

Breathing Emergencies



A lifeguard can be called upon at any time to respond to a breathing emergency. Therefore, it is important for lifeguards to know how to recognize and care for a breathing emergency. Caring for breathing emergencies includes—

- Performing rescue breathing for a victim who is not breathing.
- Giving back blows and abdominal thrusts for a conscious adult or child who is choking.
- Giving back blows and chest thrusts to a conscious infant who is choking.
- Giving chest thrusts, doing a foreign object check/removal and giving rescue breaths to an unconscious adult, child or infant who has an airway obstruction.
- Administering emergency oxygen, if available and trained to do so.

BREATHING EMERGENCIES

A lifeguard may detect a breathing emergency during the initial assessment. A breathing emergency occurs if a victim has difficulty breathing (*respiratory distress*) or stops breathing (*respiratory arrest/failure*). Without adequate oxygen, hypoxia will result. *Hypoxia* is a condition in which insufficient oxygen reaches the cells. Signs and symptoms of hypoxia include increased breathing and heart rates, *cyanosis* (a condition that develops when tissues do not get enough oxygen and turn blue, particularly the lips and nailbeds), changes in the level of consciousness, restlessness and chest pain. Breathing emergencies can be caused by—

- Obstructed airway (choking).
- Injury to the head, chest, lungs or abdomen.
- Illness, such as pneumonia.
- Respiratory conditions, such as emphysema or asthma.
- Heart attack.
- Coronary heart disease, such as angina.
- Allergic reactions (food or insect stings).
- Electrocutation.
- Shock.
- Drowning.
- Nonfatal submersion injury.
- Poisoning.
- Drugs.
- Emotional distress.

Respiratory Distress

A victim who is having difficulty breathing is in respiratory distress. Signs and symptoms of respiratory distress include—

- Slow or rapid breathing.
- Unusually deep or shallow breathing.
- Shortness of breath or noisy breathing.
- Dizziness, drowsiness or light-headedness.
- Changes in the level of consciousness.
- Increased heart rate.
- Chest pain or discomfort.
- Skin that is flushed, pale, ashen or bluish.
- Unusually moist or cool skin.
- Gasping for breath.
- Wheezing, gurgling or making high-pitched noises.
- Inability to speak in full sentences.
- Tingling in the hands or feet.

Injuries and other conditions, such as asthma, emphysema and anaphylactic shock, can cause respiratory distress.

Asthma is a condition that narrows the air passages and makes breathing difficult. During an asthma attack,

the air passages become constricted by a spasm of the muscles lining the bronchi or by swelling of the bronchi themselves. Asthma may be triggered by an allergic reaction, emotional stress or physical activity. A characteristic sign of asthma is wheezing when exhaling.

Emphysema is a disease in which the lungs lose their ability to exchange carbon dioxide and oxygen efficiently, causing a shortness of breath.

Anaphylactic shock, also known as *anaphylaxis*, is a severe allergic reaction. The air passages may swell and restrict breathing. Anaphylaxis may be caused by insect bites or stings, foods, chemicals, medications or latex allergies. Anaphylactic shock is a life-threatening condition.

Caring for Respiratory Distress

Lifeguards do not need to know the cause of respiratory distress to provide care. Whenever a victim is experiencing difficulty breathing—

- Summon emergency medical services (EMS) personnel by calling 9-1-1 or the local emergency number.
- Help the victim rest in a comfortable position that makes breathing easier.
- Reassure and comfort the victim.
- Assist the victim with any of his or her prescribed medication.
- Keep the victim from getting chilled or overheated.
- Administer emergency oxygen, if it is available and trained to do so.

Someone with asthma or emphysema who is in respiratory distress may try to do pursed lip breathing. Have the person assume a position of comfort. After he or she inhales, have the person slowly exhale out through the lips, pursed as though blowing out candles. This creates back pressure, which can help open airways slightly until EMS personnel arrive.

Respiratory Arrest

A victim who has stopped breathing is in respiratory arrest, or respiratory failure. Respiratory arrest may develop from respiratory distress or may occur suddenly as a result of an obstructed airway, heart attack or other cause. If an unconscious victim is not moving or breathing normally but has a pulse, he or she needs rescue breathing. When checking an unconscious victim, lifeguards may detect an irregular, gasping or shallow breath. This is known as an *agonal breath*. Do not confuse this with normal breathing. Look for movement and check for breathing and a pulse during the initial assessment. If the person is not moving or breathing normally but has a pulse, begin rescue breathing.

Epinephrine Administration

Approximately 2 million people in the United States are at risk for anaphylaxis, and each year 400 to 800 people die from anaphylactic reactions. Insect stings; penicillin; aspirin; food additives, such as sulfites; and certain foods, such as shellfish, fish and nuts, can trigger anaphylaxis in susceptible people. These reactions may be life threatening and require immediate care. A medical ID bracelet should be worn by anyone at risk. Some possible signs and symptoms in anaphylactic victims include—

- Swelling of the face, neck, hands, throat, tongue or other body part.
- Itching of the tongue, armpits, groin or any body part.
- Dizziness.
- Redness or welts on the skin.
- Red, watery eyes.
- Nausea, abdominal pain or vomiting.
- Rapid heart rate.
- Difficulty breathing or swallowing.
- Feelings of constriction in the throat or chest.

Epinephrine is a medication prescribed to treat the signs and symptoms of these reactions. If someone shows any of these signs or symptoms, summon EMS personnel.

LIFEGUARDING TIP: Lifeguards should follow local protocols or medical directives when applicable.

Use an epinephrine auto-injector when a victim—

- Relates a history of allergies or allergic reactions.
- Is having an allergic reaction.
- Requests assistance to administer epinephrine.
- Provides the epinephrine or auto-injector.
- Has a family member who relates a victim's history of allergies or allergic reactions and provides the victim's auto-injector.

Before assisting or administering epinephrine to the victim—

- Summon EMS personnel.
- Check the label to ensure that the prescription is for the victim.
- Ensure that the person has not already taken epinephrine or antihistamine. If so, do not administer another dose unless directed by EMS personnel.
- Ensure that the prescription has not expired.
- Ensure that the medication is clear and not cloudy or discolored.
- Read and follow instructions provided with the auto-injector.

An epinephrine auto-injector is simple and easy to use. However, it needs to be accessed quickly. Assisting the victim with the medication can include getting the pen from a purse, car, home or out of a specially designed carrier on a belt. It may also include taking it out of the plastic tube or assisting the victim with the injection into the thigh.

The standard epinephrine dose is 0.3 mg for an adult or 0.15 mg for a child weighing less than 45 pounds. To administer an intramuscular injection—

1. Locate the middle of the outer thigh or the upper arm to use as the injection site.



Epinephrine Administration (*continued*)

2. Grasp the auto-injector firmly and remove the safety cap.
3. Hold the auto-injector at a 90-degree angle to the victim's outer thigh.
4. Firmly jab the tip straight into the thigh. A click will be heard. Hold the auto-injector firmly in place for 10 seconds.



5. Remove it from the thigh and massage the injection site for several seconds.



Continue to check the victim's airway, breathing and circulation (ABCs). Give the used auto-injector to EMS personnel.

In all cases of epinephrine administration, follow-up care and transport to a medical facility is needed. The beneficial effect of epinephrine is relatively short in duration. Someone having a severe allergic reaction may require additional medications that can be administered only in a hospital.

RESCUE BREATHING

Rescue breathing is a technique for breathing air into a victim to give him or her oxygen needed to survive. Exhaled air contains enough oxygen to keep a person alive. When giving rescue breaths, take a normal breath and breathe into the mask. Each breath should last about 1 second and make the chest clearly rise. Give 1 rescue breath about every 5 seconds for an adult. Give 1 rescue breath about every 3 seconds for a child or infant.

Continue rescue breathing until—

- The victim begins to breathe on his or her own.
- Another trained rescuer takes over.
- Too exhausted to continue.
- The victim has no pulse, in which case cardiopulmonary resuscitation (CPR) should be initiated or an automated external defibrillator (AED) used if one becomes immediately available.
- The scene becomes unsafe.

Rescue Breathing—Adult

If an unconscious adult is not moving or breathing but has a pulse, begin rescue breathing.

1. Conduct an initial assessment.
2. Use a resuscitation mask and give 1 rescue breath about every 5 seconds.
 - Position the resuscitation mask.
 - Tilt the head back and lift the chin to open the airway.
 - Breathe into the mask (**Fig. 7-1**).
 - Each rescue breath should last about 1 second and make the chest clearly rise.
 - Watch the chest clearly rise when giving each rescue breath.
 - Do this for about 2 minutes.
3. Remove the resuscitation mask, look for movement and recheck for breathing and a pulse **for no more than 10 seconds** (**Fig. 7-2**).
 - If there is a pulse, but still no movement or breathing—

Fig. 7-1

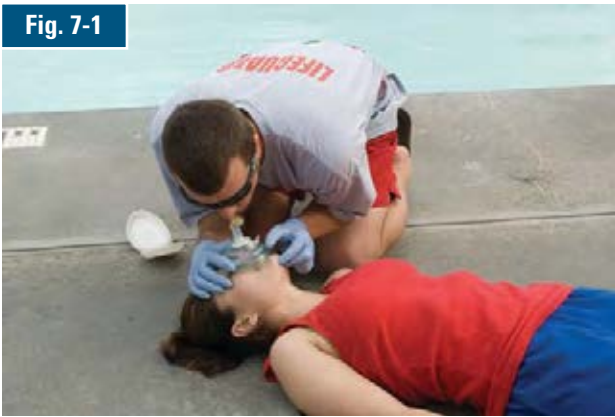


Fig. 7-2

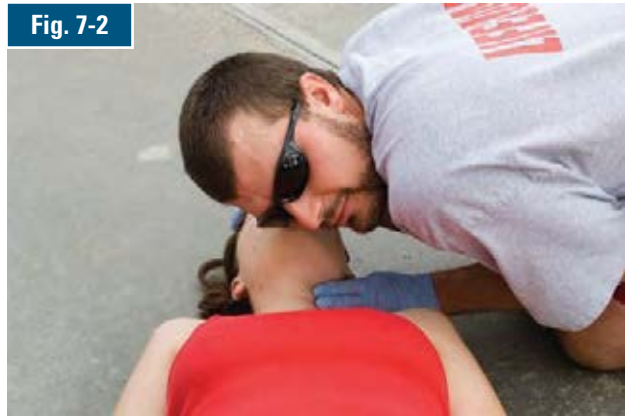


Fig. 7-3



Fig. 7-4



- Replace the mask and continue rescue breathing.
- Look for movement and recheck for breathing and a pulse about every 2 minutes.
- If there is movement, breathing and a pulse—
 - Place the victim in a recovery position (or a modified H.A.IN.E.S. [High Arm in Endangered Spine] position if spinal injury is suspected) and continue to monitor the victim's airway, breathing and signs of circulation (ABCs).
 - Administer emergency oxygen, if available and trained to do so.
- If there is no movement, breathing or pulse, begin CPR or two-rescuer CPR.

Rescue Breathing—Child

If an unconscious child is not moving or breathing but has a pulse, begin rescue breathing.

1. Conduct an initial assessment.
2. Use a resuscitation mask and give 1 rescue breath about every 3 seconds.
 - Position the resuscitation mask.
 - Tilt the head slightly past neutral and lift the chin to open the airway.

- Breathe into the mask (Fig. 7-3).
- Each rescue breath should last about 1 second and make the chest clearly rise.
- Watch the chest clearly rise when giving each rescue breath.
- Do this for about 2 minutes.
- 3. Remove the resuscitation mask, look for movement and recheck for breathing and a pulse **for no more than 10 seconds** (Fig. 7-4).
 - If there is a pulse, but still no movement or breathing—
 - Replace the mask and continue rescue breathing.
 - Look for movement and recheck for breathing and a pulse about every 2 minutes.
 - If there is movement, breathing and a pulse—
 - Place the child in a recovery position (or a modified H.A.IN.E.S. position if spinal injury is suspected) and continue to monitor the child's ABCs.
 - Administer emergency oxygen, if available and trained to do so.
 - If there is no movement, breathing or pulse, begin CPR or two-rescuer CPR.

Fig. 7-5

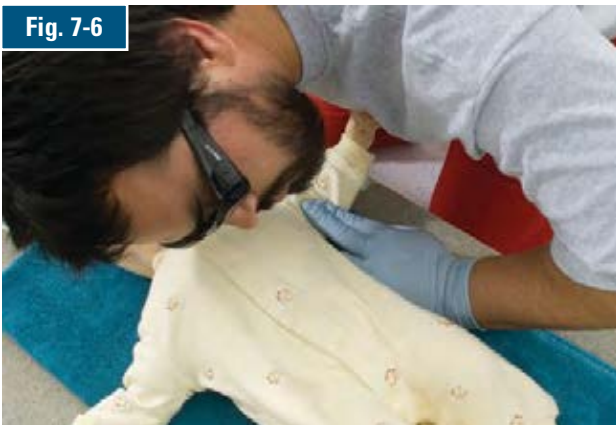


Rescue Breathing—Infant

If an unconscious infant is not moving or breathing but has a pulse, begin rescue breathing.

1. Conduct an initial assessment.
2. Use a resuscitation mask and give 1 rescue breath about every 3 seconds.
 - Position the resuscitation mask.
 - Tilt the head to a neutral position and lift the chin to open the airway.
 - Breathe into the mask (Fig. 7-5).
 - Each rescue breath should last about 1 second and make the chest clearly rise.
 - Watch the chest clearly rise when giving each rescue breath.
 - Do this for about 2 minutes.
3. Remove the resuscitation mask, look for movement and recheck for breathing and a pulse **for no more than 10 seconds** (Fig. 7-6).
 - If there is a pulse, but still no movement or breathing—
 - Replace the mask and continue rescue breathing.
 - Look for movement and recheck for breathing and a pulse about every 2 minutes.

Fig. 7-6



- If there is movement, breathing and a pulse—
 - Maintain an open airway and continue to monitor the infant's ABCs.
 - Administer emergency oxygen, if available and trained to do so.
- If there is no movement, breathing or pulse, begin CPR or two-rescuer CPR.

Breathing Barriers

Breathing barriers include resuscitation masks, face shields and bag-valve-mask resuscitators (BVMs). Breathing barriers help protect lifeguards against disease transmission when giving rescue breaths. As a professional rescuer, a lifeguard should have a resuscitation mask with a one-way valve or a BVM available in the response gear.

Resuscitation Masks

Resuscitation masks are flexible, dome-shaped devices that cover a victim's mouth and nose and allow lifeguards to breathe air into a victim without making mouth-to-mouth contact. Most employers provide resuscitation masks for lifeguards. Resuscitation masks have several benefits. They—

- Create a seal over the victim's mouth and nose.
- Supply air to the victim more quickly through both the mouth and nose.
- Can be connected to emergency oxygen if they have an oxygen inlet.
- Protect against disease transmission when giving rescue breaths.

A resuscitation mask should have the following characteristics (Fig. 7-7):

- Be easy to assemble and use.
- Be made of transparent, pliable material that creates a tight seal over the victim's mouth and nose.
- Have a one-way valve for releasing exhaled air.

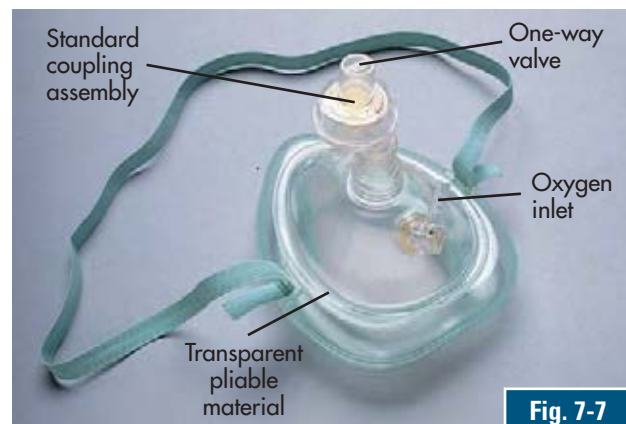


Fig. 7-7

Fig. 7-8



- Have a standard 15-mm or 22-mm coupling assembly (the size of the opening for the one-way valve).
- Have an inlet for delivering emergency oxygen.
- Work well under different environmental conditions, such as extreme heat or cold.

Child and infant resuscitation masks are available and should be used to care for children and infants (Fig. 7-8). If a pediatric resuscitation mask is not available, an adult mask can be used instead by placing the narrow end of the mask over the mouth. Not all resuscitation masks need to be rotated to create an adequate seal.

To use a resuscitation mask to give rescue breaths, take the following steps:

1. Assemble the mask.
 - Attach the one-way valve to the resuscitation mask (Fig. 7-9).
2. Position the mask.
 - Kneel behind or to the side of the victim's head and place the rim of the mask between the lower lip and chin. Lower the resuscitation mask until it covers the victim's mouth and nose (Fig. 7-10).
3. Seal the mask and open the victim's airway and begin rescue breathing.
 - From the back of the victim's head (Fig. 7-11)—
 - Place the thumbs along each side of the resuscitation mask.

Fig. 7-9



Fig. 7-10



Fig. 7-11



- Slide the fingers into position behind the angles of the victim's jawbone.
- Apply downward pressure with the thumbs.
- Lift the jaw and tilt the head back to open the airway.
- From the side of the victim's head (Fig. 7-12)—
 - With the top hand, place the thumb and fingers around the top of the resuscitation mask.
 - With the other hand, slide the first two fingers into position on the bony part of the victim's chin.

Fig. 7-12



- Apply downward pressure with the top hand and the thumb of the lower hand to seal the top and bottom of the resuscitation mask.
- Lift the chin and tilt the head back to open the airway.
- If the victim is suspected to have a head, neck or back injury, use the jaw-thrust maneuver on pages 109-110 to open the airway.
- If using an adult resuscitation mask on an infant—
 - Kneel behind the infant's head.
 - Rotate the mask and position the nose of the mask on the infant's chin.
 - Lower the wide end of the mask to cover the infant's mouth and nose.
 - Place the thumbs along either side of the rim and slide the fingers into position behind the angles of the infant's jawbone.
 - Seal the mask by applying downward pressure with the thumbs.
 - Lift the jaw and tilt the head to a neutral position to open the airway.

LIFEGUARDING TIP: If using a pediatric mask, it is not necessary to rotate the mask. Pediatric masks are specifically designed to fit a child or infant. Seal the pediatric mask and give rescue breaths in the same manner learned for an adult.

Face Shields

One of the most compact and easy-to-use breathing devices is a face shield (Fig. 7-13). A face shield is a small sheet of plastic with a filter or one-way valve in the middle. It is placed over a victim's face with the one-way valve covering the mouth. This allows lifeguards to give



Fig. 7-13

Fig. 7-14



rescue breaths to a victim while reducing the risk of disease transmission during rescue breathing. A major limitation of face shields is that they cannot be used with emergency oxygen like resuscitation masks and BVMs.

Bag-Valve-Mask Resuscitators

BVMs are hand-held devices used primarily to ventilate a victim in respiratory arrest (Fig. 7-14). They can also be used for a victim in respiratory distress. Because it is necessary to maintain a tight seal on the mask, two rescuers should operate a BVM (one rescuer positions and seals the mask, while the second rescuer squeezes the bag).

BVMs have several advantages. They—

- Increase oxygen levels in the blood by using the air in the surrounding environment instead of the air exhaled by the lifeguard.
- Can be connected to emergency oxygen.
- Are more effective at delivering ventilations when used correctly by two rescuers.
- Protect against disease transmission.

BVMs come in various sizes. Pediatric BVMs are available for children and infants. Facilities must have BVMs for adults, children and infants to be appropriately prepared. If a pediatric BVM is not available, an adult mask can be used by placing the narrow end of the mask over the mouth and making sure not to use as much force when squeezing the bag. Using an adult BVM on an infant has the potential for harm and should only be used in an emergency situation when pediatric BVMs are not available.

If an unconscious victim has a pulse but is not moving or breathing, two rescuers can use a BVM to perform rescue breathing. The rescuers should take the following steps:

1. Rescuer 1 conducts an initial assessment.
2. Rescuer 2 arrives and assembles the BVM (Fig. 7-15).

LIFEGUARDING TIP: Use pediatric BVMs for children and infants.

Fig. 7-15



Fig. 7-16



Fig. 7-17



Fig. 7-18



3. **Rescuer 1** kneels behind the victim's head and positions the mask over the victim's mouth and nose (Fig. 7-16).
4. **Rescuer 1** seals the mask and opens the airway (Fig. 7-17).
 - Kneels behind the victim's head.
 - Places the thumbs along each side of the mask.
 - Slides the fingers behind the angles of the jawbone.
 - Pushes down on the mask with the thumbs, lifts the jaw and tilts the head back.
5. **Rescuer 2** begins ventilations (Fig. 7-18).
 - Squeezes the bag slowly for about 1 second using just enough force to make the chest clearly rise with each ventilation.
 - Gives 1 ventilation about every 5 seconds for an adult and 1 ventilation about every 3 seconds for a child or infant.
 - Does this for about 2 minutes.
6. **Rescuer 1** removes the BVM, looks for movement and rechecks for breathing and a pulse **for no more than 10 seconds**.
 - If there is a pulse, but still no movement or breathing—
 - Replaces the BVM and continues ventilations.
 - Continues to look for movement and rechecks for breathing and a pulse about every 2 minutes.
 - If there is movement, breathing and a pulse—
 - Places the victim in a recovery position (or a modified H.A.I.N.E.S. recovery position if spinal injury is suspected) and continues to monitor the ABCs. For an infant, maintain an open airway and continue to monitor the infant's ABCs.
 - Administers emergency oxygen, if available and trained to do so.
 - If there is no movement, breathing or pulse, begins CPR or two-rescuer CPR.

Rescue Breathing—Special Situations Suspected Head, Neck or Back Injury

If an unconscious victim has a suspected head, neck or back injury, remember the priority of care. Airway and breathing take precedence over restricting motion of the head, neck and back. Try to open the airway by lifting the

Fig. 7-19



chin without tilting the head, using the jaw-thrust maneuver (Fig. 7-19):

1. From behind the victim's head, position the mask.
2. Place the thumbs along each side of the resuscitation mask.
3. Brace the elbows for support.
4. Slide the fingers into position under the angles of the victim's jawbone.
5. Without moving the victim's head, apply downward pressure with the thumbs to seal the mask and lift the jaw to open the airway.
6. Give rescue breaths.

If the jaw-thrust maneuver does not open the airway, use the head-tilt/chin-lift technique to open the airway. See Chapter 10 for more information on caring for head, neck and back injuries.

Air in the Stomach

When giving rescue breaths, breathe slowly, just enough to make the victim's chest clearly rise. If too much air is pushed into the victim, it will enter the stomach, causing gastric distention. The victim then will likely vomit, which can obstruct the airway and complicate resuscitation efforts.

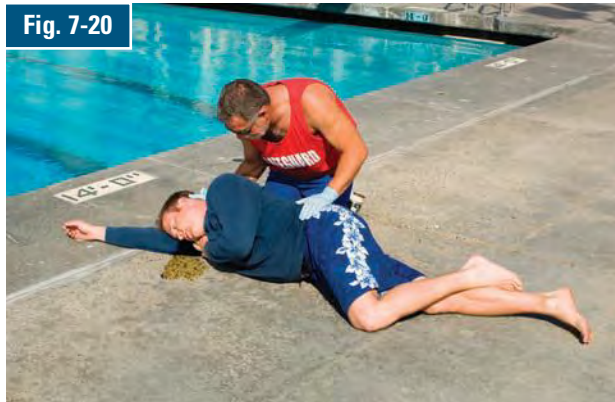
Vomiting and Drowning

When a lifeguard gives rescue breaths to a victim of a non-fatal submersion injury, the victim will likely vomit. If this occurs, quickly turn the victim onto his or her side. Support the head and neck and turn the body as a unit (Fig. 7-20). Turning the victim onto his or her side keeps vomit from blocking the airway and entering the lungs. After vomiting stops, quickly wipe the victim's mouth clean. Then turn the victim on his or her back, and continue with rescue breathing.

Victims with Dentures

If the victim is wearing dentures, leave them in place unless they become loose and block the airway. Dentures

Fig. 7-20



help support the victim's mouth and cheeks, making it easier to seal the resuscitation mask during rescue breathing.

Mask-to-Nose Breathing

If the victim's mouth is injured, the lifeguard may need to give rescue breathing through the nose. To perform mask-to-nose breathing—

1. Use a resuscitation mask.
2. Maintain the head-tilt position.
3. Place the resuscitation mask over the victim's mouth and nose.
4. Use both hands to close the victim's mouth.
5. Seal the resuscitation mask with both hands.
6. Give rescue breaths.

Mask-to-Stoma Breathing

On rare occasions, a lifeguard may see an opening in a victim's neck as the head is tilted back to check for breathing. This victim may have had an operation to remove part of the windpipe. If so, the victim breathes through this opening, which is called a *stoma*. If a victim with a stoma needs rescue breathing, follow the same steps for mouth-to-mask breathing, except—

1. Look, listen and feel for breathing with an ear over the stoma.
2. Maintain the airway in a neutral position. (This ensures the victim's airway is neither flexed nor extended, as the stoma provides access to the lower airway.)
3. Use a child or infant resuscitation mask over the victim's stoma.
4. If possible, pinch the nose and close the mouth, as some victims with a stoma may still have a passage for air that reaches the mouth and nose in addition to the stoma.
5. Give rescue breaths.

AIRWAY OBSTRUCTION

An airway obstruction is the most common cause of respiratory emergencies. A victim whose airway is blocked can quickly stop breathing, lose consciousness and die. There are two types of airway obstructions: anatomical and mechanical. An *anatomical obstruction* occurs when the airway is blocked by an anatomical structure, such as the tongue or swollen tissues of the mouth and throat. In an unconscious victim, the tongue is a common cause of airway obstruction. This occurs because the tongue relaxes when the body is deprived of oxygen. As a result, the tongue rests on the back of the throat, inhibiting the flow of air to the lungs. A *mechanical obstruction* occurs when foreign objects, such as a piece of food, a small toy or fluids, such as vomit, blood, mucus or saliva, block the airway. A conscious victim who is clutching his or her throat with one or both hands is usually choking. This is considered the universal sign of choking.

Common causes of choking include—

- Poorly chewed food.
- Drinking alcohol before or during meals. (Alcohol dulls the nerves that aid swallowing, making choking on food more likely.)
- Eating too fast or talking or laughing while eating.
- Walking, playing or running with food or objects in the mouth.
- Wearing dentures. (Dentures make it difficult to sense whether food is fully chewed before it is swallowed.)

Caring for Airway Obstructions

Lifeguards must be able to recognize when a victim is choking. The airway may be partially or completely obstructed. A victim who is clutching his or her throat with one or both hands is usually choking. Someone with a partial airway obstruction can still move some air to and from the lungs and may make wheezing sounds. Someone with a complete airway obstruction cannot cough, speak or breathe. Get consent before helping a conscious choking victim. If the choking victim is unconscious, consent is implied.

Conscious Choking—Adult and Child

When caring for a conscious choking adult or child, perform a combination of 5 back blows followed by 5 abdominal thrusts. Each back blow and abdominal thrust should be a distinct attempt to dislodge the object. Use less force when giving back blows and abdominal thrusts to a child. Using too much force may cause internal injuries. Continue back blows and abdominal thrusts until the object is dislodged and the victim can breathe or cough forcefully, or becomes unconscious.

LIFEGUARDING TIP: If a parent or guardian is present, obtain consent before giving care to a conscious choking child. A lifeguard should tell the child's parent or guardian the level of his or her training and the care that will be provided. If the parent or guardian is not available, consent is implied.

To care for a conscious choking adult and child, follow these steps:

1. Ask the victim "Are you choking?" (Fig. 7-21).
 - Identify yourself and ask if you may help.
 - If the victim is coughing forcefully, encourage continued coughing.
2. If the victim cannot cough, speak or breathe, summon EMS personnel.
3. Lean the victim forward and give 5 back blows with the heel of the hand (Fig. 7-22).
 - Position yourself slightly behind the victim.
 - Provide support by placing one arm diagonally across the chest and lean the victim forward.
 - Firmly strike the victim between the shoulder blades with the heel of the hand.
 - Each back blow is a distinct attempt to dislodge the object.

Fig. 7-21



Fig. 7-22



4. Give 5 abdominal thrusts.

- **For an adult**, stand behind the victim (**Fig. 7-23**).
- **For a child**, stand or kneel behind the child depending on the child's size. Use less force on a child than would be used on an adult (**Fig. 7-24**).
- Use one hand to find the navel (**Fig. 7-25**).
- Make a fist with the other hand and place the thumb side of the fist against the middle of the victim's abdomen, just above the navel.

Fig. 7-23



Fig. 7-24



Fig. 7-25



- Grab the fist with the other hand.
 - Give quick, upward thrusts. Each abdominal thrust should be a distinct attempt to dislodge the object (**Fig. 7-26**).
5. Continue giving 5 back blows and 5 abdominal thrusts until—
- The object is forced out.
 - The victim begins to cough or breathe on his or her own.
 - The victim becomes unconscious.
 - If the victim becomes unconscious, begin care for an unconscious choking adult or child.

LIFEGUARDING TIP: Some conscious choking victims may need a combination of back blows and chest thrusts instead of abdominal thrusts. Perform chest thrusts if the victim is obviously pregnant, known to be pregnant or too large to reach around.

Conscious Choking—Infant

Abdominal thrusts are not used for a choking infant because of the risk of injury. When caring for a conscious choking infant, use a combination of 5 back blows and 5 chest thrusts. Continue back blows and chest thrusts until the object is dislodged and the infant can breathe or cough forcefully, or becomes unconscious.

LIFEGUARDING TIP: If a parent or guardian is present, obtain consent before providing care to a conscious choking infant. A lifeguard should tell the child's parent or guardian the level of his or her training and the care that will be provided. If the parent or guardian is not available, consent is implied.

Fig. 7-26



To care for a conscious choking infant, follow these steps:

1. If the infant cannot cough, cry or breathe, summon EMS personnel.
2. Carefully position the infant face-down along the forearm.
 - Support the infant's head and neck with the hand.
 - Lower the infant onto the thigh, keeping the infant's head lower than his or her chest.
3. Give 5 back blows (**Fig. 7-27**).
 - Use the heel of the hand.
 - Give back blows between the infant's shoulder blades.
 - Each back blow should be a distinct attempt to dislodge the object.
4. Position the infant face-up along the forearm.
 - Position the infant between both forearms, supporting the infant's head and neck.
 - Turn the infant face-up.
 - Lower the infant onto the thigh with the infant's head lower than his or her chest.
5. Give 5 chest thrusts (**Fig. 7-28**).
 - Put 2 or 3 fingers on the center of the chest, just below the nipple line.
 - Compress the chest 5 times about $\frac{1}{2}$ to 1 inch.

Fig. 7-27



Fig. 7-28



- Each chest thrust should be a distinct attempt to dislodge the object.
6. Continue giving 5 back blows and 5 chest thrusts until—
 - The object is forced out.
 - The infant begins to cough, cry or breathe on his or her own.
 - The infant becomes unconscious.
 - If the infant becomes unconscious, begin care for an unconscious choking infant.

Special Considerations for Choking Victims

In some situations, abdominal thrusts may not be an effective method of care for conscious choking victims. If a rescuer cannot reach far enough around the victim to give effective abdominal thrusts or if the victim is obviously pregnant or known to be pregnant, the rescuer should give 5 back blows followed by 5 chest thrusts.

To perform chest thrusts—

1. Stand behind the victim.
2. Make a fist with one hand and place the thumb side against the center of the victim's chest. If the victim is obviously pregnant or known to be pregnant, position the hands slightly higher on the victim's chest.
3. Grab the fist with the other hand and give quick, inward thrusts (**Fig. 7-29**). Look over the victim's shoulder so that his or her head does not hit your face when performing the chest thrusts.
4. Repeat the back blows and chest thrusts until the object is forced out, the victim begins to breathe or cough forcefully on his or her own or the victim becomes unconscious.

Unconscious Choking—Adult and Child

If rescue breaths given to an unconscious adult do not make the chest clearly rise, reposition the airway by tilting the head farther back and then try the rescue breaths again. For an unconscious child, if the rescue breaths do not make the

Fig. 7-29



chest clearly rise, reposition the airway by retilting the child's head and attempting the rescue breaths again. If the rescue breaths still do not make the chest clearly rise, give 5 chest thrusts. Repeat cycles of chest thrusts, foreign object check/removal and rescue breaths until the chest clearly rises. If the chest clearly rises, look for movement and check for breathing and a pulse for no more than 10 seconds. Provide care based on the conditions found.

To care for an unconscious choking adult and child, follow these steps:

1. If, during the initial assessment, the first 2 rescue breaths do not make the chest clearly rise, reposition the airway by tilting the victim's head farther back and try 2 rescue breaths again.
 - For a child, reposition the airway by retilting the child's head and try 2 rescue breaths again (Fig. 7-30).
2. If the rescue breaths still do not make the chest clearly rise, give 5 chest thrusts (Fig. 7-31).
 - Place the heel of one hand on the center of the chest.
 - Place the other hand on top of the first hand and compress the chest 5 times.
 - **For an adult**, compress the chest about 1½ to 2 inches.
 - **For a child**, compress the chest about 1 to 1½ inches.

Fig. 7-30



Fig. 7-31



- Each chest thrust should be a distinct attempt to dislodge the object.
- Compress at a rate of about 100 compressions per minute.

LIFEGUARDING TIPS:

- **Keep the fingers off the chest when giving chest thrusts.**
- **Use body weight, not the arms, to compress the chest.**
- **Position the shoulders over the hands with the elbows locked.**
- **If the victim is obviously pregnant or known to be pregnant, adjust hand positions to be slightly higher on the chest.**
- **Take pressure off the chest between chest compressions, but leave the hands in place.**
- **One hand can be used to compress the chest of a child. If using one hand, place it on the center of the child's chest while the other hand is on the child's forehead.**
- **Counting out loud helps keep an even pace.**

3. Look inside the victim's mouth.
 - Grasp the tongue and lower jaw between the thumb and fingers and lift the jaw (Fig. 7-32).
4. If an object is seen, take it out.
 - **For an adult**, remove the object with the index finger by sliding it along the inside of the cheek, using a hooking motion to sweep the object out (Fig. 7-33).
 - **For a child**, remove the object with the little finger by sliding it along the inside of the cheek, using a hooking motion to sweep the object out (Fig. 7-34).

Fig. 7-32



5. Replace the resuscitation mask and give 2 rescue breaths (Fig. 7-35).
 - If the rescue breaths still do not make the chest clearly rise—
 - Repeat Steps 2 to 5.
 - If the rescue breaths make the chest clearly rise—
 - Remove the mask, look for movement and check for breathing and a pulse **for no more than 10 seconds**.
 - If there is movement, breathing and a pulse—
 - Place the victim in a recovery position (or a modified H.A.IN.E.S. recovery position if

Fig. 7-33



Fig. 7-34



Fig. 7-35



- spinal injury is suspected) and continue to monitor the victim's ABCs.
 - Administer emergency oxygen, if available and trained to do so.
- If there is a pulse, but no movement or breathing, perform rescue breathing.
- If there is no movement, breathing or pulse, perform CPR or two-rescuer CPR.

Unconscious Choking—Infant

If a lifeguard gives rescue breaths to an unconscious infant and the rescue breaths do not make the chest clearly rise, reposition the airway by rettiling the infant's head and attempt the rescue breaths again. If the rescue breaths still do not make the chest clearly rise, carefully position the infant and give 5 chest thrusts. Repeat cycles of chest thrusts, foreign object check/removal and rescue breaths until the chest clearly rises. If the chest clearly rises, look for movement and check for breathing and a pulse for no more than 10 seconds. Provide care based on the conditions found.

To care for an unconscious choking infant, follow these steps:

1. If, during the initial assessment, the first 2 breaths do not make the chest clearly rise, reposition the airway by rettiling the infant's head and try 2 rescue breaths again (Fig. 7-36).
2. If rescue breaths still do not make the chest clearly rise, remove the resuscitation mask and give 5 chest thrusts (Fig. 7-37).
 - Keep one hand on the infant's forehead to maintain an open airway.
 - Put two or three fingers on the center of the chest, just below the nipple line.
 - Compress the chest about $\frac{1}{2}$ to 1 inch.
 - Each chest thrust should be a distinct attempt to dislodge the object.
 - Compress at a rate of about 100 compressions per minute.

Fig. 7-36



Fig. 7-37



Fig. 7-38



Fig. 7-39



Fig. 7-40



LIFEGUARDING TIP: Take pressure off the chest between chest thrusts, but leave the fingers in place.

3. Look inside the infant's mouth.
 - Grasp the tongue and lower jaw between the thumb and fingers and lift the jaw (Fig. 7-38).
4. If an object is seen, take it out.
 - Remove the object with the little finger by sliding it along the inside of the cheek, using a hooking motion to sweep it out (Fig. 7-39).
5. Replace the resuscitation mask and give 2 rescue breaths (Fig. 7-40).
 - If the rescue breaths still do not make the chest clearly rise—
 - Repeat Steps 2 to 5.
 - If the rescue breaths make the chest clearly rise—
 - Look for movement and check for breathing and a pulse **for no more than 10 seconds** (Fig. 7-41).
 - If there is movement, breathing and a pulse—
 - Maintain an open airway and continue to monitor the infant's ABCs.
 - Administer emergency oxygen, if available and trained to do so.
 - If there is a pulse, but no movement or breathing, perform rescue breathing.
 - If there is no movement, breathing or pulse, perform CPR or two-rescuer CPR.

EMERGENCY OXYGEN

When someone has a breathing emergency or cardiac emergency, the flow of oxygen to his or her brain, heart and blood cells is reduced, resulting in *hypoxia*. Hypoxia is a condition in which insufficient oxygen reaches the cells. If breathing stops, the brain and heart will soon be starved of oxygen, resulting in cardiac arrest and then death.

Fig. 7-41



The air a person normally breathes contains about 21 percent oxygen. When a lifeguard gives rescue breaths or provides CPR, the air exhaled into the victim is about 16 percent oxygen. This may not be enough oxygen to save the victim's life. By administering emergency oxygen, a higher percentage of oxygen is delivered, thus increasing the victim's chance of survival. It also helps reduce the pain and breathing discomfort caused by hypoxia.

Emergency oxygen can be given for just about any breathing or cardiac emergency. If a person is breathing but has no obvious signs or symptoms of injury or illness, emergency oxygen should be considered if—

- An adult is breathing fewer than 12 breaths per minute or more than 20 breaths per minute.
- A child is breathing fewer than 15 breaths per minute or more than 30 breaths per minute.
- An infant is breathing fewer than 25 breaths per minute or more than 50 breaths per minute.

Oxygen should be delivered with properly sized equipment for the respective victim and appropriate flow rates for the delivery device.

Variable-Flow-Rate Oxygen

Many EMS systems use variable-flow-rate oxygen. Variable-flow-rate oxygen systems allow the lifeguard to vary the flow of oxygen and the type of delivery device used. Because of the large amount of oxygen EMS systems deliver and the variety of equipment and emergency situations to which they respond, variable-flow-rate oxygen is practical. To deliver variable-flow-rate emergency oxygen, the following pieces of equipment need to be assembled:

- An oxygen cylinder
- A regulator with pressure gauge and flowmeter
- A delivery device

Emergency oxygen units are available without prescription for first aid use provided they contain at least a 15-minute supply of oxygen and are designed to deliver a preset flow rate of at least 6 liters per minute (LPM). Oxygen cylinders are labeled "U.S.P." and marked with a yellow diamond that says "Oxygen" (Fig. 7-42, A). The U.S.P. stands for United States Pharmacopeia and indicates the oxygen is medical grade. Oxygen cylinders come in different sizes and have various pressure capacities. In the United States, oxygen cylinders typically have green markings. However, the color scheme is not regulated, so different manufacturers and other countries may use different color markings. Oxygen cylinders are under high pressure and should be handled carefully. The regulator



lowers the pressure coming out of the cylinder so that the oxygen can be used safely (Fig. 7-42, B). The regulator also has a pressure gauge that shows the pressure in the cylinder. The pressure gauge shows if the cylinder is full (2,000 pounds per square inch [psi]), nearly empty or in between. The regulator must be carefully attached to the oxygen cylinder. An "O-ring" gasket makes the seal tight (Fig. 7-42, C). The flowmeter controls how rapidly the oxygen flows from the cylinder to the victim. The flow can be set from 1–25 LPM.



Fig. 7-43

Fixed-Flow-Rate Oxygen

Some emergency oxygen systems have the regulator set at a fixed-flow rate. The flow rate is set at 6 LPM, 12 LPM or another rate. In some cases, the fixed-flow-rate systems may have a dual (high/low) flow setting. Fixed-flow-rate oxygen systems typically come with the delivery device, regulator and cylinder already connected to each other (Fig. 7-43). This eliminates the need to assemble the equipment, which makes it quick and very simple to deliver emergency oxygen.

To operate this type of device, the lifeguard simply turns it on, checks that oxygen is flowing and places the mask over the victim's face. The drawback to using fixed-flow-rate oxygen systems is that the flow rate cannot be adjusted to different levels. This limits both the type of delivery device that can be used and the concentration of oxygen that can be delivered. A fixed-flow-rate unit with a preset flow of 6 LPM can be used with a nasal cannula or resuscitation mask. With a preset flow rate of 12 LPM, the unit can be used with a resuscitation mask or non-rebreather mask.

Because of the simplicity of the preconnected fixed-flow-rate systems and the life-saving benefits of oxygen, these systems are becoming increasingly popular in the workplace, schools and other places where professional rescuers may have to respond to on-site emergencies.

OXYGEN DELIVERY DEVICES

An oxygen delivery device is the piece of equipment a victim breathes through when receiving emergency oxygen. Tubing carries the oxygen from the regulator to the delivery device on the victim's face (Table 7-1). These devices include nasal cannulas, resuscitation masks, non-rebreather masks and BVMs. Various sizes of masks, BVMs and nasal cannulas are available for adults, children and infants. Appropriate sizing is important to ensure adequate airway management.

Nasal Cannulas

A *nasal cannula* delivers oxygen to someone who is breathing (Fig. 7-44). It has two small prongs that are inserted into the nose. Nasal cannulas are not used often in an emergency because they do not give as much oxygen as a resuscitation mask, a non-rebreather mask or a BVM. They are used mostly for victims with minor breathing problems rather than for life-threatening conditions. If a victim will not accept having a mask on his or her face, a nasal cannula can be used. With a nasal cannula, set the flow rate at 1–6 LPM.

Resuscitation Masks

A resuscitation mask with an oxygen inlet can be used with emergency oxygen to give rescue breaths to a nonbreathing victim. It also can be used for someone who is breathing but still needs emergency oxygen. Some resuscitation masks come with elastic straps to put over the victim's head to

TABLE 7-1 OXYGEN DELIVERY DEVICES

Delivery Device	Common Flow Rate	Oxygen Concentration	Function
Nasal Cannula	1–6 LPM	24–44 percent	Breathing victims only
Resuscitation Mask	6–15 LPM	35–55 percent	Breathing and nonbreathing victims
Non-Rebreather Mask	10–15 LPM	90 percent or more	Breathing victims only
BVM	15 LPM or more	90 percent or more	Breathing and nonbreathing victims

Fig. 7-44



Fig. 7-45



keep the mask in place (Fig. 7-45). If the mask does not have a strap, the lifeguard or the victim can hold it in place. With a resuscitation mask, set the flow rate at 6–15 LPM.

Non-Rebreather Masks

A non-rebreather mask is an effective method for delivering high concentrations of oxygen to breathing victims (Fig. 7-46). The *non-rebreather mask* consists of a face mask with an attached oxygen reservoir bag and a one-way valve between the mask and bag to prevent the victim's exhaled air from mixing with the oxygen in the reservoir bag. The victim inhales oxygen from the bag and exhaled air escapes through flutter valves on the

Fig. 7-46



side of the mask. The reservoir bag should be inflated by covering the one-way valve with the thumb before placing it on the victim's face. The oxygen reservoir bag should be sufficiently inflated (about $\frac{2}{3}$ full) so as not to deflate when the victim inhales. If it begins to deflate, increase the flow rate of the oxygen to refill the reservoir bag. With non-rebreather masks, the flow rate should be set at 10–15 LPM. When using the non-rebreather mask with a high flow rate of oxygen, up to 90 percent or more oxygen can be delivered to the victim. If children or infants do not want the mask over their faces, use the blow-by oxygen method. Hold the mask close to their mouth and nose so oxygen is still being delivered.

Bag-Valve-Mask Resuscitators

A BVM can be used on a person who is breathing or not breathing. By using a BVM with emergency oxygen attached to an oxygen reservoir bag, up to 100 percent oxygen can be delivered to the victim (Fig. 7-47). The BVM can be held by a breathing victim to inhale the oxygen, or the lifeguard can squeeze the bag as the victim inhales to help deliver more oxygen. If a BVM is used without emergency oxygen, the nonbreathing victim receives 21 percent oxygen—the amount in the air. With a BVM, the flow rate should be set at 15 LPM or more.

OXYGEN ADMINISTRATION

To deliver emergency oxygen:

1. Make sure the oxygen cylinder is labeled "U.S.P." and marked with a yellow diamond that says "Oxygen" (Fig. 7-48).
2. Clear the valve.
 - Remove the protective covering and save the O-ring gasket.
 - Turn the cylinder away from you and others before opening.
 - Open the cylinder valve for 1 second to clear the valve (Fig. 7-49).

Fig. 7-47



3. Attach the regulator.

- Put the O-ring gasket into the valve on top of the cylinder, if necessary (Fig. 7-50).
- Make sure that it is marked "Oxygen Regulator" (Fig. 7-51).
- Secure the regulator on the cylinder by placing the three metal prongs into the valve.
- Hand-tighten the screw until the regulator is snug (Fig. 7-52).

4. Open the cylinder valve one full turn (Fig. 7-53).

- Check the pressure gauge (Fig. 7-54).
 - Determine that the cylinder has enough pressure.
- 5. Attach the delivery device.**
- Attach the plastic tubing between the flowmeter and the delivery device (Fig. 7-55).
- 6. Adjust the flowmeter.**
- Turn the flowmeter to the desired flow rate (Fig. 7-56).

Fig. 7-48



Fig. 7-49



Fig. 7-50



Fig. 7-51



Fig. 7-52



Fig. 7-53



Fig. 7-54



Fig. 7-55



Fig. 7-56



Fig. 7-57



Fig. 7-58



- With a nasal cannula, set the rate at 1–6 LPM.
- With a resuscitation mask, set the rate at 6–15 LPM.
- With a non-rebreather mask, set the rate at 10–15 LPM.
 - Ensure that the oxygen reservoir bag is inflated by placing the thumb over the one-way valve at the bottom of the mask until the bag is sufficiently inflated.
- With a BVM, set the rate at 15 LPM or more.

7. Verify the oxygen flow.
 - Listen and feel for oxygen flow through the delivery device (Fig. 7-57).
8. Place the delivery device on the victim and continue care until EMS personnel arrive and take over (Fig. 7-58).

Oxygen Safety Precautions

When preparing and administering oxygen, safety is a concern. Use emergency oxygen equipment according to the manufacturer's instructions and in a manner consistent with federal and local regulations. Also follow these recommended guidelines:

- Be sure that oxygen is flowing before putting the delivery device over the victim's face.
- Do not use oxygen around flames or sparks. Oxygen causes fire to burn more rapidly.
- Do not use grease, oil or petroleum products to lubricate or clean the regulator. This could cause an explosion.
- Do not stand oxygen cylinders upright unless they are well secured. If the cylinder falls, the regulator or valve could become damaged or cause injury.
- Do not drag or roll cylinders.
- Do not carry a cylinder by the valve or regulator.

- Do not hold on to protective valve caps or guards when moving or lifting cylinders.
- Do not deface, alter or remove any labeling or markings on the oxygen cylinder.
- Do not attempt to mix gases in an oxygen cylinder or transfer oxygen from one cylinder to another.
- If defibrillating, make sure that no one is touching or in contact with the victim or the resuscitation equipment.
- Do not defibrillate someone when around flammable materials, such as gasoline or free-flowing oxygen.

PUTTING IT ALL TOGETHER

As a lifeguard, recognizing the signs and symptoms of respiratory distress and respiratory arrest is important. Lifeguards need to know how to give rescue breaths to a victim who has a pulse but is not moving or breathing

normally, and how to care for a conscious or unconscious victim who is choking. Lifeguards should also know how to use a resuscitation mask and BVM properly. If there is emergency oxygen available, lifeguards should know how to use the equipment to deliver a higher concentration of oxygen to victims of respiratory distress and respiratory arrest.

Administering emergency oxygen to the victim of a cardiac or breathing emergency can help improve the victim's chances of survival. It also helps reduce the pain and breathing discomfort caused by hypoxia. It is important to follow safety precautions and use the equipment according to the manufacturer's instructions when using emergency oxygen. Variable-flow-rate oxygen systems allow the lifeguard to vary the concentration of oxygen and the type of delivery device used. Preconnected fixed-flow-rate systems eliminate the need to assemble the equipment, which makes it quick and very simple to deliver emergency oxygen.