouth to see whether the obstructing object is visible (**Figure 32-21**). If the object is visible, try to remove it using a finger sweep motion. Never use blind finger sweeps, regardless of the patient's age, if you cannot see the object, as you may push it further into the airway.

- Page 960, Replace the caption for Figure 32-21 with:

Open the airway and look inside the mouth of an unconscious child with a possible airway obstruction.

- Page 960, Replace the caption first two paragraphs in the left-hand column with:

Chest compressions are recommended to relieve a severe airway obstruction in an unconscious child. Chest compressions increase the pressure in the chest, creating an artificial cough that may force a foreign body from the airway.

Skill Drill 32-5 demonstrates the steps for removing a foreign body airway obstruction in an unconscious child:

- Page 960, Replace steps 2-9 with:

2. **Open the airway using the head tilt-chin life maneuver** and look inside the child's mouth (Step 2).
3. **Attempt rescue breathing**. If the first try is unsuccessful, reposition the child's head and try again (Step 3).
4. **If ventilation is still unsuccessful, begin CPR** (Step 4).
5. Place the heel of one hand on the lower half of the sternum between the nipples.
6. **Administer 30 chest compressions.** Compressions should be one third to one half the depth of the chest.
7. **Open the airway** using the head tilt–chin lift maneuver and look inside the child's mouth. If you see the object, remove it (Step 5).

8. Repeat the process starting at Step 3.

- Page 960, Replace steps 2 in the right-hand column with:

2. **Give the child abdominal thrusts** in an upward direction. Be careful to avoid applying force to the lower rib cage or sternum.

- Page 962, Replace steps 4 and 6 in the right-hand column with:

4. **If the child becomes unconscious**, position the child on a hard surface. Open the airway using the head tilt-chin list maneuver and look inside the child's mouth.

6. **If the airway remains obstructed, begin CPR**.

- Page 962, Replace the first paragraph under "Management of Airway Obstruction in an Infant" in the left-hand column with:

Management of Airway Obstruction in an Infant

Abdominal thrusts are not recommended for conscious infants with an airway obstruction because of the risk of injury to the immature organs of the abdomen. Instead, perform back slaps and chest thrusts to try to clear a severe airway obstruction in a conscious infant, as follows (**Figure 32-23**):

- Page 962, Replace step 2 in the left-hand column with:

2. **Deliver five back slaps** between the shoulder blades, using the heel of your hand.

- Page 963, Replace steps 4 and 6 in the right-hand column with:

4. **Give five quick chest thrusts** in the same location and manner as chest compressions, using two fingers placed on the lower half of the sternum. For larger infants, or if you have small hands, you can perform this step by placing the infant in your lap and turning the infant's whole body as a unit between back slaps and chest thrusts.

6. **If the infant becomes unconscious, begin CPR**, remembering to look in the airway before ventilations each time.

- Page 963, Replace first sentence in the left-hand column with:

If the infant regains consciousness, keep him or her in a position that allows for frequent reassessment of the airway and vital signs.

- Page 963, Replace the last bullet in Table 32-5 with:
- Perform chest compressions if there is no pulse or if the pulse rate is less than 60 beats/min despite oxygenation and ventilation

- Page 964, Replace the second paragraph in the left-hand column with:

If chest compressions are required, give them at a rate of 120 times per minute, to a depth equal to one third to one half the depth of the chest. If two rescuers are present, the two-thumb hands-encircling technique should be used; the two-finger technique is appropriate to use if you are by yourself or if the infant is large (**Figure 32-35**). Coordinate chest compressions and ventilations at a ratio of 3:1.

- Page 964, Replace the caption for Figure 32-25 with:

Figure 32-25 A. If two rescuers are present, use the two-thumb hands-encircling technique to perform chest compressions on the newborn. **B.** In very small infants, you may need to overlap the thumbs. **C.** If you are by yourself or if the infant is large, use your middle and ring fingers (two-finger technique).

- Page 965, Replace second paragraph in the left-hand column with:

For purposes of pediatric BLS, infancy ends at 1 year of age, and childhood extends through the onset of puberty. The goal, of course, is the same for all patients—to restore breathing and circulation of the blood.

- Page 965, Replace Table 32-7 with:

TABLE 32-7 Review of Pediatric BLS Procedures

Procedure	Infants (younger than 1 y)	Children (1 y to onset of puberty)[1]
Airway	Head tilt-chin lift; jaw thrust if spinal injury is suspected	Head tilt-chin lift; jaw thrust if spinal injury is suspected
Breathing		
Initial breaths	2 breaths with duration of 1 second each with enough volume to produce chest rise	2 breaths with duration of 1 second each with enough volume to produce chest rise
Subsequent breaths	1 breath every 3 to 5 seconds (12 to 20 breaths/min)	1 breath every 3 to 5 seconds (12 to 20 breaths/min)
Circulation		
Pulse check	Brachial artery	Carotid or femoral artery
Compression area	Just below the nipple line	In the center of the chest, in between the nipples
Compression width	2 fingers or 2-thumb hands-encircling technique	Heel of one or both hands
Compression depth	One third to one half depth of chest	One third to one half depth of chest
Compression rate	100/min	100/min
Ratio of compressions to ventilations	30:2 (one rescuer); 15:2 (two rescuers)[2]	30:2 (one rescuer); 15:2 (two rescuers)[2]
Foreign body obstruction	Conscious: back slaps and chest thrusts Unconscious: CPR	Conscious: abdominal thrusts Unconscious: CPR

[1] Onset of puberty is approximately 12-14 years of age, as defined by secondary characteristics (eg, breast development in girls and armpit hair in boys).
[2] Pause compressions to deliver ventilations.

- Pages 965-966, Replace the second paragraph in the right-hand column with:

If you find an unresponsive, apneic, and pulseless child while you are alone and not on duty, perform CPR for approximately 2 minutes, and then stop to call the EMS system. Why not call right away, as you would with an adult? Because cardiopulmonary arrest in children is most often the result of respiratory failure, not a primary cardiac event. Therefore, they will require *immediate* restoration of oxygenation, ventilation, and

circulation, which can be accomplished by *immediately* performing 5 cycles (about 2 minutes) of CPR before activating the EMS system.

- Page 966, Replace the first paragraph in the right-hand column with:

There are two common techniques for manually opening the airway in a child who is unconscious and not breathing: the head tilt-chin lift technique (**Figure 32-29**) and the jaw-thrust maneuver. The jaw-thrust is safer if there is a possibility of spinal injury. Remember, however, that if the jaw-thrust does not adequately open the child's airway, *carefully* perform the head tilt-chin lift technique.

- Page 966, Delete Figure 32-29 B.

- Page 967, Replace the first paragraph under "Breathing" in the left-hand column with:

Once the airway is open, take at least 5 seconds but no more than 10 seconds to determine if the child is breathing spontaneously, using the look, listen, and feel technique (**Figure 32-30**):

- Page 967, Replace the first paragraph in "You are the Provider" with:

The mild airway obstruction has become a severe obstruction. You kneel behind the girl and wrap your arms around her. Finding the appropriate anatomic landmarks, you perform the Heimlich maneuver using forceful and inward and upward motions.

- Page 968, Replace the first paragraph under "Circulation" in the left-hand column with:

Once you have opened the airway and provided two rescue breaths, you must assess the child's circulation. Check for pulses in the carotid or femoral arteries in children and the brachial artery in infants. Locate the carotid artery by placing one or two fingers over the groove between the Adam's apple and the neck muscles. The femoral artery can be felt in the crease between the upper leg and groin. Locate the brachial artery by placing two or three fingers on the inside of the infant's upper arm, between the elbow and the shoulder. Take at least 5 seconds but no more than 10 seconds to assess for a pulse. If the infant or child is not breathing, the pulse is often too slow (less than 60 beats/min) or absent altogether; therefore, CPR will be required.

- Page 968, Replace step 3 in the left-hand column with:

3. **Using two fingers, compress the sternum** about one third to one half the depth of the chest. Compress the chest at a rate off 100 compressions/min.

- Page 968, Replace the first paragraph in the right-hand column with:

Coordinate rapid chest compressions and ventilations in a 30:2 ratio, making sure the infant's chest fully recoils in between compressions and that the chest visibly rises with each ventilation. You will find this easier to do if you use your free hand to keep the head in the open airway position. If the chest does not rise, or rises only a little, use a chin lift to open the airway. Reassess the infant for signs of spontaneous breathing and pulses after every 5 cycles (about 2 minutes) of CPR.

Skill Drill 32-7 shows the steps for performing CPR in children between 1 year of age and the onset of puberty.

- Page 968, Replace steps 2-6 in the right-hand column with:

2. Place the heel of one or two hands in the center of the chest, in between the nipples. Avoid compression over the lower tip of the sternum, which is called the **xiphoid process** (**Step 2**).
3. Compress the chest about one third to one half the depth of the chest at a rate of 100 compressions/min. With pauses for ventilation, the actual number of compressions delivered will be about 80/min. In between compressions, allow the chest to fully recoil. Compression and relaxation time should be about the same duration. Use smooth movements. Hold your fingers off the child's ribs, and keep the heel of your hand(s) on the sternum.
4. Coordinate rapid compressions and ventilations in a 30:2 ratio for one rescuer and 15:2 for two rescuers, making sure the chest rises with each ventilation. At the end of each cycle, pause for two ventilations (**Step 3**).
5. Reassess the child for breathing and pulses after every five cycles (about 2 minutes) of CPR.
6. **If the child resumes effective breathing**, place him or her in a position that allows for frequent reassessment of the airway and vital signs during transport (Step 4).

- Page 969, Replace the caption for step 2 in the Skill Drill with:

2. Use two fingers to compress the chest one-third to one-half its depth at a rate of 100 times/min.
Allow the sternum to return to its normal position between compressions.

- Page 969, Replace the text under "AED Usage in Children" with:

AED Usage in Children
Cardiac rhythms that require defibrillation can be the cause of sudden cardiac arrest (SCA) or may develop during resuscitation attempts. According to the American Heart Association, AEDs can safely be used in children older than 1 year of age. When using an AED on a child between 1 and 8 years of age, you should use pediatric-sized pads and a dose-attenuating system (energy reducer). However, if these are not available, an adult AED should be used. The AED is not indicated for use in infants less than 1 year of age. During CPR, the AED should be applied to children over 1 year of age after the first five cycles of CPR have been completed. As discussed earlier, cardiac arrest in children is usually due to respiratory failure; therefore, oxygenation and ventilation are vitally important. After the first five cycles of CPR, the AED should be used to deliver shocks in the same manner as with an adult patient.

- Page 970, Replace captions for steps 1-4 in Skill Drill with:

1. Place the child on a firm surface, open the airway, and deliver two rescue breaths.
2. Place the heel of one or both hands in the center of the chest, in between the nipples. Avoid the xiphoid process.

3. Compress the chest one third to one half the depth of the chest at a rate of 100 times/min. Coordinate compressions with ventilations in a 30:2 ratio (one rescuer) or 15:2 (two rescuers), pausing for ventilations.
4 Reassess for breathing and pulse after every 5 cycles (about 2 minutes) of CPR. If the child resumes effective breathing, place him or her in a position that allows for frequent reassessment of the airway and vital signs during transport.

- Page 975, Replace the last sentence in the first paragraph in the right-hand column with:

A child breathing 40 breaths/min who is playing happily does not need assisted ventilation; a child breathing 40 breaths/min who is lying unconscious on the floor does.

- Page 976, Replace the second paragraph in the left-hand column with:

Changes in behavior will also occur until the child demonstrates an altered level of consciousness. The patient may experience periods of **apnea** (absence of breathing). As the lack of oxygen becomes more serious, the heart muscle itself becomes hypoxic and slows down. This leads to bradycardia, a condition in which the heart rate is less than 80 beats/min in children and less than 100 beats/min in newborns. Bradycardia is always an ominous sign in pediatric patients. If the heart rate is fast, you need to investigate the cause. However, if the heart rate is slow (less than 60 beats/min) or absent—especially in an unconscious infant or child, you must begin CPR immediately. Without aggressive management, particularly of the airway, bradycardia will quickly progress to cardiopulmonary arrest.

- Pages 980-981, Replace bullets 5, 7, 11, 12, 18, 19, and 20 in "Ready for Review" with:

- Appropriate oxygen delivery devices include the blow-by technique at 15 L/min, a nasal cannula at 1 to 6 L/min, a nonrebreathing mask at 10 to 15 L/min, and a BVM device at 10 to 15 L/min.
- The three keys to successful use of the BVM device in a child are: (1) have the appropriate equipment in the right size; (2) maintain a good mask-to-face seal; and (3) ventilate at the appropriate rate and volume—12 to 20 breaths/min for an infant or child, 1 second per ventilation. Squeeze gently, and stop squeezing as the chest wall begins to visibly rise; use the phrase "squeeze, release, release" to maintain a proper rhythm.
- In treating an unresponsive child or infant with a severe airway obstruction, perform chest compressions, alternating with opening the airway and visualizing the mouth and attempts to ventilate.
- In a conscious child who is sitting or standing, stand or kneel behind the patient and perform abdominal thrusts until the obstruction is relieved or the child loses consciousness. In a conscious infant, perform back slaps and chest thrusts.
- If an infant or child is not breathing, provide rescue breathing while keeping the airway open. Rescue breaths for infants and children are delivered over a period of 1 second each, at a rate of 12 to 20 breaths/min (1 breath every 3 to 5 seconds).
- To provide CPR in an infant, use a compression to ventilation ratio of 30:2 if you are alone; 15:2 if two rescuers are present. Use two fingers to compress the lower half of

the sternum to a depth that is one third to one half the depth of the chest at a rate of 100 compressions/min.

- In children, use the same depth, rate, and ratio of compressions to ventilations as you did for the infant; however, use the heel of one or both hands to compress the chest; avoid compressing the xiphoid process.

- Pages 981, Replace the definition for “bradycardia” with:

bradycardia A heart rate of less than 80 beats/min in children or less than 100 beats/min in newborns.