Dyspnea

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KEYWORDS

• Dyspnea • Respiratory distress • Critical care • Assessment • Treatment

KEY POINTS

- Dyspnea is highly prevalent in the intensive care unit, including in patients undergoing mechanical ventilation.
- Dyspnea is one of the most distressing symptoms experienced by critically ill patients; it can be likened to suffocation.
- Assessment may be hampered by the patient's inability to communicate or self-report secondary to intubation and/or cognitive impairment.
- Treating the underlying condition is the first step to relieving dyspnea.
- A number of evidence-based interventions may relieve the dyspnea sensation.

INTRODUCTION

Dyspnea is a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity and can only be known through the patient's report.[1] Dyspnea is akin to suffocation and is one of the worst symptoms experienced by critically ill patients, including those who are mechanically ventilated.[2] When a patient cannot report dyspnea, as typifies many critically ill patients, the observed behaviors are characterized as respiratory distress.[3]

Expert guidelines are available to assist in the management of dyspnea,[1,4] but additional empirical evidence to support clinical care is needed, and wide variation persists in practice. The purpose of this paper is to address the following questions: (1) How prevalent, intense, and distressing is dyspnea experienced by critically ill patients? (2) How should dyspnea be assessed in the intensive care unit (ICU)? (3) What are current strategies for managing dyspnea during critical illness?

DYSPNEA MECHANISMS

The pathophysiologic basis for dyspnea occurs when there is a derangement in respiratory function. Normal respiration is a function of the complex integration of the respiratory control system consisting of voluntary, autonomic and emotional responses.

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Conscious controls (voluntary) from the cortex were identified in functional MRI studies of healthy human subjects during volitional breathing.[5–7] The autonomic responses are regulated in the brainstem and are basic and vital to the existence of the organism and will override conscious controls. Hence, telling a dyspneic patient to slow down their breathing is a futile exercise (**Fig. 1**).

Respiratory sensors consist of central (medulla, pons) and peripheral chemoreceptors (aortic and carotid bodies) and peripheral sensory receptors found in the chest wall, airways, and lungs. Alterations in respiratory function will produce blood gas imbalances (hypoxemia and hypercarbia) and changes in thoracic displacement. Peripheral afferents play only a minor role in respiratory control.

Stimulation of the respiratory center elicits an increased respiratory and cardiac response through activation of the parabrachial complex in the pons,[8] sympathetic nervous system, and activation of the adrenal medullary catecholamines (epinephrine and norepinephrine). Increased cardiac and pulmonary responses from central respiratory control and the sympathetic nervous system produces compensatory responses, including accelerations in heart and respiratory rates, increased lung volumes through recruitment of thoracic accessory muscles, changes in muscle tone, and increases in mean arterial pressure.[9] These cardiorespiratory responses are intended to restore respiratory homeostasis and preserve life.

The awareness of difficulty breathing, dyspnea, and the associated emotional responses of fear and anxiety are produced when there is pathology compromising normal respiratory functioning and is characterized by antecedent conditions, neurophysiologic, pulmonary, and emotional responses, and patient subjective experiences and behaviors.[10]

ANTECEDENT CONDITIONS AND MECHANISMS

A number of common pathologic conditions produce dyspnea (**Table 1**). The physiologic conditions shown in **Table 1** have 1 or more common mechanisms for producing uncomfortable breathing, including respiratory effort, blood gas imbalances, and afferent mismatch. A sense of respiratory effort is produced by conscious awareness of voluntary activation of the diaphragm, intercostals, and sternocleidomastoid muscles. Muscle receptors provide feedback about muscle force and tension, and information from these chest wall receptors produce the conscious awareness of respiratory effort. The respiratory muscles also activate autonomic central respiratory motor centers (ventromedial pons and medulla) that can contribute to the sense of effort.

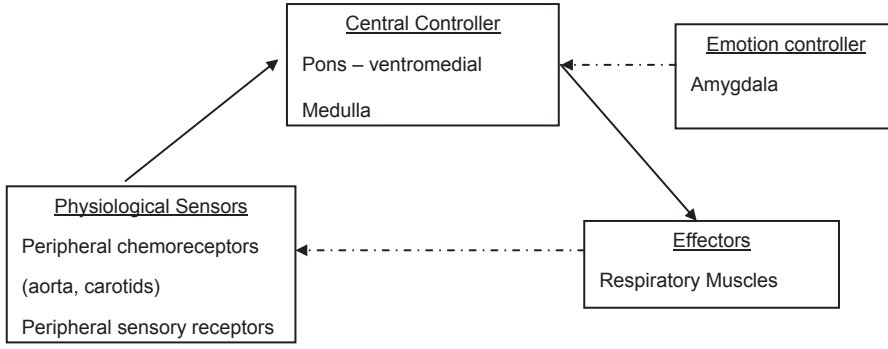

Fig. 1. Autonomic control of respiration.