BEHAVIORAL OBJECTIVES

AFTER READING THIS NEWSLETTER THE LEARNER WILL BE ABLE TO:

1. Discuss age-related changes that can affect pulmonary functioning.
2. Describe the basic assessment skills of inspection and auscultation, as well as implications for healthcare professionals.

Trauma, chronic illnesses, and acute infections, can affect the ability to breathe for patients of all ages. Changes occurring with aging can impact pulmonary functioning, as well. On-going, clinical assessments provide vital information about respiratory functioning and responses to treatment.

A comprehensive respiratory assessment includes a patient history of factors, past and present, that may impact respiratory function, as well as diagnostic tests including pulse oximetry, blood gas analysis, chest x-ray, pulmonary function tests, and thoracic CT and MRI scans. On-going physical assessment provides vital information about respiratory function. It is important for nurses in all practice settings to be able to perform a basic respiratory assessment, including inspection and auscultation.

In this newsletter, physical assessment of the chest and lungs will be discussed, as well as age-related changes that can affect pulmonary functioning. The basic assessment skills of inspection and auscultation will be reviewed, as well as implications for healthcare professionals.

RESPIRATORY ASSESSMENT

Before performing a respiratory physical assessment it is important to consider the impact the patient’s age may have on findings. Aging can directly affect normal physical assessment findings.

AGE-RELATED CHANGES: The chest wall typically becomes stiffer with aging. Movements of the rib cage are often become restricted because of arthritic changes and the respiratory muscles, particularly the diaphragm, lose tone.

Therefore, the maximal force a person generates during inspiration and expiration often decreases with age. The lungs become less elastic with age, a decreased ability to expand and contract, due to various factors including the loss of a tissue protein called elastin. This causes a decrease in vital capacity. By age 50, vital lung capacity has decreased to 65% and to 40% by age 70.

With aging, protective mechanisms also decrease. The cough reflex is less sensitive and may not trigger as readily, and the cough is generally less forceful. The cilia that line the airway are decreased and are also less able to move mucus up and out of the airway. In addition, the nose and breathing passages secrete less IgA, an antibody that protects against viruses. Thus, the elderly are more susceptible to lung infections, particularly pneumonia and chronic bronchitis.

With age, the number of alveoli also diminishes. People normally make new alveoli until about age 20. After that, as the lungs begin to lose some of their tissue, the number of alveoli gradually decreases and there is a corresponding decrease in lung capillaries. With aging, these changes often resulting in chronically low oxygen levels. Chronic hypoxia also occurs from such diseases as emphysema or chronic bronchitis and often reduces tolerance to illness, a decreased ability to exercise, and may cause abnormal breathing patterns, including sleep apnea. Some emphysema normally occurs with aging, but this varies depending on patient’s history of smoking and lifetime exposure to cigarette smoke or other respiratory irritants.

An important change for many older people is that the airways close more readily. The airways tend to collapse when an older person breathes shallowly or when they’re in bed for a prolonged time. Breathing shallowly because of pain, illness, or surgery causes an increased risk for respiratory problems, including pneumonia. As a result, it is important for older people to be assisted out of bed as often as possible. Likewise, when in bed, encouraging the patient to turn, cough and deep breathe is important.

Anatomical changes, such as kyphosis, the accentuated dorsal curvature of the thoracic spine (hunch back), also commonly occurs with aging. If severe, kyphosis may interfere with normal breathing patterns. Scoliosis, curvature of the spine, may also interfere with breathing, especially if it is severe and occurs in the thoracic region. Scoliosis may first be apparent in the early adolescent period.
PHYSICAL RESPIRATORY ASSESSMENT

INSPECTION: With the patient sitting, examine the patient's anterior and posterior chest. Chest inspection allows for detection of visible external signs of respiratory function. Assess the front, back, and sides of the chest for any scars, wounds, or lesions. Look for symmetry of chest wall movement. Observe the duration of the inspiratory/expiratory cycle. Prolonged expiration occurs when an individual has difficulty expelling air, as is often seen in patients with emphysema. Note the patient's respiratory pattern and breathing rhythm. Intercostal retractions, the use of accessory muscles, indicates obstruction and poor ventilation. Look at the patient's general appearance and posture. Patients who have difficulty breathing may be restless or confused, as well as anxious. And, patients with advanced chronic obstructive pulmonary disease (COPD) will commonly lean forward and prop themselves up with their arms to improve breathing. Look for bilateral symmetry of chest wall movement. Decreased movement on one side of the chest may indicate pneumothorax, pneumonia, atelectasis, or a foreign body obstruction. The chest and abdomen should rise and fall together.

Note the patient's respiratory rate, depth, quality and breathing pattern. The usual ratio of breaths to heartbeats is 1:4 in healthy adolescents, adults and aging adults. Respiration should occur between 12 and 20 times per minute. However, the rate should be evaluated in relation to general physical status. For example, tachypnea is expected with fever. The respiratory rate typically increases 4 breaths per minute per degree of Fahrenheit elevation in temperature.

A regular respiratory rhythm in which expiration takes about twice as long as inspiration is a normal finding. Also, note the character of breathing, such as noisy, grunting or snoring. Quiet, unlabored respirations, with no use of accessory muscles - neck, shoulder, or abdomen, is the norm. Also, note nasal flaring or pursed lip breathing, both of which indicate airflow obstruction and poor ventilation. Assessing forced expiratory time is another practical means of observing respiratory function. Ask the patient to take a deep breath in and then to breathe out as quickly and completely as possible, with the mouth open. A forced expiratory time of over 6 seconds suggests obstructive pulmonary disease, such as occurs with emphysema.

Auscultation: Auscultation of the lungs is the most important technique for assessing airflow. Chest auscultation involves listening for the sounds generated by normal breathing and for any adventitious, added, sounds. Lung sounds are best heard through the flat side, the diaphragm of a stethoscope which should be placed firmly against the patient’s chest.

Listen to the posterior lung fields as there is less interference from heart sounds, which are more pronounced on the anterior chest. With the patient sitting up, ask the patient to fold his or her arms across the chest with the hands resting, if possible, on the opposite shoulders. This position moves the scapulae partly out of the way and increases access to the posterior lung fields. During auscultation, instruct the patient to breathe deeply and slowly with his or her mouth open. Listen carefully for at least one full breath in each location. Move downward in a stair-step fashion, comparing your findings from one side with those from the other side. Then, proceed to the anterior chest, proceeding in the same systematic fashion.

COMMONLY HEARD ABNORMAL BREATH SOUNDS: Depending on the disease process, more than one abnormal breath sound may be heard. Although the classification and nomenclature of adventitious sounds may vary, the following terms may be used. Rather than labeling the sound, it is generally best to describe, in as much detail as possible, what you are hearing.

Crackles (Rales) – Crackling or popping sounds are created when air is forced through small respiratory passages that are narrowed by fluid, mucus, or pus. Crackles are associated with inflammation or infection of the small bronchi, bronchioles, and alveoli.

- Fine crackles are soft, high-pitched and very brief. The sound can be simulated by rolling a strand of hair between your fingers near your ear.

- Coarse crackles are somewhat louder, lower in pitch, and last longer than fine crackles. They have been described as sounding like opening a Velcro fastener.

Rattles (Rhonchi) – Coarse rattling/bubbling sounds occur from fluid or obstructions in large airways. They are commonly heard on expiration. Sounds tend to change with coughing and are commonly heard in patients with chronic bronchitis, tumors, bronchospasm, and COPD.

Wheezes – High-pitched whistling sounds are caused by air trapped or squeezed through narrow airways. Wheezes may be heard throughout inspiration and expiration, audibly and/or by auscultation. They are commonly heard with airway obstruction, emphysema, asthma and bronchiolitis.

It is important for professional nurses, in all practice settings, to perform ongoing respiratory physical assessments on patients of all ages.
Mrs. Musey, age 81, has been admitted to the hospital with a diagnosis of lower lobe pneumonia.

1. Aging can directly affect normal physical assessment findings of pulmonary functioning.
   a. True
   b. False

2. Of the following age-related respiratory changes in the elderly, which most likely did NOT predispose Mrs. Musey to developing pneumonia? With aging, the:
   a. cough reflex is less sensitive and the cough is generally less forceful.
   b. cilia are decreased and are less able to move mucus up and out of the airway.
   c. nose and breathing passages secrete less IgA, an antibody that protects against viruses.
   d. diaphragm produces deeper respirations.

3. If Mrs. Musey’s condition permits, physical assessment of respiratory function should occur:
   a. in a position of comfort.
   b. sitting up.
   c. lying down.
   d. standing upright.

4. Which finding would you expect when auscultating Mrs. Musey’s lungs?
   a. Bubbling sounds on inspiration
   b. High-pitched whistling sounds throughout lung fields
   c. Popping sounds over lower lobes
   d. Changing sounds with coughing

5. Which of the following correctly outlines the proper technique for auscultation?
   a. Start with the posterior chest and proceed downward, comparing one side to the other.
   b. Instruct the patient to hold his or her breath and listen in a stair-step fashion.
   c. Compare findings of the lower anterior and lower posterior chest.
   d. Completely auscultate one side of the chest, such as the right, before assessing the other side.
6. When auscultating a patient’s lung sounds, the bell of the stethoscope should be used so there is less interference from heart sounds.
   a. True
   b. False

7. Which of the following changes normally occurs in the elderly and may influence respiratory assessment findings?
   a. Respiratory muscles may weaken
   b. The capacity for exercise increases
   c. The shape of the chest becomes non-symmetrical
   d. Vertebrae changes due to scoliosis

8. Normal findings of chest inspection include:
   a. shallow respirations in a range of 22-28 breaths per minute.
   b. unlabored respirations, with expiration taking twice as long as inspiration.
   c. a forced expiratory time of over 6 seconds, less time for inspiration.
   d. use of accessory muscles to breathe.

9. With disorders where the air is trapped or squeezed through narrow airways, such as with asthma, bronchiolitis or emphysema, the healthcare professional would expect to hear high-pitched whistling sounds.
   a. True
   b. False

10. Which of the following is the most accurate documentation of an abnormal breath sound?
   a. “Wheezes heard upon auscultation.”
   b. “Rales heard throughout anterior and posterior lung fields.”
   c. “Short, high-pitched, popping sounds heard continuously in lower left posterior lung during inspiration.”
   d. “Rhonchi, supporting the patient’s diagnosis of pneumonia, heard in both lungs.”