ARTICLES

Management of Dyspnea Guidelines for Practice for Adults with Chronic Obstructive Pulmonary Disease

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ABSTRACT. Dyspnea is an important symptom to address in occupational therapy since it significantly contributes to decreased functional status and health-related quality of life in adults with chronic obstructive pulmonary disease (COPD). This article presents the Management of Dyspnea Guidelines for Practice. The guidelines direct the clinician to help adult patients with COPD overcome the disabling effects of dyspnea by helping patients to master combining controlled breathing with activity exertion and by desensitizing them to dyspnea. An example of an occupational therapy treatment program based on the practice guidelines is

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described. A case study example is also provided to illustrate how the guidelines can be applied to occupational therapy practice.

KEYWORDS. Pulmonary rehabilitation, dyspnea, dyspnea-related anxiety, functional status, desensitization, occupational therapy

INTRODUCTION

Dyspnea is the subjective perception and experience of difficult, labored, and uncomfortable breathing (American Thoracic Society [ATS], 1999a). It is a common sequela of Chronic Obstructive Pulmonary Disease (COPD), a grouped diagnosis that includes emphysema, peripheral airways disease, and/or chronic bronchitis (ATS, 1986). Increased dyspnea is the main factor that contributes to decreased functional status and health-related quality of life in adults with COPD (ATS, 1999a; Fishman, 1994; Moody, McCormick, & Williams, 1990; Weaver, Richmond, & Narsavage, 1997).

Occupational therapists bring expertise to pulmonary rehabilitation in using appropriately challenging, purposeful activity to maximize patients' activity tolerance, functional capabilities, and perceived control over their disease (Pierce, 2001; Wilcock, 1999). The use of purposeful, meaningful therapeutic activities in occupational therapy can serve to enhance patients' transfer of learning of dyspnea management strategies to everyday physical activity performance (Gray, 1998). While occupational therapists are currently involved in evaluating and treating functional symptoms of COPD, including dyspnea (Matthews, 2001), their role has not been fully developed, especially in multidisciplinary outpatient pulmonary rehabilitation programs and is not adequately described in the literature (Daus, 1998).

There has also been relatively little attention given to the application and specific contributions of monitored activity training in dyspnea management in the pulmonary rehabilitation literature. In contrast, clinical guidelines and benefits of monitored exercise training in pulmonary rehabilitation are documented extensively in the literature and supported by outcome research.

This author recently developed the Management of Dyspnea practice guidelines using a method of applied scientific inquiry outlined by Mosey (1996). The developed guidelines address both the need to expand occupational therapy practice guidelines in pulmonary rehabilitation and to standardize controlled breathing training (Cahalin, Braga, Matsuo, & Hernandez, 2002). Many variations and inconsistencies in the teaching and performance of controlled breathing techniques for patients with COPD have limited the study and understanding of the effectiveness of controlled breathing training in pulmonary rehabilitation. The Management of Dyspnea practice guidelines were also developed to structure future occupational therapy outcome research. The guidelines employ a remediation approach with behavioral techniques for dyspnea management as supported by pulmonary rehabilitation literature (ATS, 1999a; Eakin, Kaplan, Ries, & Sassi-Dambron, 1996).

The guidelines apply to occupational therapy intervention for adults with chronic obstructive pulmonary disease (COPD) experiencing chronic dyspnea on exertion. They do not specifically apply to the management of dyspnea at rest, a symptom occurring later in the progression of COPD. Also, individuals with acute dyspnea, neurological disorders, and paralysis of their respiratory muscles, and those dependent on a mechanical ventilator for respiration are not candidates for this intervention. Prerequisite skills required by patients to participate in the intervention process include the ability to comprehend, recall, and learn new information and behaviors. There are no known contraindications, however, patients should be prompted to stop activity exertion when arterial oxygen saturation falls below 90 percent.

THEORETICAL BASE

Behaviors and Signs Associated with Dyspnea

Individuals with COPD typically demonstrate an uncoordinated, inefficient breathing pattern, which contributes to dyspnea (Breslin, 1995; Collins, Langbein, Fehr, & Maloney, 2001). On exertion, the breathing pattern of adults with COPD tends to be rapid and shallow with their diaphragms typically flat and abnormally low throughout a breath cycle (Neumann, 2002). During inspiration, they tend to gulp for air (ATS, 1999a). Individuals may demonstrate a paradoxical breathing pattern or breathing dyssynchrony, in which the abdomen displaces inward with inspiration, especially in upright standing and sitting, associated with

dyspnea (Breslin, Garoutte, Kohlman-Carrieri, & Celli, 1990; Sharp, Drutz, Moisan, Foster, & Machnach, 1980). They also experience airway resistance and obstruction with expiration, reducing expiratory air flow (Breslin, 1995).

Adults with COPD frequently experience dyspnea-related anxiety. Dyspnea-related anxiety is fear associated with dyspnea and impaired confidence regarding the management of dyspnea resulting in the avoidance of realistic physical activity exertion (Carrieri-Kohlman, Douglas, Gormley, & Stulbarg, 2000; Smoller, Pollack, Otto, Rosenbaum, & Kradin, 1996; Tiep, 1991). The progressive deconditioning associated with inactivity causes a vicious circle in which increasing dyspnea and dyspnea-related anxiety occur with decreasing levels of physical demands (Celli, 1995; Dekhuijzen, Beek, Folgering, & van Herwaarden, 1990; Sassi-Dambron, Eakin, Ries, & Kaplan, 1995; Tiep, 1991).

Disproportionately increased ventilation with light activity exertion in addition to the unpleasantness of obstructed breathing commonly trouble these individuals. Individuals may incorrectly interpret the significance of their dyspnea. Their anxiety can intensify the dyspnea (Smoller et al., 1996). With increased duration and severity of dyspnea, dyspnea-related anxiety is intensified, which can in some cases lead to a panic attack (Smoller et al., 1996).

Behaviors Related to Dyspnea Relief

Dyspnea can be relieved by assuming various positions, such as leaning forward in sitting and standing with arms supported and fixed in shoulder internal rotation and adduction, supine lying, and the head down (Trendelenburg) position of 10 to 20 degrees (ATS, 1999a; Carrieri & Janson-Bjerklie, 1986; Celli, 1998; Faling, 1993; Gosselink & Wagenaar, 1993; Sharp et al., 1980). These body positions are believed to enhance cephalad positioning of the diaphragm in the chest before contraction (Breslin, 1995). They also promote coordinated, more spontaneous (and less effortful) excursion of the diaphragm and abdominal muscle contractions and inhibit contractions of the scalenes and accessory muscles of breathing (such as sternocleidomastoid, serratus posterior superior, pectoralis minor, and erector spinae) (Gosselink & Wagenaar, 1993). A reduction in dyspnea is associated with an increase in the recruitment of the diaphragm and a decrease in upper rib cage movements and the work of accessory muscles of breathing (Breslin et al., 1990). Keeping still, moving slowly, and performing activities at a

slower pace can also relieve dyspnea (Carrieri & Janson-Bjerklie, 1986; Gift, 1993).

Breathing with pursed lips is aimed at decreasing dyspnea and respiratory rate (ATS, 1999b; Roa, Epstein, Breslin, Shannon, & Celli, 1991). Pursed-lips breathing is a breathing pattern of slowly exhaling through the center of loose and gently approximated lips (that are almost closed) and inhaling through the nose (ATS, 1999b). Combining coordinated, spontaneous diaphragmatic and abdominal movements with pursed lips breathing can further enhance dyspnea relief (Breslin et al., 1990).

A controlled breathing pattern consists of slow, fluid breathing with little rising of the upper chest and a respiratory cycle that begins with active expiration (Gosselink & Wagenaar, 1993; Hahn, 1987). The active expiratory phase is lengthened to two or three times that of inspiration (Celli, 1998). Forceful expiration is avoided (ATS, 1999b; Miller, 2000). Controlled breathing can relieve dyspnea-related anxiety (Breslin, 1995).

Controlled breathing further consists of coordinating breathing cycles of inspiration and expiration during particular parts of activities of daily living (Rashbaum & Whyte, 1996). Coordinating breath cycles and pacing breathing with activity exertion reduces dyspnea by helping to avoid breath holding and facilitating efficient energy expenditure and increased activity tolerance (ATS, 1999b). Inspiration is coordinated with body movements against gravity, with pulling movements of the arms, and with elevating the arms. Expiration is performed with the more strenuous parts of an activity, with body movements toward gravity, with pushing movements of the arms, and with lowering the arms. Dyspnea can also be limited by the reduction of moderate to maximum forward bending of the torso while performing activities of daily living (Janson-Bjerklie, Carrieri, & Hudes, 1986).

Methods that Promote the Learning of Dyspnea Management Strategies

The ability to manage dyspnea can be acquired through a process of learning. It has long been known that learning is facilitated by modeling, instruction, and positive reinforcement. It has also long been established that individuals are more likely to learn behaviors that are positively reinforced by several people (Bandura, 1977).

While breathing is an automatic, unconscious physiological act, it can also be controlled voluntarily allowing the motor patterns of conscious, efficient breathing to be learned (Esteve, Blanc-Gras, Gallego, & Benchetrit, 1996; Gallego & Perruchet, 1991). Biofeedback facilitates

the learning of controlled breathing (Collins et al., 2001; Lacroix, 1986). Biofeedback is a process in which an individual can readily observe autonomic physiological processes of the body in order to control these biological functions.

Visual biofeedback is provided by an oximeter, an instrument that measures the arterial oxygen saturation of an individual (Tiep, Burns, Kao, Madison, & Herrera, 1986). Changes in the display of the oximeter showing a higher percentage of arterial oxygen saturation (above 90%) positively reinforce the use of controlled breathing.

Auditory biofeedback from recorded human breath sounds or periodic acoustic signals can also be used to promote the efficient learning of controlled breathing (Esteve et al., 1996; Gallego & Perruchet, 1991; Miller, 2000). Individuals can be instructed to breathe according to the sequence and speed of paced sounds to learn to lengthen expiration and breathe more deeply. Biofeedback is used during activity exertion to facilitate the transfer of learning of controlled breathing to physical activity performance (Collins et al., 2001; Esteve et al., 1996). The alternating of biofeedback with no biofeedback improves the learning of the new breathing pattern of controlled breathing (Gallego & Perruchet, 1991). Also, attention to individualizing each person's controlled breathing pattern can facilitate the learning of controlled breathing (Esteve et al., 1996).

Reassurance and information that dispels misconceptions of the significance of dyspnea can help to reduce dyspnea-related anxiety (ATS, 1999a; Lareau & Insel, 2000; Smoller et al., 1996; Sweer & Zwillich, 1990; Tiep, 1991). Dyspnea-related anxiety and the resultant avoidance of activity exertion can also be reduced by desensitization (Carrieri-Kohlman et al., 1993; Haas, Salazar-Schicchi, & Axen, 1993).

Desensitization is a process of reducing anxiety by repeatedly exposing an individual to dyspnea during activity exertion without the occurrence of any feared detrimental consequences such as suffocation or death (Gift, 1993; Smoller et al., 1996). Controlled breathing is practiced during exposure to exertional dyspnea within a safe, non-threatening environment (ATS, 1999a; Haas et al., 1993). A safe, non-threatening environment is one in which the well being of an individual is regularly monitored with frequent assessment of vital signs and the provision of instruction and positive reinforcement (ATS, 1999a; Carrieri-Kohlman et al., 1993).

The avoidance behavior of dyspnea-related anxiety can further be reduced with the use of vicarious experiences. Through vicarious experiences, an individual is exposed to observations of another person with COPD engaging fearlessly in activity exertion without experiencing negative consequences (Carrieri-Kohlman et al., 1993).

CLINICAL IMPLICATIONS FOR OCCUPATIONAL THERAPY PRACTICE: INDICATORS OF FUNCTION

Based on the above theoretical principles, occupational therapy interventions can be divided into three major areas to promote dyspnea management: controlled breathing at rest, controlled breathing with activity exertion, and dyspnea-related anxiety management. Occupational therapy interventions aim to facilitate the following optimal behaviors as described and supported by the theoretical base.

Controlled Breathing at Rest

- Individual uses a pursed-lips breathing pattern combined with prominent, spontaneous abdominal muscle movements
- Individual demonstrates inward displacement of the abdomen with expiration and outward displacement of the abdomen with inspiration through the use of body positions that include leaning forward in sitting and standing and supine lying
- Individual demonstrates a slow, deep, fluid breathing pattern
- Individual demonstrates little movement of the shoulder girdle, upper rib cage (level of second rib), and head with breathing
- Individual expires for two or three times the length of inspiration
- Individual demonstrates a ventilatory cycle that begins with expiration

Controlled Breathing with Activity Exertion

Controlled breathing with activity exertion is an individual's ability to use controlled breathing during the performance of and recovery from daily physical activities requiring between light and heavy physical energy expenditure, that is, between two and five metabolic equivalent levels (METs).

- Individual demonstrates controlled breathing combined with activities of daily living of between light and heavy physical exertion
- Individual reports decreased dyspnea with activity exertion
- Individual inhales during body movements against gravity, with pulling movements of the arms, and with arm elevation
- Individual exhales during the more strenuous part of an activity, during body movements toward gravity, with pushing movements, and with lowering the arms

- Individual relieves dyspnea by moving slowly or stopping to rest
- Individual assumes leaning forward positions following activity exertion to relieve dyspnea
- Individual avoids moderate to maximum forward bending of the torso

Dyspnea-Related Anxiety Management

- Individual reports confidence with managing his or her dyspnea
- Individual reports tolerance and less fear of dyspnea
- Individual demonstrates or reports less anxiety with participation in physical and social activities associated with dyspnea
- Individual reports increased participation in physical and or social activities that he or she previously avoided
- Individual reports that rest consistently resolves dyspnea

OCCUPATIONAL THERAPY TREATMENT TECHNIQUES

Controlled Breathing at Rest

Controlled breathing at rest is facilitated by the occupational therapist providing an individual with instructions in controlled breathing, including opportunities to observe controlled breathing patterns. It is helpful for patients to first practice controlled breathing at rest (in supine and leaning forward positions) before practicing controlled breathing with activity exertion. Opportunities to practice controlled breathing in supine lying and leaning forward in sitting and standing with arms supported are provided by the occupational therapist. The occupational therapist also facilitates the learning of controlled breathing with biofeedback, for example, with the use of a pulse oximeter or an electromyogram (EMG). As an alternative form of biofeedback, the therapist can use paced breath sounds on audiotape, either recorded breath sounds of the therapist or the longest, deepest recorded breath sounds from a patient's own repertoire.

Controlled Breathing with Activity Exertion

Controlled breathing with activity exertion is facilitated by the occupational therapist providing a patient with opportunities to observe and practice controlled breathing combined with activities of daily living, requiring between light and heavy physical exertion. To promote effi-

cient dyspnea relief and recovery, the occupational therapist promotes the use of controlled breathing both during activity exertion and immediately following activity exertion. The therapist provides the patient with individualized feedback during the performance of purposeful activity. The occupational therapist, other patients, and family members all positively reinforce the use of controlled breathing with activity exertion. Instruction and modeling of how to reduce moderate to maximum forward bending of the torso during the performance of daily activities is also given by the occupational therapist.

Dyspnea-Related Anxiety Management

The occupational therapist discusses with the patient misconceptions about the significance of dyspnea and the importance of controlled breathing. For example, information that dyspnea is associated with an ineffective breathing pattern and that it is not a danger signal or an indication of hypoxemia is provided.

The occupational therapist promotes desensitization of dyspnea through activity exertion, of between light and heavy physical exertion, in a safe environment, which includes regular monitoring of patients' vital signs and close supervision. Patients are also given opportunities by the occupational therapist to observe other adults with COPD who respond fearlessly and appropriately to increased levels of activity exertion and dyspnea (for example, with the use of videotapes and group treatments).

AN EXAMPLE OF AN OCCUPATIONAL THERAPY PROGRAM

Based on the Management of Dyspnea Guidelines for Practice, this author developed and implemented an occupational therapy program consisting of six occupational therapy sessions at a large, teaching hospital in New York City for the purpose of conducting a randomized clinical trial (Migliore, 2003). The treatment sessions took place in a fully equipped, furnished apartment housed within the rehabilitation hospital. An adjacent outdoor garden and greenhouse could be accessed from the rear door of the apartment. The occupational therapy treatment sessions were entitled as follows: (1) Controlled Breathing, (2) Learning to Pace Your Breathing with Activity Exertion, (3) The Influence of Breath Monitoring and Body Position on Activity Exertion, (4) Coordinating the Mechanics of Breathing during Movement and Activity Exertion, (5) Breaking the Cycle of Shortness of Breath: Promotion of

Realistic Activity Exertion, and (6) Confidence and Mastery of Controlled Breathing with Activity Exertion (see Table 1 for session objectives and Table 2 for the form used to document patient progress).

Doing and practice were emphasized over didactic instruction. As much as possible, sessions were limited to two patients in order to afford patients individualized feedback and practice opportunities and to maintain a 1:2 ratio respectively between therapist and patients. The occupational therapy program consisted of one weekly session, each approximately one hour in length, for six weeks. Specific activities identified by patients as causing them to experience dyspnea were used to practice controlled breathing.

The occupational therapy sessions were well received by patients. A total of fourteen outpatients participated in the occupational therapy treatment over a fourteen-month period (three patients participated in the program after they completed the outcome study). The average attendance rate was 94 percent. All patients participated in a maximum of six occupational therapy treatment sessions in order to comply with the protocol of the clinical trial (Migliore, 2003). For most patients, six sessions appeared adequate to meet patients' occupational therapy goals. However, two patients specifically requested more than six occupational therapy training sessions for further guidance and monitored practice opportunities.

CASE STUDY: WENDY

Occupational Therapy Evaluation

Wendy is a 68-year-old Caucasian female who was diagnosed with emphysema one year ago. Wendy had smoked for 15 years, up to one pack of cigarettes per day, quitting 12 years ago. She uses 1L/minute supplemental oxygen at night and occasionally during the day. She has had no previous involvement in a pulmonary rehabilitation program or instruction in controlled breathing. Wendy's arterial oxygen levels tend to de-saturate with exertion. She has mild symptoms of depression as measured by the Center for Epidemiologic Depression Scale (Radloff, 1977). The author implemented all occupational therapy interventions.

Controlled Breathing at Rest. Wendy demonstrates an inefficient breathing pattern as evidenced by her excessive scapula elevation and upper chest motion, rapid respiratory rate, and overly forceful oral ex-

TABLE 1. An Example of an Occupational Therapy Program Based on the Management of Dyspnea Guidelines for Practice

	Session Titles	**Description of OT Treatment Session Objectives**
1	Controlled Breathing	Patients will: • Identify the components of controlled breathing; • Differentiate controlled breathing from poor breathing patterns; • Understand the mechanics of breathing and the rationale of controlled breathing; • Identify various sources of their dyspnea; • Acknowledge misconceptions and fears associated with their dyspnea; • Practice and correctly demonstrate gentle expiration in sitting; and • Practice controlled breathing in supine.
2	Learning to Pace Your Breathing with Activity Exertion	Patients will: • Understand the rationale for paced breathing and active expiration; • Practice pacing and controlling breathing with the aid of auditory biofeedback in forward leaning positions (and in supine if needed); and • Practice controlled, paced breathing combined with a purposeful physical activity and auditory biofeedback.
3	The Influence of Breath Monitoring and Body Position on Activity Exertion	Patients will: • Practice controlled breathing leaning forward in sitting (and compare to upright sitting) with visual biofeedback at rest; • Understand the rationale for avoiding severe forward bending of the torso during activity exertion; • Practice alternate postures to severe forward trunk flexion with performing physical activities at low heights; and • Practice controlled breathing combined with activity exertion, using visual biofeedback during rest breaks and following activity exertion.
4	Coordinating the Mechanics of Breathing during Movement and Activity Exertion	Patients will: • Understand the rationale for coordinating breath cycles with activity exertion for individuals with COPD; • Practice coordinating their breath cycles with activity exertion; and • Practice using controlled breathing to recover from activity exertion leaning forward position in sitting and standing.
5	Breaking the Cycle of Shortness of Breath: Promotion of Realistic Activity Exertion	Patients will: • Understand the vicious cycle of shortness of breath (Sassi-Dambron et al., 1995); • Identify activities that they tend to avoid due to dyspnea and dyspnea-related anxiety; • Practice using controlled breathing with different activities that cause them to experience dyspnea (that they tend to avoid) with the use of visual and auditory biofeedback; and • Observe each other responding appropriately to dyspnea on exertion.
6	Confidence and Mastery of Controlled Breathing with Activity Exertion	Patients will: • Improve their technique of controlled breathing with activity exertion based on individualized feedback from the therapist; • Practice using controlled breathing with physical activities not previously practiced in OT treatment sessions (or activities requiring further practice as identified by the patient and therapist); and • Gain confidence and mastery in combining controlled breathing with activity exertion.

Note. COPD = Chronic Obstructive Pulmonary Disease; OT = Occupational Therapy

TABLE 2. Progress Note for Occupational Therapy Sessions Based on the Management of Dyspnea Guidelines for Practice

Date: _____
Patient Name: _____
Activity Training Session Number: _____
Group Session: Yes/No Comments: _____
Supplemental O_2 Used: Yes/No Comments: _____

Activity 1: _____ MET Level: _____

Before Activity Exertion:	During Activity Exertion:	After Activity Exertion
BP: _____	BP: _____	BP: _____
HR: _____	HR: _____	HR: _____
SaO_2 (%): _____	SaO_2 (%): _____	SaO_2 (%): _____
RR: _____	RR: _____	RR: _____
PD: _____	LPE: _____	MPE: _____
	PD: _____	MPD: _____

Activity Duration: _____

Activity 2: _____ MET Level: _____

Before Activity Exertion:	During Activity Exertion:	After Activity Exertion
BP: _____	BP: _____	BP: _____
HR: _____	HR: _____	HR: _____
SaO_2 (%): _____	SaO_2 (%): _____	SaO_2 (%): _____
RR: _____	RR: _____	RR: _____
PD: _____	LPE: _____	MPE: _____
	PD: _____	MPD: _____

Activity Duration: _____

Progress/Comments (e.g., controlled breathing technique, cueing, anxiety, home program):

Therapist Signature: _____

Note. BP: Blood Pressure; HR: Heart Rate; LPE: Level of Perceived Exertion; MET: Metabolic Equivalent level; MLPE: Maximum Level of Perceived Exertion; MPD: Maximum Perceived Dyspnea; PD: Perceived Dyspnea; RR: Respiratory Rate; SaO_2 %: Percentage of Arterial Oxygen Saturation

halations. At baseline, Wendy's respiratory rate at rest was measured to be 24 breaths per minute. She is observed to incorrectly compress her cheeks and tightly purse her lips with expiration.

Controlled Breathing with Activity Exertion. At baseline, Wendy experiences moderate dyspnea with carrying heavier groceries, hurrying, playing with her grandchildren, cleaning involving bending, and walking uphill in her neighborhood as measured by the Chronic Respiratory Disease Questionnaire (CRQ). The CRQ is a health-related quality of life measure, which consists of four subscales and 20 interview questions

that incorporate patients' treatment goals (Guyatt, Berman, Townsend, Pugsley, & Chambers, 1987). The CRQ uses a seven-point Likert-scale, which ranges from one (for example, "extremely short of breath") and seven (for example, "not at all short of breath"). The CRQ has evidence of good reliability and validity (Guyatt, King, Feeny, Stubbing, & Goldstein, 1999; Wijkstra et al., 1994).

Dyspnea-Related Anxiety Management. Wendy expresses apprehension and distress about her disproportionate dyspnea with exertion. She expresses being "not very confident" (a score of two) with managing or avoiding dyspnea when lifting heavy objects and when feeling depressed and afraid as measured by the COPD Self-Efficacy Scale (CSES) (Wigal, Creer, & Kotses, 1991). Wendy expresses feeling "somewhat confident" (a rating of three) with dyspnea management during physical exertion.

The CSES is a 34-item self-administered questionnaire, which uses a five-point Likert scale (ranging from a score of one, "not at all confident," to a score of five, "very confident"). The CSES has evidence of adequate internal consistency and test-retest reliability and some evidence of concurrent validity (Scherer & Schmieder, 1997; Wigal et al., 1991).

Occupational Therapy Treatment (an Adjunct to Standard Exercise Training)

Wendy attended six occupational therapy treatment sessions, implemented by the author. She was treated individually for two sessions and paired with one other patient for four sessions. Wendy breathed room air for all breathing retraining in occupational therapy.

In addition to occupational therapy, Wendy participated in a physical therapy exercise program. Wendy's physical therapy program consisted of 15, one-hour sessions of monitored exercise on exercise equipment, predominately the treadmill, with minimal instruction in controlled breathing.

Controlled Breathing at Rest. The occupational therapist instructed Wendy in controlled breathing, including breathing patterns to avoid, through the use of demonstrations, educational videos (Milner-Fenwick, n.d.a; Milner-Fenwick, n.d.b), and handouts. To facilitate coordinated chest wall motions, Wendy first practiced controlled breathing in supine. After instruction in supine, the occupational therapist instructed Wendy to practice controlled breathing in leaning forward positions with arms supported to inhibit movements of her shoulders and upper

chest wall. The occupational therapist positively reinforced a slow breathing rate with visual biofeedback using a pulse oximeter.

Auditory biofeedback was also used in occupational therapy to reinforce paced breathing in the form of a portable tape player with headphones and a tape of paced breath sounds. The occupational therapist recorded her breath sounds with the aid of a computer. The breath sounds reinforced a breathing pattern of four seconds for expiration and two seconds for inspiration respectively. The therapist emphasized the importance of the expiratory phase by making the expiratory breath sounds louder. To demonstrate why Wendy's obstructed airways need more time to exhale and release trapped air, the occupational therapist partly inflated a balloon and then pinched its neck while deflating the balloon (Hahn, 1987). Wendy was encouraged by the occupational therapist to practice controlled breathing at rest at home, at least once a day for a minimum of 10 minutes in both supine and leaning forward positions with the aid of the auditory biofeedback. At the beginning of each session, Wendy's progress with her home program of controlled breathing practice was positively reinforced.

The occupational therapist also instructed Wendy how to avoid forceful breathing with demonstrations and practice. Wendy practiced gently exhaling into a tissue held at arm's length from her mouth, one corner in each hand, allowing the tissue to ripple without flapping (Hahn, 1987). The occupational therapist instructed Wendy to keep her lips loose and floppy, while she gently and slowly expired through the center of slightly parted lips; avoiding compressing her cheeks and limiting tension of her facial muscles.

The rationale for beginning controlled breathing with expiration was reinforced by the occupational therapist. That is, the occupational therapist explained to Wendy the importance of an active expiratory phase in expelling the trapped air characteristic of emphysema and increasing the recruitment of the diaphragm, in order to improve the efficiency of breathing and decrease dyspnea.

Controlled Breathing with Activity Exertion. The occupational therapist then combined individualized instruction in controlled breathing with activity exertion. Wendy practiced controlled breathing with physical activities, with and without auditory biofeedback. The physical activities selected and used by the occupational therapist had previously been identified by Wendy as causing her dyspnea, including carrying groceries, playing a ball game (to simulate active play with her grand-

children), watering an outdoor garden, and stair climbing. These activity challenges were monitored through the use of the Perceived Exertion Scale and the Perceived Dyspnea Scale (Scanlan, Kishbaugh, & Horne, 1993). After the first two treatment sessions, Wendy's occupational therapy home program was upgraded to include the practice of controlled breathing during activity exertion with auditory biofeedback.

The occupational therapist also afforded Wendy with practice opportunities to coordinate her breath cycles with activities of daily living (ADL) including: picking up items off the livingroom floor, lifting and carrying a lightly loaded laundry basket, reaching overhead for items on high shelves, rising from a chair, and pushing and pulling furniture such as loaded chairs and a cart. The occupational therapist discouraged Wendy from hurrying during activity performance. The occupational therapist encouraged the use of forward leaning in sitting to recover from activity exertion combined with visual biofeedback. As measured by the Perceived Exertion Scale, Wendy's level of perceived exertion during physical activities ranged between three (moderate effort) and five (strong effort).

Other individuals with COPD positively reinforced the benefit and value of controlled breathing with activity exertion, facilitated by the occupational therapist's use of group treatment sessions and patient educational videotapes. The occupational therapist also emphasized to Wendy the importance of an active lifestyle to prevent a vicious cycle of inactivity and increased dyspnea.

Dyspnea-Related Anxiety Management. The occupational therapist shared information with Wendy about misconceptions of dyspnea. Wendy was reassured by the occupational therapist that dyspnea is not in itself a danger sign and that it is not life threatening.

The occupational therapist provided Wendy with a safe environment in which to practice dyspnea management strategies with activity exertion. This safe environment was created by the occupational therapist's regular, frequent monitoring of Wendy's blood pressure, heart rate, and arterial oxygen saturation, close supervision, individualized feedback, and positive reinforcement. With the aid of a videotape (Milner-Fenwick, n.d.a) and group treatment sessions, dyspnea-related anxiety management was further promoted in occupational therapy by having Wendy observe other individuals with COPD engaging confidently and fearlessly in activity exertion while using controlled breathing.

Patient Response

Wendy experiences decreased dyspnea with activity exertion, from 4.4 (moderate dyspnea) to 5.6 (a little dyspnea) and increased total health-related quality of life (from 20.8 to 22) as measured by the CRQ. Her decrease in dyspnea was maintained over a six-month period.

Wendy had difficulty learning to divide her attention between ADL performance and controlled breathing practice. She was very motivated to learn controlled breathing techniques, as evidenced by her practicing controlled breathing at home in supine, three to four times daily. After the first OT session, she reported soreness of her abdominal muscles, indicating increased use of these muscles. She reports incorporating controlled breathing practice with auditory biofeedback at home while performing daily activities, including talking on the telephone. She also reports that the tapes of paced sounds help her to learn how to reduce her respiratory rate.

At discharge, Wendy is able to control and better pace her breathing with activity exertion with minimal cueing from the occupational therapist and continued, intermittent aide of auditory biofeedback. She is able to synchronize her breathing rate to the 4:2 paced sounds at rest, reducing her respiratory rate to ten breaths per minute. Wendy reports feeling better when she practices controlled breathing and states, "It helps a lot." As measured by the CSES, her confidence in her ability to manage dyspnea increased to "pretty confident" (a rating of 4) when physically exerting herself, lifting heavy objects, and feeling afraid or depressed.

CONCLUSIONS

The uniqueness of these guidelines lies in the comprehensive and expanded application of pulmonary rehabilitation principles to occupational therapy practice. The guidelines for practice clearly direct the occupational therapist in providing a structured pulmonary rehabilitation program that aims to assist patients with COPD to better understand dyspnea, to help to limit and relieve dyspnea and dyspnea-related anxiety, and to increase their tolerance to dyspnea and physical activity exertion. The practice guidelines describe in detail dyspnea management strategies specific to adults with COPD. More involvement of family members in occupational therapy, than is described in the case study, is recommended by the author to promote the learning and retention of

dyspnea management strategies by adults with COPD. An occupational therapy program based on these practice guidelines, when included as part of an interdisciplinary pulmonary rehabilitation program, can serve to enhance pulmonary rehabilitation outcomes. Research on the effectiveness of these guidelines for practice is needed.

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