

TERMINAL OBJECTIVE

At the end of this lesson, the EMT-Basic will be able to utilize the assessment findings to formulate a field impression of bronchospasm and understand the administration of nebulized Bronchodilator in the pre-hospital setting and appreciate the importance of initiating treatment

COGNITIVE OBJECTIVES

At the completion of this lesson, the EMT-Basic will be able to:

1. Identify the anatomy, pathophysiology, and assessment findings for the following respiratory diseases and conditions that can cause bronchospasm.
 - a. bronchial asthma
 - b. chronic bronchitis
 - c. emphysema
2. Describe the physical signs and symptoms of bronchospasm.
3. Identify the importance in the prehospital setting for the administration of nebulized bronchodilator.
4. Review the following concerning administration of nebulized bronchodilators as used in the management of bronchospasm.
 - a. Classification
 - b. Mechanism of action
 - c. Indications for use
 - d. Pharmacokinetics
 - e. Side/Adverse effects
 - f. How Supplied
 - g. Administration dosages
 - h. Contraindications for use
 - i. Special considerations
 - j. Approved protocol
5. Describe on-line medical direction/control for medication administration.
6. Describe off-line medical direction/control for medication administration.
7. Review universal precautions and body substance isolation procedures when administering nebulized bronchodilator.
8. Describe the necessary elements to be documented concerning the administration of nebulized bronchodilator.

AFFECTIVE OBJECTIVES

Upon completing this module, the EMT-Basic will be able to:

9. Recognize and value the assessment and treatment of patients with bronchospasm.
10. Demonstrate appreciation for the critical nature of accurate field impressions of patients with bronchospasm.
11. Understand the need for universal precautions and body substance isolation.

PSYCHOMOTOR OBJECTIVES

Upon completing this module, the EMT-Basic will be able to:

12. Demonstrate proper documentation of medication administration
13. Perform universal precautions and body substance isolation procedures during medication administration.
14. Demonstrate the proper use of a nebulizer.
15. Demonstrate and record pertinent assessment findings associated with bronchospasm.
16. Conduct a simulated history and patient assessment, record the findings, and report appropriate management of patients with bronchospasm.

PRESENTATION

DECLARATIVE

I. Introduction

According to one U.S. study, respiratory complaints accounted for more than 28% of all EMS calls. Over 200,000 people die each year as a result of respiratory emergencies. Bronchospasm associated with asthma and chronic obstructive pulmonary disease is a major cause of respiratory emergencies.

The purpose of this curriculum is to provide the necessary information and guidelines to educate and train the EMT-Basic in the specific use of nebulized bronchodilators solely for the emergency prehospital management of a patient with bronchospasm in the absence of a physician or other authorized practitioner.

EMT-Basic: Administration of Nebulized Bronchodilator

II. Pathophysiology of Bronchospasm

- A. Spasms of the smooth muscle of the lower airway resulting in a narrowing of the lower airway passages. Bronchospasms are caused by a number of different disease processes affection the lower airway
 - 1. Chronic Obstructive Pulmonary Disease (COPD)
 - a. Asthma
 - b. Emphysema
 - c. Chronic Bronchitis

III. Assessment of Respiratory Distress

- A. Scene Size-Up
- B. Perform Initial Assessment
 - 1. General Impression
 - 2. Airway
 - 3. Breathing
 - 4. Circulation
 - 5. Disability
- C. Perform Focused History and Physical Exam
 - 1. SAMPLE history
 - 2. Interview individual, family, or bystander
 - 3. OPQRST
 - a. Onset – What were you doing when the breathing difficulty started? Was the onset gradual or sudden? Was the onset accompanied by chest pain or any other symptoms? Was there a sudden onset of pain?
 - b. Provocation – Does lying flat make the breathing difficulty worse? Does sitting up make the breathing difficulty less severe? Is their pain that occurs or increases with breathing?
 - c. Quality – Do you have more trouble breathing in or out? Is the pain sharp or dull?
 - d. Radiation – If there is pain associated with breathing difficulty, does it radiate to the back, up the neck, down the arms, or to any other part of the body?
 - e. Severity – How bad is this breathing difficulty on a scale of 1 to 10, with 10 being the worst breathing difficulty you have ever experienced?
 - f. Time – When did the difficulty in breathing start? How long have you had it? If this is a recurring problem, how long does the breathing difficulty usually last? If the breathing difficulty started other than today, could you recall the exact day and time when this started?
 - 4. Other History
 - a. Does the patient have any known allergies to medications or other substances that may be related to the episode of difficulty in breathing?
 - b. What medications, prescriptions, or non-prescriptions, is the patient taking?
 - c. Does the patient have a pre-existing respiratory or cardiac disease?
 - d. Has the patient ever been hospitalized for a chronic condition that produces recurring episodes of difficulty in breathing?
 - 5. Physical Examination
 - a. Inspection
 - b. Palpation
 - c. Auscultation
 - 6. Baseline Vital Signs

IV. Signs and Symptoms of Respiratory Distress

A. COPD

1. Asthma
 - a. difficulty breathing (dyspnea)
 - b. Wheezing
 - (1) If severe asthma – wheezing may not be present called silent chest
 - (2) As severity increases air is trapped in the alveoli and hyperinflation of the chest will occur
 - c. Unproductive/persistent cough
 - d. Increases respiratory rate (tachypnea)
 - e. Accessory muscle use to aid breathing
 - f. Hypoxia
 - (1) Agitation
 - (2) Restlessness
 - (3) Anxiety
2. Emphysema – “pink puffer”
 - a. increased difficulty breathing on exertion
 - b. progressive limitation of physical activity
 - c. barrel chest
 - d. increase in anterior/posterior chest diameter
 - e. prolonged expiratory phase
 - f. increased heart rate
 - g. pursed lips on expiration
 - h. wheezes may or may not be present
 - i. breath sounds are usually diminished
 - j. use of accessory muscle to aid breathing
 - k. jugular vein may be distended depending on severity of emphysema
 - l. tripod position to aid in breathing
 - m. cyanosis may be present
3. Chronic Bronchitis – “blue bloater”
 - a. history of heavy cigarette smoking
 - b. history of frequent respiratory infections
 - c. increased sputum
 - d. productive cough
 - e. tend to be overweight
 - f. difficulty breathing may be present at different severity's
 - g. Use of accessory muscles to aid breathing
 - h. Wheezing or rhonchi may be present due to mucus plug

- V. General Pre-Hospital Management of Respiratory Distress
 - A. The following principles should be use in the initial management of the patient experiencing acute bronchospams.
 - 1. Establish an open airway
 - a. Protect and maintain the airway without extending the neck in the patient with suspected cervical spine injury.
 - b. Insert an oropharyngeal or nasopharyngeal airway to maintain the patency of the airway if indicated.
 - 2. Assess adequacy of breathing
 - a. If breathing is inadequate – poor chest rise and fall, poor tidal volume, diminished or absent breath sounds, inadequate rate (too fast or too slow), or severely altered mental status.
 - (1) Begin positive pressure ventilation with BVM and supplemental oxygen
 - b. If breathing is adequate – adequate chest rise and fall, good tidal volume, good breath sounds bilaterally, adequate rate, and complaints of difficulty breathing present
 - (1) Administer oxygen at 15 liters/minute by non-rebreather face mask
 - 3. Assess baseline vital signs
 - 4. Place patient in position of comfort
 - a. Typically in sitting-up position
 - 5. Determine if patient has taken any prescribed medication for breathing difficulty prior to arrival of EMS
 - 6. Prepare for immediate transport
 - 7. Reassure the patient and check for allergies
 - 8. Administer nebulized bronchodilator per written protocol or on-line medical control
 - 9. Reassess patient's vital signs and adequacy of breathing.
 - 10. Record activity and time on run report
 - a. Date
 - b. Time
 - c. Medication
 - d. Dose administered
 - e. Route administered
 - f. Any patient physiological response to the medication

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- VI. Administration of Nebulized Bronchodilator
- A. Bronchodilator, beta agonist, are the mainstay of acute therapy for asthma, emphysema, chronic bronchitis, and other forms of obstructive respiratory disease. Bronchodilators act on adrenergic receptors. The bronchodilators used in respiratory care are selective for beta₂ adrenergic receptors found primarily in pulmonary tissues. This serves to decrease the cardiac side effects associated with other beta agonist.
 - B. Mechanism of Action
 - 1. Relaxation of bronchial smooth muscle, thus decreasing airway resistance and increasing pulmonary vital capacity and pulmonary function.
 - C. Indication for use
 - 1. Bronchospasm associated with:
 - a. Asthma
 - b. Emphysema
 - c. Chronic Bronchitis
 - D. Contraindications
 - 1. Patients with known allergy to the medication
 - E. Precautions
 - 1. Use with caution in patients with cardiac ischemia and tachydysrhythmias
 - F. Side Effects
 - 1. Tremors
 - 2. Anxiety
 - 3. Dizziness
 - 4. Headache
 - 5. Insomnia
 - 6. Nausea
 - 7. Palpitations
 - 8. Tachycardia
 - 9. Hypertension
 - G. Dosage
 - 1. Will be specific to the nebulized bronchodilator allowed by medical protocol.
 - 2. Administer via nebulizer setup, including oxygen tubing, nebulizer bowl and reservoir
 - H. Peak Effects
 - 1. 1-15 minutes, depending on specific bronchodilator administered.

VII. Administering Aerosol Medications by Oxygen Powered Nebulizer Mist – Procedure

- A. Mist aerosols or nebulizers are used to dilate the bronchi and break up secretions in the bronchial tubes during times of acute difficulty breathing due to bronchospasm or bronchoconstriction such as in Chronic Obstructive Pulmonary Diseases. With these, the patient benefits from immediate local delivery to the tracheobronchial tree and the system absorption of the drug, as well as from the supplemental oxygen delivered simultaneously. Prior to administering an aerosol treatment, assess the patient's history and degree of distress as well as identifying any medications that have been prescribed for them – and which, if any, they have already taken. The assessment should include thorough auscultation to evaluate the breath sounds.
- B. Steps in setting up administration of Nebulized Bronchodilator
1. When an aerosol treatment is indicated, assemble the necessary equipment. You will need a nebulizer unit, oxygen connecting tubing, an oxygen source, and the medication to be administered. Review the order and inspect the medication to verify its identity, concentration, expiration date, and the amount to be administered.
 2. Unscrew the lid on the nebulizer to expose the medication cup.
 3. Add the medication to the cup and reattach the lid.
 4. Attach the mouthpiece and any extension tubing to the nebulizer. Connect the oxygen connecting hose to the appropriate connector on the nebulizer cup.
 5. Attach the other end of the oxygen tubing to an oxygen source, and adjust the flow of oxygen to about 6 – 8 liters per minute. With the oxygen running, you should be able to see a mist coming out of the nebulizer's mouthpiece.
 6. Instruct the patient to hold the nebulizer mouthpiece firmly in their mouth, and to breathe as deeply as they can through their mouth in order to inhale the mist. They should continue to use the nebulizer until the full amount of liquid has been used up.
 7. Monitor the patient throughout the treatment, and re-assess vital signs and ventilatory adequacy when the treatment is completed. Reauscultate for breath sounds and compare your findings to those obtained before the treatment.
 8. As needed, and if a as needed repeat dose is included in your written orders or by on-line medical control, repeat this process.
 9. After the administration of the nebulized drug has been completed, provide supplemental oxygen.

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Administration of Nebulized Bronchodilator – Pre-Course Written Evaluation

1. The primary indication for use of a bronchodilator with beta2 specific actions is:
 - a. congestive heart failure
 - b. pneumonia
 - c. bronchoconstriction/bronchospasm
 - d. myocardial infarction

2. Which of the following are side effects to the administration of a bronchodilator:
 - a. Tremors, anxiety, decreased heart rate
 - b. Anxiety, palpitations, increased heart rate, decreased blood pressure
 - c. Anxiety, palpitations, increased heart rate, increased blood pressure
 - d. Anxiety, palpitations, decreased heart rate, decreased blood pressure
 - a.

3. Which of the following are side effects to the administration of a bronchodilator:
 - e. Tremors, anxiety, decreased heart rate
 - f. Anxiety, palpitations, increased heart rate, decreased blood pressure
 - g. Anxiety, palpitations, increased heart rate, increased blood pressure
 - h. Anxiety, palpitations, decreased heart rate, decreased blood pressure

4. The patient suffering from breathing difficulty due to bronchospasms would usually position themselves to aid their breathing:
 - a. lying down
 - b. standing up
 - c. sitting down, leaning slightly forward
 - d. none of the above

5. Which of the following would indicate inadequate breathing:
 - a. poor chest rise and fall, good tidal volume, diminished or wheezing breath sounds
 - b. poor chest rise and fall, poor air exchange and volume, wheezing
 - c. good chest rise and fall, good air exchange and volume, wheezing
 - d. all would indicate inadequate breathing

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Administration of Nebulized Bronchodilator – Post-Course Written Evaluation

1. Which of the following are side effects to the administration of a bronchodilator:
 - a. Tremors, anxiety, decreased heart rate
 - b. Anxiety, palpitations, increased heart rate, decreased blood pressure
 - c. Anxiety, palpitations, increased heart rate, increased blood pressure
 - d. Anxiety, palpitations, decreased heart rate, decreased blood pressure

2. Which of the following are side effects to the administration of a bronchodilator:
 - a. Tremors, anxiety, decreased heart rate
 - b. Anxiety, palpitations, increased heart rate, decreased blood pressure
 - c. Anxiety, palpitations, increased heart rate, increased blood pressure
 - d. Anxiety, palpitations, decreased heart rate, decreased blood pressure

3. Which of the following would indicate inadequate breathing:
 - a. poor chest rise and fall, good tidal volume, diminished or wheezing breath sounds
 - b. poor chest rise and fall, poor air exchange and volume, wheezing
 - c. good chest rise and fall, good air exchange and volume, wheezing
 - d. all would indicate inadequate breathing

4. The patient suffering from breathing difficulty due to bronchospasms would usually position themselves to aid their breathing:
 - a. lying down
 - b. standing up
 - c. sitting down, leaning slightly forward
 - d. none of the above

5. The primary indication for use of a bronchodilator with beta2 specific actions is:
 - a. congestive heart failure
 - b. pneumonia
 - c. bronchoconstriction/bronchospasm
 - d. myocardial infarction

