

GUEST EDITORIAL

Pulmonary rehabilitation: The critical outcomes

Chronic obstructive pulmonary disease (COPD), the only major chronic disease with increasing mortality [1], poses significant health care burden and resource use [2]. Pulmonary rehabilitation—a multidisciplinary, 6 to 8 week outpatient intervention that combines exercise with educational, behavioral, and psychosocial support—has emerged over the past decade as the gold standard for COPD care. National and international guidelines for COPD recommend pulmonary rehabilitation for its proven efficacy. The purpose of this *Journal of Rehabilitation Research and Development* special edition is to highlight three critical outcomes of a comprehensive pulmonary rehabilitation program: smoking cessation, symptom relief, and improved functional performance.

Smoking cessation is the only intervention to slow COPD long-term decline in lung function. Sherman, Lanto, Nield, and Yano, in “Smoking cessation care received by veterans with chronic obstructive pulmonary disease,” compared tobacco cessation outcomes between smokers with and without COPD in 18 VA primary care clinics. They found that even though smokers with COPD reported receiving more smoking cessation services than smokers without COPD, the smoking quit rate was the same. Smokers who reported they were not even interested in quitting had actually received the most cessation services, which suggests the need for more creative approaches to motivate these smokers not interested in quitting.

Dyspnea (shortness of breath) and fatigue are closely related symptoms in chronic lung disease that are consistently encountered in the clinical arena. Their presence negatively impacts health-related quality of life. Meek and Lareau describe methods for their assessment and outcome evaluation in “Assessment and evaluation of dyspnea and fatigue.” Chronic dyspnea may be relieved by both pharmacologic and nonpharmacologic methods. The focus of “Controlled breathing and dyspnea in patients with chronic obstructive pulmonary disease (COPD),” by Goselink, is breathing techniques traditionally used in pulmonary rehabilitation. Recommendations for practice, based on a critical review of the literature, are



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pursed-lips breathing, forward leaning position, and inspiratory muscle training. An innovative approach for examining dyspnea relief strategies is presented by Collins and colleagues in “Effect of ventilation-feedback training on endurance and perceived breathlessness during constant work-rate leg cycle exercise in patients with COPD.” The findings of decreased breathing frequency and prolonged expiratory time suggest that dynamic hyperinflation, one reason for dyspnea during exercise for COPD patients, may be reduced when ventilation feedback with exercise is used during pulmonary rehabilitation.

Improved functional performance, the actual execution of an activity, is a highly valued outcome that contributes to improved health-related quality of life. Since it is easy to overestimate the amount of activity in which a patient actually engages, an accurate measure of activity would provide an objective measure for program evaluation and patient feedback on performance improvement. Steele and colleagues, in "Bodies in motion: monitoring daily activity and exercise with motion sensors in people with chronic pulmonary disease," describe the potential utility of a computerized accelerometer for activity monitoring.

Improvement in functional performance is gained through structured exercise. Rochester, in "Exercise training in chronic obstructive pulmonary disease," offers a detailed, comprehensive review of exercise for ambulatory chronic lung disease patients. She describes the multifactorial basis of exercise limitation, patient candidacy for exercise training, and the different types and intensity of training. Nonpharmacologic approaches that might increase exercise capacity or endurance are oxygen and noninvasive ventilation. These interventions are reviewed by Soo Hoo in "Nonpharmacologic adjuncts to training during pulmonary rehabilitation." While the author concludes that insufficient evidence exists for an across-the-board recommendation for oxygen supplementation during exercise, there is justification for oxygen supplementation to prevent oxygen desaturation during exercise, especially for those with severe COPD. Nocturnal noninvasive ventilation during pulmonary rehabilitation shows a similar pattern. Both adjuncts require prospective, randomized trials to determine their merit for pulmonary rehabilitation.

Exercise is also important for spinal cord injuries. Specifically, exercise has the potential to promote rehabilitation through resistive and endurance training of respiratory muscles. Gutierrez and colleagues describe a pilot project for those with cervical spinal cord injury levels ranging from C2 to C7 in "Using an evidence-based protocol to guide rehabilitation and weaning of ventilator-dependent cervical spinal cord injury patients."

The value of pulmonary rehabilitation for chronic lung diseases such as COPD is reinforced by the National Emphysema Treatment Trial (NETT) results [3]. But important questions in pulmonary rehabilitation remain. Are there better outcomes measures that could capture the benefit of pulmonary rehabilitation? Does pulmonary rehabilitation affect the natural history of COPD during its late stage? Is there sufficient evidence that pulmonary rehabilitation halts the downward spiral of COPD, as well as improves health-related quality of life? What is optimal testing versus safe testing for admittance to a structured program? Should supplemental oxygen be used to enhance exercise performance? What level of maintenance following a pulmonary rehabilitation program is necessary to "maintain the gain?" Is evidence for the efficacy of pulmonary rehabilitation strong enough to support it being a mandated option for veterans with chronic lung disease? And if so, what should the pulmonary rehabilitation program include?

Pulmonary rehabilitation is an essential, basic component of an integrated approach to managing chronic lung disease. It is an exciting option for those suffering from the debilitating effects of chronic dyspnea and fatigue and deserves serious consideration by health care policy makers and practitioners alike. The timing is right for translation of pulmonary rehabilitation from demonstration project status to a clinical practice gold standard.

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