Module 21
CHRONIC OBSTRUCTIVE PULMONARY DISEASE

OBJECTIVES

Upon completion of this module, you will be able to

- Discuss the impact of chronic obstructive pulmonary disease (COPD) on the health and wellness of the United States population (morbidity and mortality).
- Describe the person diagnosed with chronic bronchitis.
- Identify and describe the underlying causes of chronic bronchitis.
- Discuss the therapeutic treatment regimen for patients with chronic bronchitis.
- Discuss the disease process associated with bronchietasis.
- List the classic symptoms of patients with bronchiectasis.
- Discuss the therapeutic treatment regimen for persons diagnosed with bronchiectasis.
- Describe the pathophysiology of the disease process associated with pulmonary emphysema.
- Identify and describe the classic symptoms of pulmonary emphysema.
- Discuss the therapeutic treatment regimen for patients with pulmonary emphysema.

INTRODUCTION

Chronic obstructive pulmonary diseases (COPD) are the major cause associated with death and disability from lung-related diseases. COPD is a general classification of lung diseases that are caused by conditions obstructing the air flow both into and out of the lungs. The three major kinds of COPD described in this module are:

- chronic bronchitis
- bronchiectasis
- pulmonary emphysema

(Asthma will not be addressed in this module.) The pathophysiology of COPD includes increased mucous secretions within the airways, an increase in the size of air spaces away from the bronchioles with loss of alveolar walls and elasticity of those walls, and a decrease in the size of the actual airways. COPD occurs due to genetic predisposition and to environmental effects as they contribute to each other. Generally, the process begins at an early age and slowly progresses into a clinical state.

COMMENTS

Persons who present with a productive cough for three months each year for two consecutive years are diagnosed as having chronic bronchitis.

Chronic bronchitis: As a result of lower respiratory tract infections, excessive amounts of mucous are produced and some episodes of shortness of breath and dyspnea may occur. The excessive mucous causes constant irritation which, in turn, produces physicological changes like hypertrophy of the mucous-secreting cells, hyperplasia of the goblet cells, and increased mucous production. It is possible for alveoli and bronchioles to become fibrotic in nature. Over time irreversible lung damage occurs and other types of COPD may develop, like bronchiectasis and emphysema.

Underlying causes. There are various causes associated with chronic bronchitis which include viral, bacterial, and mycoplasma infections; smoking; allergens; and hereditary factors.

Treatment. In treating bronchitis, the old adage "an ounce of prevention is worth a pound of cure" should be followed. Persons who suffer from bronchitis should avoid all upper respiratory irritants, like smoke of any kind, and seek treatment at the first sign of purulent sputum. Immunizations for common viruses and streptococcal pneumonia are strongly encouraged. Antibiotic therapy should begin after the culture and sensitivity study results are received.

Goals of treatment include decreasing exposure to irritants and pollutants; ensuring a patent airway by facilitating the removal of bronchial secretions by using Bronchodilators, expectorants, chest PT and postural drainage; ensuring proper hydration to liquify secretions; and administering steroid therapy, if all else fails to produce the desired results.

Bronchiectasis: This disorder may be caused by several different conditions like aspiration (vomitus, foreign bodies, etc.), infections, outside pressures (tumors, swollen lymph glands, etc.), or postoperative mucous obstructions. With bronchiectasis, infections cause damage to the bronchial walls and an overproduction of mucous which may obstruct the bronchi. Severe coughing may result, which, in turn, causes the walls of the bronchi to become permanently distended, and secretions are retained. Decreased vital capacity, respiratory insufficiency, poor ventilation , poor perfusion, and eventually, collapsed lungs occur.

Classic symptoms. The following symptoms are generally present in the vast majority of patients with bronchiectasis:

- copious amounts of purulent sputus
- hemoptysis
- chronic cough
- frequent respiratory infections
- clubbing of the fingers

Treatment. The therapeutic treatment program for persons with bronchiectasis includes, but is not limited to, the following:

- Expectorants are prescribed to help liquify and produce sputum.
- Antibiotics are administered to prevent and control infections and as prophylactic therapy.
- Hydration is vital to assist in liquifying secretions.
- Chest PT and postural drainage are performed to loosen and to drain secretions from all parts of the lungs and airways. Also, this aids in decreasing the growth of bacteria.
- Breathing treatments which instill extra humidity and produce bronchodilation or mucolytic effects may assist in removing drainage.
- As a last resort, surgery may be indicated to remove all diseased tissues (lobe or entire lung) to help conserve the existing healthy tissue.

Pulmonary emphysema

In pulmonary emphysema, destruction of the aveoli, enlargement of air spaces, and loss of parenchyma tissues occur. This disease progresses over a long period of time with no symptoms until destructive and irreversible changes in the lung tissues finally produce symptoms. By the time that the process has taken hold and symptoms develop, the lung tissues are impaired past repair.

The leading cause of pulmonary emphysema is cigarette smoking; however, a small percentage of patients are genetically predisposed to the disease. Persons who have deficient alph 1-antitrypsin develop pulmonary emphysema due to the effects of allergens, pollutants, and smoke. Pulmonary emphysema is the leading cause of respiratory deaths in the United States, and the leading cause of disabilities, according to the Social Security Administration.

Patients with pulmonary emphysema suffer from airway obstruction due to mucus plugs lodged in the airways or to narrowing of the airway passages caused by the inflammatory process. During expiration, bronchioles collapse because the lung tissues have lost their elasticity. Normally, alveoli have large surface spaces and appear to be grape-like clusters; however, as the process continues, the surface of the alveoli swell and look like balloons. This decreases the air space and increases the dead space. During normal inspiration, the alveoli expand and contract, which is why we refer to the alveoli as having elastic qualities. In persons with pulmonary emphysema, the alveoli lose the elastic qualities, leaving the lung tissues in a state called chronic hyperexpansion.

Taking oxygen into the lungs is very easy for persons with the disease, but expiration of carbon dioxide becomes a difficult task involving the assistance of the chest and abdominal muscles. As the disease progresses, the patient becomes severely short of breath, the chest becomes rigid (causing the barrel-like chest to develop), and vital capacity progressively decreases. Respiratory acidosis occurs due to the build up of carbon dioxide tension (hypercapnia).

In the later states of the disease, Cor pulmonale or right-sided heart failure occurs and peripheral edema is noted (legs, distended neck veins, etc.). Fluids and secretions become static in the lungs because the patient's ability to cough with a normal force to expel these fluids is impaired. Consequently, chronic infections occur.

Classic Symptoms. The classic symptoms are dyspnea on exertion, chronic cough, wheezing, shortness of breath, chronic infections, loss of appetite, loss of weight and excessive fatigue.

Treatment. The major goal of treatment is to improve quality of life and to decrease hypoxia. Ventilation can be improved by using physical therapy which serves to assist in developing better breathing techniques. Infections must be treated as well as prevented by prescribing antibiotics. The patient is encouraged to become more aware of the environment (work and home) so that irritants and pollutants can be avoided as much as possible. Bronchodilators are prescribed to improve gas exchange, to reduce bronchial edema and spasms, and to dilate the bronchioles.

Aerosol therapy with Bronchodilators or mucolytics is ordered to liquify secretions and to decrease bronchial edema and spasms. Oxygen therapy is ordered at no more than two liters per minute. Finally, the patient is encouraged to enter a respiratory rehabilitation program to further improve the quality of life. (For review of Basic Respiratory Care, please refer to Module #19).

NURSING MANAGEMENT

The following is a nursing care plan for patients with COPD utilizing the nursing diagnosis model. All patients will present with both general and specific problems which must be addressed in the care plan.

Nursing Diagnosis 1: Impaired gas exchange related to the poor exchange of gases (O_2 and CO_2).

Goal: To improve gas exchange.

Interventions:

- Administer prescribed medications.
- Assist with respiratory therapy and assess its effects (nebulizer, aerosols, chest PT, postural drainage).
- Teach the patient to breathe using the diaphragm.
- Administer oxygen at no more than 2 liters per minute.

Nursing Diagnosis 2: Ineffective airway clearance related to increased mucous production, bronchoconstriction, inability to cough, and respiratory infections.

Goal: To clear airways.

Interventions:

- Hydrate the patient to help liquify secretions.
- Reinforce breathing from diaphragm.
- Assist with respiratory therapy and assess its effects (nebulizer, aerosols, chest PT, postural drainage).
- Assist patient to stop smoking and/or avoid respiratory irritants.
- Encourage immunizations for viruses and pneumonia.

Nursing Diagnosis 3: Ineffective breathing patterns related to disease processes (mucous, shortness of breath, allergens).

Goal: To improve breathing.

Interventions:

- Teach diaphragm breathing.
- Teach pursed-lip breathing.
- Encourage activity level based on patient tolerance followed by rest periods.

Nursing Diagnosis 4: Activity intolerance related to decreased oxygen, fatigue, and shortness of breath.

Goal: To improve activity tolerance.

Interventions:

- Assess activity tolerance level.
- Develop activity plan based on tolerance.
- Keep portable oxygen available as needed.

Nursing Diagnosis 5: Self-care deficit related to fatigue and poor gas exchange.

Goal: To attain independence in self-care.

Interventions:

- Encourage coordinated effort between better breathing techniques and activities.
- Start training sessions with low energy level activities.
- Build in rest periods.
- Day by day, increase levels of activities while maintaining rest periods.
- Gradually increase time in activities and decrease time in rest periods.
- Settle on a balance between activities and rest.

Nursing Diagnosis 6: Ineffective individual coping related to psychosocial factors (inability to work at a normal pace, anxiety, sexual inactivity).

Goal: To attain optimal coping ability.

Interventions:

- Use positive reinforcement techniques.
- Reinforce patient whenever there is successful increase in activity levels.
- Provide support when progress is slow.
- Encourage enrollment in a pulmonary rehabilitation program or attendance at community support groups for COPD patients.
- Encourage vocational rehabilitation counseling.

Nursing Diagnosis 7: Potential for non-compliance with the prescribed treatment regimen.

Goal: To encourage compliance with the treatment regimen.

Interventions:

- Explain disease process and possible treatment outcomes when compliance is foremost.
- Develop a patient-specific education program.
- Acknowledge days when activity tolerance is high.
- Provide a high level of support.
- Encourage group efforts among patients with similar activity tolerance levels.
- Keep daily logs to compare improvements (they may be very slight and hardly noticeable otherwise).

All classifications of COPD are serious pulmonary diseases which begin early in the life cycle and progressively cause impairment of lung function over time. Early diagnosis and treatment as well as strict compliance with treatment regiments assist in developing a better quality of life as the disease progresses.

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