LESSON 2

DEVICES USED TO AID BREATHING

Section I. OROPHARYNGEAL AIRWAY

2-1. OROPHARYNGEAL AIRWAYS (J-TUBES)

There will be situations in the field where you will encounter a patient who not only needs his breathing restored, but must also have it maintained by mechanical means. In the field, rescue breathing is the preferred method of maintaining respiration. Before any airway adjuncts are utilized, it should be remembered that the airway can be improved in most cases by tilting the head back and performing the chin lift or jaw thrust. These maneuvers displace the tongue forward and away from the posterior pharyngeal wall. If the patient is capable of spontaneous breathing, this positioning may be all that is necessary. In some situations, however, an oropharyngeal airway may be needed to maintain an open air passage.

a. The oropharyngeal airway is a semicircular apparatus of plastic, rubber, or metal. The apparatus is also called a J-tube because of its shape. It is curved to fit over the back of the tongue and is inserted into the lower posterior wall of the pharynx. In this location, the apparatus will hold the tongue away from the posterior wall of the pharynx and keep the patient's airway patent (open).

b. The insertion of any mechanical breathing device is advised only when the patient is unconscious and is not having convulsions and when the preferred manual methods (head-tilt chin-lift, etc.) are not practical or possible. Before inserting the airway, attempt normal resuscitation procedures (rescue breathing).

2-2. PROCEDURE FOR INSERTING AN OROPHARYNGEAL AIRWAY

a. Determine Need for Oropharyngeal Airway. Before you insert an oropharyngeal airway (J-tube), you must survey the patient, open the airway, clear the upper airway of obstruction (if applicable), and perform rescue breathing. If the patient begins breathing on his own but does not regain consciousness and you are unable to stay with the patient to keep his airway open, a J-tube may be inserted in order to keep the patient's airway patent.

b. Select the Proper Size Oropharyngeal Airway. To select the correct size of airway, select one of the J-tubes (figure 2-1) and hold it alongside the patient's jaw (jaw in the normal position with the mouth closed). Then measure from the corner of the patient's mouth to the bottom tip of his ear. Use the J-tube that best matches this measurement.
c. **Open the Patient's Airway.** Open the patient's mouth using the crossed-finger method.

   (1) Place your crossed thumb and index finger of one hand on the patient's upper and lower teeth at the corner of the mouth (figure 2-2).
(2) Use a scissor motion to pry the teeth apart and hold the mouth open. If the patient's teeth are clenched, use the modified jaw thrust method to open the mouth. In cases where neck or spinal injuries are present or suspected, use the jaw thrust method of opening the airway to prevent further injury.

(3) Hyperextend the patient's neck (figure 2-3) unless there is a suspected spinal injury.

![Figure 2-3. Hyperextending the neck. A Head-tilt, chin-lift. B Head-tilt, neck-lift.](image)

d. **Insert the Oropharyngeal Airway.** Remember, the oropharyngeal airway is used for UNCONSCIOUS patients only. Do not try to insert the artificial airway in a conscious or semi-conscious patient due to the patient's gag reflex. The presence of an airway in such patients may induce vomiting and cause aspiration of the stomach contents into the lungs.

(1) Place the tip of the airway into the patient's mouth (figure 2-4).

![Figure 2-4. Tip of the oropharyngeal airway placed into the mouth.](image)
(2) Point the tip of the airway toward the roof of the patient's mouth to prevent the tongue from being pushed into the back of the throat.

(3) Slide the airway along the roof of the mouth, following the natural curvature of the tongue, past the soft palate.

(4) Rotate the airway 180 degrees as the tip reaches the back of the tongue (figure 2-5).

![Figure 2-5. Tip of the J-tube at the back of the tongue.](image)

(5) Gently advance the airway and adjust it so the flange rests on the patient's lips. If the flange of the airway does not seat properly or if the patient begins to gag or vomit, the airway may be the wrong size. The tip of the airway should rest just above the epiglottis (figure 2-6).

![Figure 2-6. J-tube in place.](image)
(6) If you have any difficulty inserting the airway, grasp the tongue with your
index finger and thumb (using a gauze pad, if available) and pull the tongue forward or
use a tongue blade to depress the tongue.

e. **Remove Oropharyngeal Airway, If Needed.** When the patient starts to
regain consciousness or gags, remove the airway quickly to prevent regurgitation and
possible aspiration of stomach contents.

f. **Record Treatment and Evacuate the Patient.**

(1) Complete a Field Medical Card and attach the card to the patient's
clothing.

(2) Evacuate the patient for further evaluation and treatment by a physician. If the oropharyngeal
airway is still in place, it may need to be taped or tied to keep it
from being dislodged during evacuation. If the oropharyngeal airway is secured in
place, the patient must be watched constantly so that the airway can be removed in the
event he becomes conscious. During evacuation, check the airway periodically to
ensure that it is free from obstacles and is functioning properly.

**Section II. BAG-VALVE-MASK SYSTEM**

2-3. **BAG-VALVE-MASK SYSTEMS**

a. The primary function of the bag-valve-mask (BVM) system is to deliver a high
concentration of supplemental oxygen (above 55 percent) and simultaneously ventilate
the patient. When using the BVM system with an unconscious patient, the use of an
oropharyngeal airway is desirable in order to maintain the patient's airway.

b. The primary advantages of the BVM system over the mouth-to-mouth and
mouth-to-nose methods are user convenience and the ability to deliver enriched oxygen
mixtures. However, the mouth-to-mouth and mouth-to-nose methods can deliver a
greater volume of air (up to four liters at a time) than the BVM system (usually one liter).
The BVM system may also be used with or without supplemental oxygen to assist the
efforts of a spontaneously breathing patient who is having difficult respirations.

c. There are many different BVM systems in use. Most of them use these
following items:

(1) A self-inflating bag.

(2) A nonreturn valve to prevent rebreathing exhaled air.

(3) A face mask, usually made of clear plastic so that vomitus or secretions
around the patient's mouth can be seen.

(4) An inlet for supplemental oxygen delivery.
d. Most systems have oxygen reservoir bags and adaptors for use with endotracheal and tracheostomy tubes. The type of supplemental oxygen delivery system used depends on the patient's ability to adequately inhale a sufficient volume of air. If he is unable to inhale efficiently, a BVM system is used to force a greater volume of air and oxygen into the lungs. If the patient requires an increase in oxygen content and is able to inhale adequately, a simple face mask or nasal prongs is preferred if available.

2-4. PROCEDURE FOR VENTILATING THE PATIENT USING A BAG-VALVE-MASK SYSTEM

a. **Survey the Patient.** Visually check the patient for obvious causes of breathing difficulty. If no difficulties are evident, check further to determine his ability to breathe on his own.

b. **Position Yourself and Patient.** Position yourself behind the patient's head. In a hospital situation, the headboard of the bed may have to be removed or the patient moved partially across the bed to bring his head closer to the edge of the bed.

c. **Insert Oropharyngeal Airway, if Appropriate.** If the patient is unconscious, insert an oropharyngeal airway (J-tube) in order to keep the airway open while you use the BVM. If the patient is conscious or semi-conscious, do not use the J-tube.

d. **Stretch Mask.** Check the mask and bag to ensure that they are in working order (no rips, etc.). Then stretch the mask on both sides with your thumbs and fingers (figure 2-7) so that the mask will fit the patient.

![Figure 2-7. Stretching the mask.](MD0542_2-7)
e. **Seat Mask.**

(1) Place the mask over the patient's nose and mouth so that it fits over the bridge of the nose, extends below the lower lips (figure 2-8), and forms a tight seal. As the stretched mask is positioned on the patient's face, it will return to its original shape and the patient's skin will be pulled slightly inward.

![Figure 2-8. Positioning the mask.](image)

(2) Place your thumb and index finger of one hand on the mask. Position the thumb above and the finger below the valve connection. Use the other fingers (on the same hand) to grip the lower jaw in order to maintain the tight seal of the mask (figure 2-9).

![Figure 2-9. Giving ventilations using BVM.](image)
f. **Begin Ventilations.** Perform ventilations by squeezing the bag with the hand that is not holding the mask in place (figure 2-9).

   (1) Squeeze four initial quick breaths with the bag.

   (2) Thereafter, use your other hand to squeeze the bag in a rhythmical manner once every five seconds to give a rate of twelve breaths per minute.

   (3) An oxygen source may be attached to the mask if available and ordered by a physician.

**NOTE:** When the BVM system is used to assist the breathing of a spontaneously breathing patient, time the ventilations so they will coincide with the patient's inhalations by observing the rise and fall of his chest. Try to obtain a more normal rate and depth of respirations.

g. **Check for Effectiveness.** Observe the patient's chest to see if it rises and falls. If the chest does not rise and fall, reopen or clear the airway. If the rising and falling chest movement is observed, continue to ventilate the patient.

h. **Continue Ventilations.** Continue to ventilate the patient at a rate of one breath every five seconds until spontaneous breathing returns. When the patient begins to breathe on his own again, time your ventilations to correspond to the patient's inhalations. Continue until the patient's respirations attain a normal rate and depth or until you are ordered to stop by a physician.

i. **Evacuate, if Needed.** In a field situation, you may need to prepare a Field Medical Card and evacuate the patient for further evaluation and treatment by a physician. Maintain adequate ventilation en route, if necessary.

j. **Clean the BVM system.** The BVM system must be cleaned in accordance with the manufacturer's specifications after each use. The cleaning prevents the spread of microorganisms from one patient to another and helps to prevent equipment malfunction.

**Continue with Exercises**
EXERCISES, LESSON 2

INSTRUCTION. The following exercises are to be answered by completing the incomplete statement or by writing the answer in the space provided at the end of the question.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. Why is the J-tube not used for conscious and semi-conscious patients?

2. When do you remove the airway?

3. List the steps to follow when inserting a J-tube after the patient's airway has been opened.

4. What do you do if you have difficulty keeping the tongue in the proper position while inserting the J-tube?
5. List the steps used when putting the mask of a BVM on a patient's face.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

6. When restoring the patient's breathing and using the bag-valve-mask system you should first administer ___________ quick ventilations, then administer one ventilation every ___________ seconds.

7. The BVM system must be cleaned in accordance with the manufacturer's specifications after each use. Why?

____________________________________________________________________
____________________________________________________________________

Check Your Answers on Next Page
SOLUTIONS TO EXERCISES, LESSON 2

1. Conscious and semi-conscious patients may still have a gag reflex and the presence of an airway may induce vomiting and cause aspiration of the stomach contents into the lungs. (para 2-2d)

2. When the patient starts to regain consciousness, or gags. (para 2-2e)

3. Place the tip of the airway into the patient's mouth.

   Point the tip of the airway toward the roof of the patient's mouth to prevent the tongue from being pushed into the back of the throat.

   Slide the airway along the roof of the mouth, following the natural curvature of the tongue, past the soft palate.

   Rotate the airway 180 degrees as the tip reaches the back of the tongue.

   Gently advance the airway and adjust it so the flange rests on the patient's lips. (para 2-2d(1) through (5))

4. Grasp the tongue with your index finger and thumb (using a gauze pad, if available) and pull the tongue forward or use a tongue blade to depress the tongue. (para 2-2d(6))

5. Check the mask and bag to ensure that they are in working order.

   Stretch the mask on both sides with your thumbs and fingers.

   Place the mask over the patient's nose and mouth so that it fits over the bridge of the nose and extends below the lower lips and forms a tight seal.

   Place your thumb and index finger of one hand on the mask. Position the thumb above and the finger below the valve connection.

   Grip the patient's lower jaw with the other fingers in order to maintain the tight seal of the mask (para 2-4d, e).

6. Four quick ventilations, one ventilation every five seconds. (paras 2-4f(1), (2), h)

7. This cleaning prevents the spread of microorganisms from one patient to another and helps to prevent equipment malfunction. (para 2-4j)

End of Lesson 2