

Module 2: Airway

Lesson 2-1

Airway

Objectives

Objectives Legend

C=Cognitive A=Affective P=Psychomotor

1 = Knowledge level

2 = Application level

3 = Problem-solving level

Cognitive Objectives

At the completion of this lesson, the First Aid student will be able to:

- 2-1.1 Describe the major structures of the respiratory system. (C-1)
- 2-1.2 Describe determining the presence of breathing. (C-1)
- 2-1.3 Describe the steps in the head-tilt chin-lift (Chin-lift without Head-tilt). (C-1)
- 2-1.4 Relate mechanism of injury to opening the airway. (C-3)
- 2-1.5 Describe how to ventilate an ill or injured adult, infant and child* with a resuscitation barrier device. (C-1)
- 2-1.6 Describe the steps in providing mouth-to-mouth and mouth-to-stoma ventilation. (C-1)
- 2-1.7 Describe how to clear a foreign body airway obstruction in a responsive adult, infant and child.* (C-1)
- 2-1.8 Describe how to clear a foreign body airway obstruction in an unresponsive adult, infant and child.* (C-1)

Affective Objectives

At the completion of this lesson, the First Aid student will be able to:

- 2-1.9 Explain why airway protective skills and basic life support ventilation take priority over all other basic life support skills. (A-3)
- 2-1.10 Demonstrate a caring attitude towards ill or injured persons with airway problems who request emergency medical services. (A-3)
- 2-1.11 After rescuer safety is assured, place the interests of the ill or injured person with airway problems as the foremost consideration when making any and all emergency care decisions. (A-3)

Psychomotor Objectives

At the completion of this lesson, the First Aid student will be able to:

- 2-1.12 Demonstrate the steps in the head-tilt chin-lift. (P-1,2)
- 2-1.13 Describe the steps in the chin-lift without head-tilt.(P-1,2)
- 2-1.14 Demonstrate the steps in mouth-to-mouth ventilation with body substance isolation (barrier shields) in the unresponsive adult, infant and child.* (P-1,2)
- 2-1.15 Demonstrate how to clear a foreign body airway obstruction in a responsive adult, infant and child.* (P-1)
- 2-1.16 Demonstrate how to clear a foreign body airway obstruction in an unresponsive adult, infant and child.* (P-1)

* When infants and/or children are not present or are not anticipated in the First Aid Provider's occupational setting, this information may be omitted.

Preparation

Motivation:

An ill or injured person without an airway has no chance of survival. It is essential for the First Aid Provider to be able to manage an airway and support breathing with and without resuscitation barriers. First Aid Providers should focus on airway and ventilation as their first priority of care to assure oxygen to the brain.

Prerequisites:

Preparatory

Materials

AV Equipment:

Utilize various audio-visual materials relating to first aid. The continuous development of new audio-visual materials relating to first aid requires careful review to determine which best meet the needs of the program. Materials should be edited to ensure that the objectives of these guidelines are met.

Equipment:

Training manikin(s), resuscitation mask(s), barrier device(s).

Recommended Minimum Time to Complete:

See page 12 of *Course Guide*

Presentation

- I. The Respiratory system
 - A. Function
 1. Deliver oxygen to the body
 2. Remove carbon dioxide from the body
 - B. Components/anatomy
 1. Nose and mouth
 2. Epiglottis - a leaf-shaped structure that prevents food and liquid from entering the trachea during swallowing.
 3. Windpipe (trachea)
 4. Lungs
 5. Diaphragm
 6. Chest wall muscles
 - C. Physiology
 1. Diaphragm moves down, chest moves out, drawing air into the lungs (inhalation)
 2. Exchange of oxygen and carbon dioxide in the lungs
 3. Diaphragm moves up causing air to exit the lungs (exhalation)
 - D. Infant and Child Considerations*

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1. All structures are smaller and more easily obstructed
 2. Infants and children's tongues take up proportionally more space in the mouth
 3. Trachea more flexible
 4. Smaller lung capacity.
 5. Large head to body ratio in infants requires different positioning of the head for airway management.
 6. Primary cause of cardiac arrest is respiratory arrest.
- II. Opening the Airway
- A. After activating the EMS system, the most important actions that the First Aid Provider can perform is opening the airway of an unresponsive ill or injured person.
1. An unresponsive ill or injured person loses muscle tone, and the soft tissue and base of the tongue may occlude the airway.
 2. The tongue is the most common cause of airway obstruction in an unresponsive ill or injured person.
 3. Since the tongue is attached to the lower jaw, forward displacement of the jaw will lift the tongue away from the back of the throat.
- B. Head-tilt chin-lift
1. The method of choice for opening the airway in uninjured persons
 2. Research has indicated that the head-tilt chin-lift consistently provides the optimal airway.
 3. Technique
 - a. Place your hand that is closer to the person's head on his/her forehead, apply firm backward pressure to tilt the head back.
 - b. Place the fingers of your hand that is closer to the person's feet on the bony part of his/her chin.
 - c. Lift the chin forward and support the jaw, helping to tilt the head back.
 4. Precautions
 - a. Finger must not press deeply into the soft tissues of the chin as this may lead to airway obstruction.
 - b. The thumb should not be used for lifting the chin.
 - c. The mouth must not be closed.
- C. Chin Lift without head-tilt.
1. Indications
 - a. Used for unresponsive persons with suspected head/neck or back injuries.
 - b. Used when the First Aid Provider is uncertain if the unresponsive person is ill or injured.
 2. Technique
 - a. Place your hand that is closer to the person's head on his/her forehead to stabilize the head.
 - b. Place the fingers of your hand that is closer to the person's feet on the bony part of his/her chin.
 - c. Lift the chin forward and support the jaw.
 - d. The head should be carefully supported without tilting it backward or turning it from side to side.
 - e. If chin-lift alone is unsuccessful, the head should be tilted backward slightly.

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- III. Inspect the Mouth
- A. An unresponsive ill or injured person may have fluid or solids in their mouth that may compromise the airway.
 - B. Responsive ill or injured persons who cannot protect their airway should also have their mouth inspected.
 - C. Indications
 - 1. All unresponsive ill or injured persons
 - 2. Responsive ill or injured persons who may not be able to protect their own airways.
 - D. Technique
 - 1. Open the ill or injured person's mouth with a gloved hand.
 - 2. Look inside the mouth.
 - a. Mouth clear.
 - b. Mouth not clear.
 - (1) Fluids
 - (2) Solids
 - (3) Teeth, including dentures
- IV. Clearing the Compromised Airway and Maintaining the Open Airway
- A. There are two ways that First Aid Providers can clear or maintain an airway.
 - B. These techniques are not sequential; the situation will direct which technique is most appropriate.
 - C. There are two methods of clearing and protecting the airway from liquids or solids.
 - 1. The Recovery Position
 - a. The first step in maintaining an open airway
 - b. Uses gravity to keep the airway clear.
 - c. The airway is likely to remain open in this position.
 - d. Unrecognized airway obstructions are less likely to occur.
 - e. Monitor the ill person until additional EMS arrives and assumes care.
 - f. Allows fluids to drain from the mouth and not into the airway.
 - g. Used in unresponsive, uninjured person, breathing adequately
 - h. Technique
 - (1) Kneel at the person's waist.
 - (2) Move the nearer arm above the head.
 - (3) Straighten the legs.
 - (4) Grasp the opposite shoulder and pull the person towards you onto his or her side while supporting the head and neck. Avoid twisting the body.
 - (5) Pull the top leg forward and place the person's top hand under the side of the face to stabilize the person in this position.
 - 2. Finger sweeps
 - a. Uses your fingers to remove solid objects from the airway.
 - b. Use body substance isolation.
 - c. If foreign material or vomit is visible in the mouth, it should be removed.
 - d. Do this quickly.
 - e. Technique.
 - (1) If uninjured, roll the ill or injured person to their side
 - (2) Liquids or semi-liquids should be wiped out with the index and middle fingers covered with a cloth.
 - (3) Solid objects should be removed with a hooked finger.*Note: Blind finger sweeps should not be performed infants and*

children since the foreign body may be pushed back into the airway, causing further obstruction.

- V. Determining Presence of Breathing
- A. Immediately after opening the airway, check for breathing.
 - B. As you determine the presence of breathing, look at the effort or work of breathing.
 - 1. Breathing should be effortless.
 - 2. Observe the chest for adequate rise and fall.
 - C. Techniques
 - 1. Responsive ill or injured persons
 - a. Ask: "Can you speak?", "Are you choking?"
 - b. The ability to talk or make vocal sounds indicates that air is moving past the vocal cords.
 - 2. Unresponsive ill or injured persons
 - a. Maintain an open airway
 - b. Place your ear close to the ill or injured persons mouth and nose
 - c. Assess for three to five seconds.
 - (1) Look for the rise and fall of the chest
 - (2) Listen for air escaping during exhalation
 - (3) Feel for air coming from the mouth and nose
 - d. The First Aid Provider may observe the rise and fall of the chest even if an airway obstruction is present, but will not hear or feel air movement
 - e. Some reflex gasping (agonal respirations) may be present just after cardiac arrest. This should not be confused for breathing.
 - f. If unable to determine presence of breathing in unresponsive person, provide ventilations.
- VI. Ventilation
- A. Once the airway has been assured, and breathing is assessed, breathing for the ill or injured person may be necessary.
 - B. If the ill or injured person is not breathing they only have the oxygen in their lungs and their bloodstream remaining.
 - C. In order to prevent death, the First Aid Provider must ventilate the ill or injured person.
 - D. There are many techniques for ventilation--the First Aid Provider must be competent in the following techniques of ventilation
- VII. Techniques of Ventilation
- A. The techniques of ventilation in order of preference are
 - 1. Mouth-to-barrier device
 - 2. Mouth-to-mouth
 - B. Mouth-to-Barrier Device
 - 1. A barrier device should be used if available to protect the ill or injured and the First Aid Provider.
 - 2. When a barrier device is not available, consider mouth-to-mouth ventilation.
 - 3. Technique
 - a. Position the device over the ill or injured person's mouth and nose ensuring an adequate seal.
 - b. Keep the airway open by the head tilt-chin lift maneuver.
 - c. Give one slow (1.5-2.0 second) breath of sufficient volume to make the chest rise.
 - d. Too much ventilation is likely to allow air to enter the stomach.

- e. Adequate ventilation is determined by:
 - (1) Observing the chest rise and fall
 - (2) Hearing and feeling the air escape during exhalation
 - f. Continue at the proper rate
 - (1) 10-12 breaths per minute for adults.
 - (2) 20 breaths per minute for infants and children.
 - g. If initial (or subsequent) attempts to ventilate the ill/injured person are unsuccessful, the ill/injured person's head should be repositioned and ventilation reattempted.
 - h. If the ill/injured person cannot be ventilated after repositioning the head, the rescuer should proceed with foreign-body airway maneuvers.
- C. Mouth-to-mouth
- 1. The First Aid Provider must be aware of the risks of performing mouth-to-mouth ventilation.
 - 2. Quick, effective method of delivering oxygen to the non-breathing ill or injured person
 - 3. Ventilating an ill or injured person with your exhaled breath while making mouth-to-mouth contact
 - 4. The rescuer's exhaled air contains enough oxygen to support life.
 - 5. Barrier devices are available for use during ventilation.
 - 6. Mouth-to-barrier device does not replace *training* in mouth-to-mouth ventilation.
 - 7. The decision to perform mouth-to-mouth ventilation on a stranger or ill or injured person with unknown infectious status by First Aid Providers is a matter of personal choice.
 - 8. Technique
 - a. Keep the airway open by the head tilt-chin lift or chin lift without head tilt maneuver.
 - b. Gently squeeze the ill or injured person's nostrils closed with the thumb and index finger of your hand on the ill or injured person's forehead.
 - c. When ventilating an infant, cover the infant's mouth and nose with your mouth.
 - d. Take a deep breath and place your lips over the ill or injured person's mouth, creating an airtight seal.
 - e. Give one slow (1.5 - 2 second) breath of sufficient volume to make the chest rise.
 - (1) Too much ventilation is likely to allow air to enter the stomach.
 - (2) Adequate ventilation is determined by:
 - (a) Observing the chest rise and fall
 - (b) Hearing and feeling the air escape during exhalation
 - f. Continue at the proper rate
 - 1) 10-12 breaths per minute for adults, with 1.5 - 2 second inspiratory time.
 - (2) 20 breaths per minute for infants and children.
 - g. If initial (or subsequent) attempts to ventilate the ill/injured person are unsuccessful, the ill/injured person's head should be repositioned and ventilation reattempted.
 - h. If the ill/injured person cannot be ventilated after repositioning the head, the rescuer should proceed with foreign-body airway maneuvers.

- VIII. Foreign Body Airway Obstructions in Adults (FBAO)
1. Partial
 - a. Good air exchange
 - (1) Ill or injured person remains responsive
 - (2) May be able to speak
 - (3) Can cough forcefully
 - (4) May be wheezing between coughs (whistling sounds)
 - b. Poor air exchange
 - (1) Weak ineffective cough
 - (2) High-pitched noise on inhalation
 - (3) Increased respiratory difficulty
 - (4) Blue tissue color at lips and nail beds
 2. Complete
 - a. No air can be exchanged.
 - b. Person will be unable to speak, breathe, or cough.
 - c. Person may clutch the neck--the universal distress signal.
 - d. Death will follow rapidly if prompt action is not taken.
- IX. Management of FBAO
See “Foreign Body Airway Obstruction Management” in the most current version of the *Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiac care.*
- X. Foreign Body Airway Obstruction in Infants and Children*
- A. More than 90% of childhood deaths from FBAO are in children below the age of 5 years.
 - B. 65% are infants.
 - C. FBAO in children is caused by;
 1. Toys.
 2. Balloons
 3. Small Objects.
 4. Food (hot dogs, round candies, nuts and grapes).
 - D. Should be expected in infants and children who demonstrate a sudden onset of difficulty breathing.
 - E. Airway obstruction may be caused by infection and should be considered when there is a history of fever with congestion, hoarseness, drooling, or inactivity.
 1. Infection must be distinguished from FBAO.
 2. Attempting to clear the airway of a child with an infection using maneuvers for FBAO is dangerous and unnecessary.
 3. Activate EMS.
 - F. The First Aid Provider should only attempt to clear a complete or partial FBAO with poor air exchange.
 - G. “Blind” finger sweeps are not done in infants or small children.
 - H. For management of FBAO in infants and children;
See “Foreign Body Airway Obstruction Management” in the most current version of the *Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiac care.*

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- XI. Special Considerations
- A. Persons with stomas
 - 1. Persons who have had their voice box have a permanent opening (stoma) that connects the windpipe (trachea) to the front of the neck.
 - 2. When such person requires rescue breathing, mouth-to-stoma ventilations are required.
 - 3. Technique
 - a. Make an airtight seal around the stoma. Use a barrier if possible.
 - b. Deliver a ventilation slowly, allowing the chest to rise.
 - c. After delivering the ventilation, allow time for the person to exhale.
 - 4. If air escapes from the mouth or nose when ventilating the ill or injured person through the stoma - close the mouth and pinch the nostrils.
 - B. Infants and Children*
 - 1. Place an infant's head in a neutral position. Extend a little past neutral for a child.
 - 2. Take care not to over extend the infant or child's head/neck.
 - 3. Limit the amount of ventilation to that which makes the chest rise.
 - 4. Avoid excessive ventilation volumes that may force air into the stomach.
 - C. Dental appliances
 - 1. Dentures - ordinarily dentures should be left in place.
 - 2. Partial dentures (plates) may become dislodged during an emergency. Leave in place, but be prepared to remove it if it becomes dislodged.

Application

Procedural (How)

1. Show visual representations of the airway and respiratory system of adults. (optional - children, and infants).
2. Demonstrate how to determine the presence of breathing.
3. Demonstrate the head-tilt, chin-lift method of opening the airway.
4. Demonstrate ventilation of a ill or injured person with a barrier device and/or resuscitation mask.
5. Demonstrate mouth-to-mouth ventilation of a ill or injured person.
6. Optional - Demonstrate ventilation of an infant or child ill or injured person.

Contextual (When, Where, Why)

Every ill or injured person must have an open airway to survive. When the airway is obstructed, the First Aid Provider must clear it as soon as possible using the methods escribed in this lesson. Once the airway has been opened, the First Aid Provider must determine if breathing is adequate. Unresponsive ill or injured persons with inadequate breathing may need to be ventilated.

Student Activities

Auditory (Hearing)

1. The student should hear presentations of ill or injured persons with abnormal breathing.

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2. The student should hear a manikin ventilated with a resuscitation mask/barrier device.

Visual (Seeing)

1. The student should see visual representations of the airway and respiratory system.
2. The student should observe normal breathing in other students.
3. The student should see visual representations of abnormal breathing.
4. The student should see visual representations of ill or injured persons with stomas.
5. The student should see different devices for ventilating ill or injured persons (resuscitation masks, barrier devices).

Kinesthetic (Doing)

1. The student should practice evaluating breathing.
2. The student should practice opening the airway with the head-tilt, chin-lift maneuver.
3. The student should practice mouth-to-mouth ventilation.
4. The student should practice ventilation of an ill or injured person with a resuscitation barrier (using a manikin).
5. The student should practice techniques for clearing a FBAO.
6. The student should practice ventilating an ill or injured infant or child.*

Instructor Activities

Facilitate discussion and supervise practice.
Reinforce student progress in cognitive, affective, and psychomotor domains.
Redirect students having difficulty with content.

Evaluation

Evaluate the actions of First Aid students during role play, practice or other skill stations to determine their comprehension of the cognitive and affective objectives and reasonable proficiency with the psychomotor objectives.

Remediation

Identify students or groups of students who are having difficulty with this subject content.

Enrichment

Address unique student requirements or local area needs concerning this topic.

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