Pulmonary Issues in the Older Adult

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KEYWORDS

• Older adults • Pulmonary issues • Effects of aging • Pneumonia
• Chronic obstructive pulmonary disease

KEY POINTS

- Overall body changes in muscular strength, skeletal structure, and mobility, in addition to cardiovascular function, result in changes in pulmonary function.
- Decreased thirst response, and less moisture within the mucous membranes of the upper and lower respiratory tract contribute to thickened mucus.
- Community-acquired pneumonia and chronic obstructive pulmonary disease are typical respiratory diseases in older adults.

INTRODUCTION

Pulmonary diseases are not the highest ranked reasons for admission to hospital, nor are they the principal reason for death in the United States. Pulmonary complications are of concern for all individuals admitted to an intensive care unit (ICU). Chronic lower respiratory diseases result in the deaths of only 6.2% of adults older than 65 years, and deaths attributable to influenza and pneumonia occur in of 2.6% of adults older than 65. Morbidity for chronic lower respiratory diseases is 6.4%.[1]

Nevertheless, older adults do have anatomic and physiologic changes that adversely affect the protective mechanisms for the pulmonary system.[2] Some of the changes nurses see in older adults are due to normal aging processes, but others are related to disease processes. It is imperative that nurses should not assume that alterations in pulmonary status are due to aging, and thus fail to intervene to correct the pulmonary issue. The purpose of this article is to review the changes that occur with aging and elucidate their effects on the pulmonary system. Interventions to deter complications and recognize respiratory distress are also provided.

The author has nothing to disclose.
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Crit Care Nurs Clin N Am 26 (2014) 91–97
http://dx.doi.org/10.1016/j.ccell.2013.09.008 **ccnursing.theclinics.com**
0899-5885/14/$ – see front matter

ANATOMY OF THE PULMONARY SYSTEM

The anatomy of the pulmonary system begins with the upper airway. The nose and mouth are entrances for air into the lungs. Atmospheric air is warmed and moistened as it courses through the nares. Adequate moisture of breathed air depends on a well-hydrated individual.[3]

The upper respiratory tract has 2 protective mechanisms to prevent foreign matter from entering the lower respiratory tract. The sneeze is a reflexive action that clears the upper airway when the presence of foreign matter enters the nose. This reflex is in place from the neonatal period until well into old age. The second protective mechanism is cilia within the posterior portion of the nares. Cilia are fine hairs that trap large foreign matter to prevent its entry into the lower respiratory tract. The cilia propel matter into the pharynx to be coughed out or swallowed. In a healthy older adult there is no decrease in the cough reflex.[3–5]

The pharynx has protective mechanisms in place to prevent aspiration of foreign matter into the lower respiratory tract. At the entrance to the lower respiratory tract, the tracheal opening, the glottis, is covered by the epiglottis during swallowing or at any time foreign matter makes contact with the glottis. This closure is a reflexive response that depends on cranial nerves IX (glossopharyngeal), X (vagus), and XII (hypoglossal). Effective swallowing is the result of coordination of these cranial nerves as well as many muscles, the cerebral cortex, the brainstem, and the cerebellum.[3,6]

The lower respiratory tract is enclosed in the thoracic cavity. The pulmonary system shares space with the heart and its structures. The skeletal structures of the thoracic cavity consist of an anterior sternum and a posterior vertebral column joined together by 12 pairs of curved ribs. Intercostal muscles allow for the movement of the skeletal structure necessary for inhalation and exhalation. In aging, reduced muscular strength or skeletal changes in the thorax can affect breathing even in the presence of healthy lung tissue.[2,4]

The trachea branches into 2 bronchi, then into the right and left lung fields. The right bronchus is straighter and more in line with the trachea, thus the risk of foreign-matter aspiration is more likely to occur in the right lung. The lungs are divided into lobes, of which there are 3 on the right and 2 on the left. The major lung fields are best auscultated on the back. It is important to assess lung sounds in all lung fields. Macrophages within the alveolar clusters consume foreign matter and bacteria that reach the terminal structures of the lungs. Gas exchange occurs at the alveolar-capillary membrane. The overall purpose of the pulmonary system is to deliver oxygen to the alveoli for diffusion into the bloodstream.[3,4]

ASSESSMENT OF THE PULMONARY SYSTEM

Respiratory rate provides a primary tool for determining homeostasis in individuals. The rate and effort of respirations in the older adult should be monitored, in addition to meticulous auscultation of lung sounds for abnormality. Tachypnea is an indication of hypercarbia, chemical irritation of the airways, or edema within the alveolar-capillary membrane tissue.[6] A full set of vital signs, including level of consciousness, is indicated to ensure stable oxygenation. Confusion, agitation, or both can indicate hypoxia. Tachycardia can be a sign of hypoxia.

Laboratory values are useful for evaluating pulmonary status.[7] Admission laboratory values may alert the nurse to potential risks of respiratory complications for an individual. Venous CO_2 can be referenced for metabolic processes in the absence of arterial blood gas. Fasting hyperglycemia on admission laboratory data has been found to be associated with higher rates of mortality in the presence of pneumonia.[8] An arterial