**ARTICLES**

# Dyspnea: Recognizing and Managing an Invisible Problem

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## Case Study 1

B.H. is a 67-year-old woman who was diagnosed 15 years ago with breast cancer that was treated with a modified right mastectomy. About a year ago, she was diagnosed with non-small cell lung cancer. Despite chemotherapy, she had a progressive tumor in her right lung, bilateral pleural effusions, two darkened areas in her right axilla that appeared to be tumors, a large protruding epigastric mass, and moderate hepatomegaly. She was admitted because of uncontrolled pain. Upon admission, she was sitting up in her chair and receiving oxygen, 3 liters per nasal cannula. Three months ago, she noticed shortness of breath that began with activities not previously associated with this sensation. She eventually needed supplemental oxygen but could drive as long as she took her portable oxygen with her; she hated it but was willing to "pay the price of looking sick" to go out with her friends. As her dyspnea and pain worsened, B.H. became more depressed and isolated. She no longer called her three good friends and would not take their phone calls. Now B.H. can walk only from her chair to the bathroom because of shortness of breath. When asked about her hopes, B.H. said she would like to be "in a more comfortable place." Her fear was that she would die gasping and in pain. She had not responded to third-line chemotherapy, and no further regimens were expected to be beneficial in terms of extending her life or palliating her symptoms. She was not ready to talk about hospice care, but her palliative treatment plan included radiation to her painful tumor masses (i.e., right axilla, liver, and epigastric mass).

## Case Study 2

After experiencing progressive dysphagia, R.A., a 45-year-old man, was diagnosed with esophageal carcinoma. His initial treatment was an esophagectomy, and he began chemotherapy three weeks later. The chemotherapy was interrupted after two cycles for radiation therapy to the tumor bed. Chemotherapy and radiation therapy were complicated by nausea and vomiting, and his jejunostomy tube, which had been placed for enteral feedings, fell out. After the fourth radiation treatment, he suddenly developed severe shortness of breath and pleuritic chest pain. He became extremely anxious and felt as if he were going to die. Oxygen was started at 2 liters per nasal cannula, and a portable chest radiograph was done. He had no redness, tenderness, or swelling, and he had a negative Homan's sign in both of his calves.

## Case Study 3

A.T., a 72-year-old man, was diagnosed with prostate cancer seven years ago. He suffered a massive cerebral vascular accident six months ago that resulted in left-sided paralysis and expressive aphasia. His cancer is stable, but he has developed pneumonia several times in the past few months. He again has pneumonia, which now is antibiotic-resistant. A.T. is minimally responsive, his respiratory rate is 36 breaths per minute, he has coarse crackles throughout both lung fields, and he has easily audible rattling respirations. He continues on enteral feedings through a jejunostomy tube and is receiving IV fluids (1,000 cc every 12 hours).

**D**yspnea, from the Greek words for hard and breathing, is a frequent symptom among seriously ill patients that increases symptom burden and alters quality of life (Desbiens, Mueller-Rizner, Connors, Wenger, & Lynn, 1999). Despite its frequent occurrence, little research exists to support evidence-based care for dyspneic patients with cancer who frequently are underdiagnosed and inadequately managed (Farncombe, 1997). Patients with lung cancer are at greatest risk to develop breathlessness, followed by those with breast, colorectal, or prostate cancer (Desbiens et al.; Escalante et al., 1996; Reuben & Mor, 1986). However, virtually any patient who has a solid or hematologic malignancy

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can become dyspneic at any point along the disease trajectory. About one-third of patients with dyspnea have responded to cancer therapy, and treating the underlying cause may alleviate breathlessness (Escalante et al.). More often, dyspnea is progressive and life altering. Severe dyspnea may portend the terminal phase for patients with lung cancer, but patients with breast or other cancer diagnoses may live longer with dyspnea. Therefore, nurses must recognize the nature and scope of the problem of dyspnea, identify cancer-related and other problems associated with dyspnea, and incorporate evidence-based assessment and management strategies into oncology nursing practice.

## Normal Breathing and the Pathogenesis of Dyspnea

Normal breathing is quiet, automatic, and usually unconsciously controlled by the respiratory center in the brain stem, which responds to afferent impulses from chemoreceptors in the medulla, carotid and aortic bodies, and from mechanoreceptors (Kuebler, 2002; Manning & Schwartzstein, 1999; Ripamonti & Bruera, 1997). The cortex can override the autonomic process when it perceives a need to increase respirations, which induces greater effort from respiratory muscles. The sense of increased effort or work to breathe may occur when chemoreceptors are stimulated, primarily by small increases in $CO_2$ and less frequently by decreased $O_2$. In addition, mechanoreceptors in the upper airways, lung, and chest can affect breathing. Juxtacapillary receptors (i.e., unmyelinated C fibers) deep in the lung parenchyma and bronchi are triggered by chemical and mechanical stimulation, such as pulmonary congestion or emboli. Stretch receptors respond to stretching of the airways, and inhaled irritants stimulate irritant receptors. In addition, stimulation of receptors in the face and upper airways may modify respiratory sensations. Under normal circumstances, the respiratory center initiates efferent impulses to the respiratory muscles to maintain normal breathing.

The actual pathogenesis of dyspnea is unknown, but one or more of three main abnormalities are implicated (Ripamonti & Bruera, 1997).
- Respiratory effort must increase to overcome load that can occur with restrictive or obstructive lung disease or with pleural effusion.
- An individual must use a greater proportion of respiratory muscles (i.e., diaphragm, intercostal and sternomastoid muscles) to maintain normal respirations. This can occur with cachexia or neuromuscular weakness.
- Ventilatory requirements are amplified because of hypercapnia, metabolic acidosis, anemia, increased dead space, or other problems.

Dyspnea, as well as other distressing symptoms, alerts the cortex to a threat, which leads to protective or adaptive behaviors to maintain homeostasis. Dyspnea also activates the limbic region, an internal alarm center that induces negative emotions to stressful stimuli (Banzett et al., 2000; Banzett & Moosavi, 2001; LaDuke, 2001). Dyspnea can be classified by time course (i.e., acute, subacute, chronic, and progressive) or by etiology (i.e., direct or indirect effect of tumor, effect of treatment, or not related to either cancer or therapy) (LeGrand & Walsh, 1999). Cancer-related dyspnea usually is multifactorial, resulting from cancer and perhaps exacerbated by cancer therapy or other factors (Cowcher & Hanks, 1990; Ripamonti, 1999; Ripamonti & Bruera, 1997) (see Figure 1).

No definition of dyspnea is accepted universally. It has been characterized as difficult, labored, and uncomfortable or unpleasant breathing; an awareness of respiratory distress (American Thoracic Society, 1999); and a sensation of feeling breathless (having air hunger) that occurs when the demand for ventilation exceeds the body's ability to meet this need (Foote, Sexton, & Pawlik, 1986). The definition proposed by the American Thoracic Society recognizes that dyspnea is a subjective physical and emotional experience: "Dyspnea is a term used to characterize a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity" (p. 322).

## Themes of Dyspnea

Several themes regarding dyspnea have emerged from the literature and clinical experience. For example, dyspnea is a pain equivalent, an invisible problem, and a profound and lonely experience that affects patients and their loved ones. Furthermore, nurses must decipher the language of dyspnea, particularly regarding its quality and intensity.

### A Pain Equivalent

Dyspnea is a pain equivalent. Both are complex, sensory, and affective subjective experiences that result from the interaction of modulating factors (e.g., intensity, mood, cultural influences) (Ripamonti, 1999). Individuals who have cancer

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**Cancer-related (direct and indirect)**
- Primary lung cancer
- Obstructed bronchus
- Atelectasis
- Chest wall infiltration
- Lung metastases
- Pleural effusion
- Lymphangitic carcinomatosis
- Tracheal obstruction
- Tracheo-esophageal fistula
- Phrenic nerve palsy
- Vocal cord paralysis/aspiration pneumonia
- Pericardial effusion
- Superior vena cava syndrome
- Ascites
- Hepatomegaly

**Therapy and other effects**
- Thoracotomy
- Radiation fibrosis
- Chemotherapy-related pulmonary or cardiac toxicity
- Chest wall deformity
- Chronic obstructive pulmonary disease
- Heart failure
- Motor neuron disease
- Obesity
- Thyrotoxicosis
- Adult respiratory distress syndrome
- Pulmonary embolus
- Cachexia, malnutrition
- Severe anemia
- General debility

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**Figure 1. Some Causes of Dyspnea**

*Note.* Based on information from Cowcher & Hanks, 1990; Ripamonti, 1999; Ripamonti & Bruera, 1997.

often experience dyspnea and pain simultaneously, and both often worsen with progressive disease. A common opinion is that anxiety causes dyspnea (and pain), but correlations between dyspnea and anxiety are modest (Bruera, Schmitz, Pither, Neumann, & Hanson, 2000; Desbiens et al., 1999; Dudgeon & Lertzman, 1998; Dudgeon, Lertzman, & Askew, 2001). Therefore, whether anxiety increases dyspnea, results from it, or is an interpretation of patients' emotional response cannot be determined (LeGrand & Walsh, 1999).

On the other hand, worsening and unmanaged dyspnea can exacerbate anxiety, which causes patients to breathe harder—setting up a vicious cycle of air hunger, loss of control, greater anxiety, and panic (Tarzian, 2000). Finally, as with pain, the language of dyspnea is imprecise, and the severity of dyspnea does not necessarily correlate with objective measures (e.g., pulse oximetry, respiratory rate) or stage of cancer (Smith et al., 2001). Thus, just as "your pain is your pain, your dyspnea is your dyspnea" (Banzett & Moosavi, 2001, p. 6). Dyspnea is what a patient says it is (Davis, 1997).

## An Invisible Problem

The reported incidence of dyspnea in patients with cancer varies from 21%–90% (Bruera et al., 2000; LaDuke, 2001; Reuben & Mor, 1986; Smith et al., 2001). Given that wide range, many cases of dyspnea go unrecognized, undocumented, and unmanaged. Studies of patients' perspectives have confirmed that moderate to severe dyspnea is common with lung cancer (primary or metastatic) (Brown, Carrieri, Janson-Bjerklie, & Dodd, 1986; O'Driscoll, Corner, & Bailey, 1999; Smith et al.; Wilcock et al., 2002). Researchers know less about patients with other cancer diagnoses, particularly those who are breathless despite no pulmonary involvement. Such individuals may not have been included in studies because of a preconception that dyspnea is infrequent in other malignancies. However, one quality-of-life study found that two-thirds of hospice patients with cancer of the lung, colon, rectum, breast, or prostate were breathless; dyspnea and constipation were the two most problematic physical symptoms in terms of inadequate control (McMillan & Weitzner, 2000). Similarly, 77% of another group of hospice patients reported breathlessness, but hospice nurses caring for the patients documented dyspnea in only 39% of charts (Roberts, Thorne, & Pearson, 1993).

## A Profound and Lonely Experience

Dyspnea leads to multiple threats and barriers to normal life and may have devastating effects on physical functioning, personal and sexual behaviors, self-care ability, household and work activities, and social roles. In addition, dyspnea negatively affects emotions and decreases comfort and peace of mind (Brown et al., 1986; O'Driscoll et al., 1999; Roberts et al., 1993). Over time, patients with progressive shortness of breath continue to realize new events that trigger breathlessness and increasingly avoid physical activities, mechanical activities (e.g., crying, laughing, smoking), environmental factors (e.g., bad weather, extremes in humidity, pollen, smoke), and emotions that precipitate dyspnea. As dyspnea worsens, triggers become more limiting and patients must carefully plan or pace activities. As activity tolerance further declines, they must seek assistance or transfer to others their usually independent activities of daily living (e.g., bathing, eating, dressing, grooming). As one patient reported, "Breath-lessness makes you slow right down, like a car running out of gas" (O'Driscoll et al., p. 39). Ultimately, patients with severe dyspnea may find that nothing helps, so they must totally limit their activities.

Not only can emotions trigger dyspnea, but dyspnea may heighten emotional responses, such as anger, helplessness, depression, anxiety, nervousness, fear of impending death, frustration, thoughts of suicide, envy of the dead, guilt, and panic (Brown et al., 1986; O'Driscoll et al., 1999). Higher levels of breathlessness also are related to more severe pain and lower quality of life. In other symptom complexes, dyspnea occurs with cognitive changes (e.g., poor concentration, memory changes), anorexia, sweating, loss of strength, or fatigue (Desbiens et al., 1999; Smith et al., 2001).

Patients with dyspnea often struggle alone for weeks or months to cope with the meaning and management of dyspnea and to deal with the life-threatening potential of their breathlessness (Roberts et al., 1993). Patients believe nurses do not understand their symptom experience and, thus, do not discuss breathlessness (or other symptoms) with them. This perception may arise because few nurses or physicians give patients concrete suggestions to manage dyspnea; vague suggestions, such as "don't do the things that make you short of breath," are not helpful (Brown et al., 1986; O'Driscoll et al., 1999).

Dyspnea also affects family members who experience increased burdens of care as they assume patients' previous responsibilities and roles. In addition, caregivers' emotional burdens worsen if they feel unable to help patients who have terminal air hunger and are "drowning" in secretions (O'Driscoll et al., 1999). A family's long-lasting memory may be the terrible death of a loved one.

## The Language of Dyspnea

Researchers also should identify the words patients would use to describe their breathlessness because they may not understand the terms that healthcare professionals use, and vice versa. For instance, Brown et al. (1986) reported that all patients selected "short of breath" as a descriptor of their dyspnea. On the other hand, other authors have contended that shortness of breath is an unusual term for anyone who is not a healthcare professional and reflects learned vocabulary by patients (Hardie, Janson, Gold, Carrieri-Kohlman, & Boushey, 2000). A common patient descriptor is "I cannot get enough air." Others include "difficult breathing," "like suffocation," "tightness in the chest," "hard to move air," "feeling out of breath," "like breathing through cotton wool," "having to work to breathe," and "like drowning or filling up" (Brown et al.; O'Driscoll et al., 1999). Patients who have different underlying causes of dyspnea may choose different words or phrases to describe their breathlessness, but no clusters of descriptors are so unique and consistent with particular etiologies that they are useful to differentiate one cause of dyspnea from another (Wilcock et al., 2002). Another factor to consider is that patients of different ethnic and cultural backgrounds may use different words and phrases for dyspnea, as was found among African American and Caucasian patients with asthma during induced bronchoconstriction (Hardie et al.).

# Assessment of Dyspnea

Routine patient assessments should include dyspnea and other common symptoms. Nurses have honed their skills to

manage pain and nausea, and they can apply the same principles to breathlessness. All patients with cancer are at some risk for dyspnea from an acute event (e.g., pulmonary embolus, pneumothorax, pneumonia), chronic and progressive dyspnea from cancer or corelated problems, or terminal air hunger. Gathering general survey data is second nature to experienced nurses, who almost unconsciously gather clues about their patients' respiratory status (see Figure 2).

Patient histories not only focus on current breathlessness but also gather information about patients' smoking history, pulmonary and cardiac problems, previous cancer therapy, and medication history. To gain a clearer understanding of the symptom experience, nurses ask patients specific questions about breathlessness. Nurses may find it useful to ask general questions or make statements such as, "I notice that you seem to be working a bit to breathe. Do you feel like you are getting enough air?" or "Do you have any difficulty breathing? Tell me more about it." Nurses should ask patients how they would describe the quality of their breathing; they may offer a list of words that other patients have used to describe dyspnea.

Questions about the intensity or severity of breathlessness should inquire about current, usual, and worst severity. No validated "best way" exists to measure the intensity or severity of dyspnea, but a common method is to ask patients to rate their shortness of breath or breathlessness on 100-millimeter visual analogue scale (Brown et al., 1986; Roberts et al., 1993; Smith et al., 2001). Alternately, a numeric scale (0–10) or categorical scale (e.g., none, mild, moderate, severe) anchored by no breathlessness and worst breathlessness, shortness of breath, or patients' descriptors are clinically useful (Chandler, 1999). Breathlessness tends to fluctuate; it often is moderate but typically becomes severe. Fifteen percent of patients have continuous severe breathlessness, but dyspnea episodes that last from a few minutes to an hour are most common (O'Driscoll et al., 1999).

Comprehensive histories explore whether patients have shortness of breath when resting or being active, and whether they have orthopnea, paroxysmal nocturnal dyspnea, or any edema. Nurses should explore not only the current intensity of breathlessness, but also the effects of dyspnea on usual home, work, and social activities because patients often report less severe breathlessness on an intensity scale but simultaneously report that dyspnea limits activities of daily living (Farncombe, 1997). One patient-completed measure that identifies which level of activity triggers dyspnea is the Modified Medical Research Council Dyspnea Scale (MMRCDS), which allows healthcare providers to determine how much dyspnea is affecting patients' activities. If MMRCDS is not used, nurses still can ask patients how far they can walk, how many steps they can climb, what housework they can do, and so forth, before they have to stop or slow down because of shortness of breath.

Other areas of a comprehensive dyspnea assessment include what alleviates breathlessness (e.g., medications, rest, positioning), emotional and social effects, dyspnea-related hardships for patients and family members, and any accompanying symptoms. Objective indicators, such as tachypnea, gasping, restlessness, agitation, use of accessory muscles, and tachycardia, are important in assessing patients who cannot describe their breathlessness (Campbell, 1996). An accurate medication history also is necessary to substantiate past and current drug use (e.g., opioids, anxiolytics, bronchodilators, corticosteroids), doses, and schedules that have or have not been helpful in reducing dyspnea and other symptoms.

Physical assessment focuses mainly on the respiratory and cardiac systems to identify potential underlying causes of dyspnea, such as pericardial effusion or superior vena cava syndrome. The choice of diagnostic tests is guided by the goals of therapy, cancer stage and prognosis, and the benefits and burdens of tests. Common tests include pulse oximetry at rest and after exercise, chest radiograph, complete blood count, and serum electrolytes (i.e., potassium, magnesium, and phosphate). Pulmonary function tests and arterial blood gases are performed infrequently on patients with advanced cancer (Dudgeon & Rosenthal, 1996; LeGrand & Walsh, 1999).

# Management of Dyspnea

Therapy recommendations are based mostly on clinical experience. Only a few studies, which were limited by small sample sizes, have examined interventions for cancer-related dyspnea. Initial treatments focus on reversible or manageable causes, so therapies might include antibiotics for pneumonia; anticoagulants for pulmonary embolis; bronchodilators, corticosteroids, or stent placement for obstruction with lung cancer or chronic obstructive pulmonary disease (COPD); or thoracentesis plus pleurodesis for pleural effusion. As dyspnea worsens, opioids are the cornerstone of management, but other medications, supplemental oxygen, and nondrug measures may be useful adjunctive palliative measures.

## Opioids

Opioids decrease the intensity of dyspnea and the sense of respiratory effort and have been used for this purpose for more than 100 years (Chandler, 1999; Dudgeon & Rosenthal,

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- Relative health (e.g., healthy, acutely or chronically ill)
- Apparent nutritional status (e.g., cachectic, well nourished, obese)
- Color (e.g., within normal limits, pale or ashen, cyanotic or gray, jaundiced)
- Emotional demeanor (e.g., relaxed, anxious, sad or depressed, panicky)
- Mental status (e.g., awake, alert, and appropriate; confused; somnolent; restless; comatose)
- Specific respiratory cues
  - Is the patient receiving supplemental oxygen? If so, by what means (e.g., nasal cannula, face mask, tracheostomy collar)?
  - How is the patient's respiratory rate and rhythm (e.g., seemingly within normal limits, visibly tachypneic)?
  - Breathing pattern and depth (e.g., respirations quiet, "working" to breathe, using accessory muscles, staccato speech (count the number of words between breaths), audible wheeze, retained secretions in upper airways/ bronchus)
  - Position in bed or chair (e.g., lying flat, elevated more than 30°, sitting up, leaning forward with elbows propped on an overbed table)
  - Is the patient coughing (e.g., frequency, productive or nonproductive)?

**Figure 2. General Survey Data Related to Respiratory Status**

1996; Mazzocato, Buclin, & Rapin, 1999). Morphine is used most commonly, but hydromorphone and fentanyl, administered in various doses and routes, are beneficial alternatives (Boyd & Kelly, 1997; Bruera, MacEachern, Ripamonti, & Hanson, 1993; Cohen et al., 1991; Cowcher & Hanks, 1990; Mazzocato et al.; Ripamonti, 1999). Opioids are theorized to act at central and peripheral opioid receptors and on the respiratory center, thereby altering the perception of breathlessness, decreasing respiratory drive, and decreasing ventilatory responses to hypoxia and hypercapnia (Chandler; Ripamonti). Assessment of therapeutic benefits of opioids and other interventions could include reduced sense of breathlessness, increased activity tolerance, improved sleep, enhanced self-care ability, and improved mood (Quelch, Faulkner, & Yun, 1997).

Opioids usually decrease cancer-related dyspnea that is not relieved by supplemental oxygen and rest. Their benefits usually are greater when patients have low or moderate dyspnea, rather than severe breathlessness (Allard, Lamontagne, Bernard, & Tremblay, 1999). Adverse effects of opioids (e.g., sleepiness, nausea, hypercapnia) are infrequent, and tolerance to side effects develops quickly. Transient somnolence actually may be related to sleep deprivation from dyspnea; increases in $CO_2$ are more likely in patients whose condition is worsening rapidly and probably are a natural consequence of dying (Cohen et al., 1991). No evidence exists that opioids given for dyspnea shorten patients' lives; in fact, they might live longer (certainly with a better quality of life) when physical distress, emotional suffering, and exhaustion are relieved (Dudgeon & Rosenthal, 1996).

Opioids can be administered orally (po), subcutaneously (SQ), via IV, rectally (PR), and in a nebulized form. Immediate-release oral formulations are used most commonly, but sustained-release drugs also have been effective. SQ and IV opioids can be administered by continuous infusion or as bolus injections. Recommended starting oral doses of opioids are lower than those for analgesia, typically 5–15 mg of morphine, or 1 mg of hydromorphone (Cohen et al., 1991; Cowcher & Hanks, 1990). Duration of action may be shorter when opioids are used to treat, rather than as an analgesic (Dudgeon & Rosenthal, 1996).

No standard or usual doses of opioids always effectively relieve breathlessness, but principles of administration similar to those of pain management are helpful to guide practice (see Figure 3) (Allard et al., 1999; Chandler, 1999; Cohen et al., 1991; LeGrand & Walsh, 1999; Quelch et al., 1997; Wickham, 1998). If patients receive an opioid for pain, 25%–50% of the analgesic dose of the same opioid is recommended for dyspnea (Mazzocato et al., 1999). When patients have inadequately controlled breathlessness despite receiving a regularly scheduled opioid, the 24-hour dose should be increased by 25%–50%, with the goal of titration being the relief of dyspnea (Cohen et al).

Alternately, a dose increase is contraindicated if patients are sedated excessively (i.e., they cannot be easily aroused). An appropriate response when patients become very sedated after the initiation of an opioid infusion or with rapid dose escalation is to turn the infusion off or decrease the hourly rate by 50%. Whether sedation or other distressing symptoms are opioid-induced adverse effects or caused by disease progression or other complications is related to timing; if opioid-naïve patients become sedated within several hours of starting scheduled doses or continuous infusion of an opioid, the event is

- Goals of opioids for breathlessness: Increase patients' quality of life through an increase in exercise tolerance, mobility, and function.
- Rare reports of respiratory depression: Start with a modified "as needed" schedule (e.g., medical order might read: Morphine x mg po every four hours for dyspnea. Patient may refuse.).
- Supplementary doses of one-fourth or one-half of the four-hour dose administered orally (po) or subcutaneously should be available to patients.
- Patients who have severe dyspnea might require a higher dose and more frequent dose escalation.
- Titrate to affect. A large range of reported effective doses exist, perhaps because of interpatient variability and severity of symptom.
- Patients who are receiving an opioid for pain should receive the same drug for dyspnea.
- Substitute hydromorphone (po, parenteral, nebulized) if patients have a history of morphine intolerance.
- Some patients experience a bitter taste with nebulized agents. Use a trial of inhaled saline alone before implementing a nebulized opioid.
- Use a sedation scale to assess patients: 0 = none (i.e., patient alert), 1 = mild (i.e., patient slightly drowsy but easily aroused), 2 = moderate (i.e., patient often drowsy but easily aroused, drifts off to sleep during conversation), 3 = severe (i.e., patient somnolent and difficult to arouse).
- Do not administer naloxone to dyspneic patients who become sedated with opioid infusion because it will cause the return of acute dyspnea, anxiety, and agitation.

### Figure 3. Principles of Opioid Use for Dyspnea

*Note.* Based on information from Allard et al., 1999; Chandler, 1999; Cohen et al., 1991; LeGrand & Walsh, 1999; Quelch et al., 1997; Wickham, 1998.

more likely causally related than if patients have been taking opioids for more than a week and suddenly become sleepy. Other reasons for a change in the level of consciousness should be ruled out. Naloxone (Narcan®, Endo Pharmaceuticals, Inc., Chadds Ford, PA) *should not* be administered. Opioids administered for dyspnea, of course, are associated with similar side effects as when they are used for pain. Constipation is the most frequent symptom, so nurses should remind physicians or other primary care providers to write orders for stool softeners plus laxatives (Cowcher & Hanks, 1990).

The use of nebulized opioids (e.g., morphine, hydromorphone, fentanyl) for dyspnea is gaining wider acceptance. The findings of most studies of nebulized opioids have been inconclusive or negative. However, anecdotal evidence supports the benefits of nebulized administration, including simplicity of administration, avoidance of invasive procedures, and the fact that direct pulmonary delivery circumvents a first-pass effect in the liver (Chandler, 1999; Quelch et al., 1997). Typical starting doses for opioid-naïve patients are morphine 5–10 mg every four hours, hydromorphone 1–2 mg every four hours, or fentanyl 25–50 mcg every four hours. Opioid-tolerant patients need larger doses. Many patients require much higher doses (e.g., 20–50 mg of morphine or appropriate morphine equivalents) before dyspnea is relieved (Quelch et al.). Nebulized administration of fentanyl may be advantageous because it is lipophilic, making it readily absorbed and enhancing its effectiveness. Furthermore, fentanyl does not induce histamine release and, therefore, is less likely than morphine to cause bronchospasm (Coyne, Viswanathan, & Smith, 2002).

Nebulized opioids are prepared by combining a parenteral, preservative-free opioid with 2–3 ml normal saline. A patient then inhales the fine mist through a passive mask method or with an air-compressed nebulization mouthpiece until it is gone (about 7–10 minutes). Estimates of systemic absorption of nebulized opioids range from 5% to more than 30% and may depend on the drug administered and the mechanism of delivery (Chandler, 1999; Ripamonti, 1999). Relief of dyspnea begins 10–15 minutes after treatment and lasts four hours or longer. If relief of dyspnea lasts less than four hours, the dose should be increased 25%–30% (Storey, 1994).

Adverse effects are similar to those caused by opioids administered by other routes and may occur with titration to higher doses. A disadvantage of nebulized opioids is that weak patients may not tolerate the treatments and stop them, which is more likely with progressive disease (LeGrand & Walsh, 1999). Furthermore, the mouthpiece provides more consistent dose delivery but may be difficult for sicker patients to coordinate; the mask is easier to use but can cause claustrophobia (Chandler, 1999; Quelch et al., 1997).

## Other Medications

Medication selection takes into consideration the probable underlying mechanism(s) of breathlessness, associated symptoms that require control, and the benefits and burdens of drugs. Anxiolytics, corticosteroids, bronchodilators, and other novel medications have been used to treat dyspnea.

Evidence is conflicting regarding whether anxiolytics, particularly benzodiazepines and phenothiazines, are better than placebo to alleviate dyspnea, but these agents may add benefit for dyspnea accompanied by anxiety (Cowcher & Hanks, 1990; Davis, 1997; LeGrand & Walsh, 1999; Ripamonti, 1999). However, anxiolytics also may decrease respiratory center responses to hypoxia, which can lead to respiratory depression, and they may not be well tolerated when administered for long periods. Phenothiazines have anticholinergic properties and may dry respiratory secretions and add antiemetic benefit but also increase the risk of delirium.

Benzodiazepines are metabolized in the liver to long-acting metabolites, so drugs with the shortest half-life and duration of action should be used. Lorazepam (0.5–2.0 mg po sublingually/SQ/IV every 4–6 hours) is used more frequently than diazepam (2 mg po/SQ/IV every 12 hours) because of this. Midalozam (0.1–2.1 mg/hour IV/SQ) and chlorpromazine (25 mg PR/IV every 4–12 hours) often are used for their sedative effects in terminally ill patients with air hunger, but midalozam has a very short half-life and duration of action, whereas chlorpromazine will accumulate (Davis, 1997; Kuebler, 2002; Wickham, 1998).

No clinical trials have defined the role of corticosteroids, which may decrease inflammation and increase bronchodilation for dyspnea. Dexamethasone, prednisolone, and prednisone are used to alleviate dyspnea resulting from superior vena cava obstruction, stridor secondary to tracheal obstruction, lymphagitic carcinomatosis, and bronchospasm that has not responded to bronchodilators (Ahmedzai, 1997; Ripamonti, 1999). No standard doses of corticosteroids have been established to relieve breathlessness. Some practitioners start with higher doses to induce a strong anti-inflammatory response and decrease doses over several days to the lowest dose that still alleviates shortness of breath. Recommended doses of steroids vary widely; for example, prednisone doses range from 30–60 mg/day (po), prednisolone 48–128 mg/day (po/IV), and dexamethasone 4–8 mg two, three, or four times a day (po/IV) (Kuebler, 2002; LeGrand & Walsh, 1999).

Bronchodilators may stimulate respiratory muscles and diaphragmatic contractility and relax smooth muscles in the bronchioles to decrease the effort of breathing in patients who have air flow obstruction, such as those with COPD and some with lung cancer (Kuebler, 2002; LeGrand & Walsh, 1999; Ripamonti, 1999). Bronchodilators include inhaled or nebulized beta$_2$-adrenergic agonists (e.g., albuterol) and methylxanthine agents (e.g., aminophylline, theophylline), as well as caffeine. Patients receiving these drugs require ongoing and careful assessment because bronchodilators have a narrow therapeutic index. Because they can stimulate the heart and may cause tachycardia, palpitation, hypertension, and dysrythmias, bronchodilators should be used cautiously in elderly patients and those with cardiac disease (Sterling, 1995). Other adverse effects include tremor, headache, anorexia, and nausea.

Limited reports exist of other, more novel drug therapies for dyspnea, such as nebulized local anesthetics (Cowcher & Hanks, 1990). One recent article included case descriptions of patients with cancer who were treated effectively with nebulized furosemide (Lasix®, Aventis Pharmaceuticals, Bridgewater, NJ), 20 mg four times a day (Shimoyama & Shimoyama, 2002). Positive effects included decreased breathlessness, alleviation of tachypnea, and reduction of cough. Patients did not have any systemic effects of furosemide; that is, they did not have any increase in diuresis nor did they have adverse effects. Thus, nebulized furosemide may be worthy of further study. Other medications that decrease secretions may increase patient and family comfort when patients are dying. These include scopolamine 0.4–0.6 mg every 4–6 hours (SQ) or one or two transdermal patches (Transderm Scop®, Novartis Consumer Health, Inc., Summit, NJ) to the upper chest every 72 hours. Another agent that may be useful is hyoscyamine (Levsin®, Schwarz Pharma, Inc., Mequon, WI) 0.125 mg every four hours as needed (po/SQ).

## Supplemental Oxygen

The use of supplemental oxygen for cancer-related dyspnea is somewhat controversial. It is most appropriate for patients who are hypoxemic (oxygen saturation less than 90% by pulse oximetry) and may experience decreased dyspnea (i.e., intensity and effort) with supplemental oxygen (Bruera, de Stoutz, Velasco-Leiva, Schoeller, & Hanson, 1993; Cowcher & Hanks, 1990). However, some patients who are not hypoxemic also report relief of dyspnea with oxygen. This may be a placebo effect (Davis, 1997; Ripamonti, 1999). Other patients who are hypoxemic report similar degrees of relief after supplemental administration of either oxygen or air (Booth, Kelly, Cox, Adams, & Guz, 1996). When oxygen is used, it should be humidified to decrease mucosal drying and administered by nasal cannula whenever possible because face-mask administration increases discomfort and isolation by increasing the sense of claustrophobia and interfering with communication between patients and others.

## Complementary and Alternative Measures

Complementary and alternative measures may be useful to decrease the sense of dyspnea and enhance psychological well-being. Studies have found that acupuncture, acupressure, and behavioral therapies, such as progressive muscle relaxation, are

more effective than sham or placebo therapies to alleviate breathlessness in patients with COPD and lung cancer (Pan, Morrison, Ness, Fugh-Berman, & Leipzig, 2000). Likewise, Bredin et al. (1999) implemented a randomized study that compared a multipronged nursing intervention clinic to usual supportive care for patients with lung cancer. Patients who received the nursing interventions were no more active and did not live any longer than those in the control group but did experience significant improvements in breathlessness, performance status, and physical and emotional states. Bredin et al. theorized that positive effects might be related to teaching patients explicit coping strategies and providing psychological support.

When patients do not receive formal teaching, they must identify their own strategies to manage breathlessness (Brown et al., 1986; O'Driscoll et al., 1999; Roberts et al., 1993). Nondrug measures that patients have found helpful are positioning and posture, moving more slowly, planning activities in advance, modifying activities or decreasing the amount of time spent on them, pacing and resting, avoiding triggering activities, deep breathing, pursed lip breathing, inhaling steam, and moving fresh air across the face. Positioning and posture increase ventilatory capacity by improving accessory muscle function, and cool air directed across the cheek or cool compresses to the face may stimulate facial receptors to change breathing patterns and reduce the perception of breathlessness (Dudgeon & Rosenthal, 1996; LaDuke, 2001).

## Nursing Care Issues

Effective nursing care of patients with dyspnea includes thorough and ongoing assessment and documentation, as previously discussed. Nurses also must address their own concerns regarding medications for breathlessness. As the most consistent care providers, nurses are in an ideal position to explore self-care measures with patients, including medications and strategies other patients have found helpful, and provide consistent physical, psychosocial, and spiritual support to patients and family members when dyspnea is progressive and terminal.

Too many nurses and other healthcare professionals do not know enough about dyspnea and believe it is rare. Such care providers may deny that dyspnea is a clinically important problem and hold unfounded opinions about breathlessness. For instance, nurses might believe that dyspnea develops slowly and patients adapt to it, that patients who stay home must have only mild dyspnea or they would have to come to the hospital, or that patients who have pain and dyspnea will forget their breathlessness (Roberts et al., 1993). Nurses, physicians, and pharmacists may not know that morphine and other opioids are effective for treating dyspnea and may consider benzodiazepines "safer." Nurses who do not understand why opioids are ordered for patients who do not have pain may refuse to administer them. Similarly, giving drugs that could cause respiratory depression to patients who are ventilatory compromised may seem contradictory and unethical. Such concerns must be addressed.

Nurses can address their own fears of "overdosing" patients with opioids or anxiolytics and recognize their feelings of helplessness and loss when caring for dying patients who have air hunger. When patients decide against further aggressive medical treatments, nurses must be able to reframe what "doing everything" and "intensive caring" mean and allow pa-

tients to control the situation as much as possible (Tarzian, 2000). Nurses caring for such patients may need assistance to deal with ethical concerns about what they see as the fine line between comforting and killing.

A way to approach this is to remember that dying people usually gradually retain increased amounts of $CO_2$, which causes them to become sleepier and ultimately comatose (Cohen et al., 1991). Nurses should remember that their intent is to provide comfort to patients and that they cannot predict exactly when they will die. Furthermore, patients will die whether nurses provide comfort or not, and opioids may relieve exhaustion from the work of breathing to help patients live a little longer (Dudgeon & Rosenthal, 1996). Careful assessment and aggressive symptom management are critical during the dying process, and alleviating dyspnea does not become unethical or illegal when patients become unconscious (LaDuke, 2001). According to LaDuke, the key is in the answer to the question: Is this patient symptomatic?

Nurses are in the ideal role to teach breathless patients breathing techniques, either one-on-one or in groups. Patients may be motivated to learn if they know that such techniques may be physically and psychologically beneficial and add to their sense of control. Gallo-Silver and Pollack (2000) wrote an excellent article that reviews breathing techniques and provides detailed teaching information about them. They pointed out that many patients do not know where the diaphragm is or how to use it to breathe more effectively. Teaching diaphragmatic breathing to patients will help them assess their usual breathing habits, slow their respiratory rate, and increase tidal volume (Dudgeon & Rosenthal, 1996). Nurses can remind patients that rapid breathing does not decrease breathlessness and can make them feel more panicked or alarmed. Diaphragmatic breathing can be defined as fuller breathing and described as healthy, effective, or successful; it can help reduce stress and make patients feel relaxed. Pursed lip breathing is a simple measure that slows breathing, encourages full exhalation, and increases intra-airway pressures, which decreases small airway collapse (Dudgeon & Rosenthal; Gallo-Silver & Pollack). Nurses can explain pursed lip breathing by telling patients to form their lips as they do when they whistle, blow out birthday candles, or blow on hot liquid to cool it. Another way to explain the technique is to have patients put their bottom lips against their bottom teeth while allowing their top lips to jut out over their mouths so they can feel exhaled breath on their chins.

Nursing management can focus on psychosocial support and goal setting regarding breathing and other techniques (Bredin et al., 1999). Emphasize to patients and their family caregivers that other nondrug self-care measures may be helpful, such as using a table fan to direct airflow toward the cheek or across the face. Other beneficial measures include relaxation techniques, acupressure, prayer, meditation, and aromatherapy, although little information exists about their benefits (Filshie, Penn, Ashley, & Davis, 1996; Maa, Gauthier, & Turner, 1997; Pan et al., 2000).

Nurses must continuously fine tune the palliative care of patients with dyspnea, which encompasses concerns and teaching needs of patients and their loved ones (Tarzian, 2000). Family members sometimes want to "turn the morphine down," particularly when patients become somnolent or when the family members worry about "giving too much." Both patients and family members need reassurance that opioids for dyspnea will not change the underlying problem but

that they are not dangerous or addictive. Most importantly, opioids will decrease distressing sensations (e.g., air hunger, suffocation, drowning) and will help patients get needed rest and sleep (Wickham, 1998).

Family members also need a great deal of support and preparation for a potential crisis of rapidly escalating breathlessness, panic, and air hunger (LaDuke, 2001; Ripamonti, 1999; Tarzian, 2000). Nurses can be most helpful by acknowledging caregivers' fears and worries and giving them a list of signs (e.g., labored breathing, gasping, anxiety, restlessness, grimacing) that mean they should call for immediate help.

Remind family members to ask patients how they feel in terms of shortness of breath. They need to have access to the names and telephone numbers of their primary nurses and physicians and perhaps have symptomatic drugs (with directions for use) and oxygen at hand. All of these things are important in providing palliative care, which is the essence of oncology nursing.

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## Case Study 1

The healthcare team caring for B.H., who has metastatic breast and lung cancer, recommended changing her medication plan, keeping in mind the goals of decreasing her symptoms and enhancing her quality of life. The plan included increasing her opioid dose to account for her progressive breathlessness. Gabapentin (Neurontin®, Parke-Davis, Morris Plains, NJ) was added because of the burning pain in her axilla and epigastric area. The healthcare professionals continued to explore the meaning that her symptoms and illness had to her and tried to help her reframe her hopes and quell her fears. Despite being progressively short of breath, she could not give up hope that more chemotherapy was available to her.

## Case Study 2

R.A., who recently had been diagnosed with esophageal cancer, clearly had an acute problem. He underwent a diagnostic workup, which confirmed that he had a pulmonary embolus thought to be related to his cancer and perhaps exacerbated by dehydration from chemotherapy-induced nausea and vomiting. His immediate treatment focused on anticoagulation with heparin followed by low molecular weight heparin, $O_2$ by nasal cannula to correct his hypoxia and sense of breathlessness, and lorazepam to increase his comfort and decrease his anxiety. He subsequently had a Greenfield filter surgically placed in his inferior vena cava to reduce the risk of further emboli. In addition, his new postchemotherapy care plan was more aggressive in managing nausea and vomiting and preventing fluid volume deficit. He completed radiation therapy and continued chemotherapy.

## Case Study 3

A.T.'s wife and children surrounded him. When he was well, he had discussed his wishes regarding end-of-life care if his condition became irreversible. He had a living will and had designated his wife as his proxy. Family members and the nurses caring for him struggled with stopping nutrition and fluids, but they were only increasing his pulmonary congestion. Not only did fluids add to his discomfort, but they also led his nurses to repeatedly suction him because of the audible retained secretions. His family wanted to respect A.T.'s wishes and make him as comfortable as possible. Aggressive comfort measures included discontinuing IV fluids and enteral feedings, stopping suctioning, and explaining to the family and nurses that although the sound he made while breathing was distressing to the family, it was not adding to A.T.'s discomfort. The healthcare professionals added transdermal scopolamine, two patches to his upper chest, to dry retained secretions. The $O_2$ was increased, along with the continuous morphine infusion, to A.T.'s apparent comfort. These interventions were appropriate in light of his advance directive and dire prognosis. A.T. died two days later.

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