

Pulmonary Rehabilitation for Respiratory Disorders Other than Chronic Obstructive Pulmonary Disease

Carolyn L. Rochester, MD^{a,*}, Carl Fairburn, PT, DPT^b,
Rebecca H. Crouch, PT, DPT, MS, CCS^b

KEYWORDS

- Pulmonary rehabilitation • Pulmonary hypertension • Exercise training • Dyspnea • Quality of life
- Cystic fibrosis • Asthma • Interstitial lung disease • Lung cancer

KEY POINTS

- A strong scientific rationale exists for providing pulmonary rehabilitation (PR) to persons with many forms of respiratory disease other than chronic obstructive pulmonary disease.
- Nearly all published clinical trials have shown beneficial effects of PR for such patients.
- Evidence to date shows that PR for patients with disorders other than chronic obstructive pulmonary disease is feasible, safe, and effective.
- PR should be provided according to a disease-relevant approach to ensure patient safety and to maximize the benefits of PR.

INTRODUCTION

Pulmonary rehabilitation (PR) improves exercise tolerance, reduces symptoms and improves quality of life (QOL) for patients with chronic obstructive pulmonary disease (COPD).¹ It is now recognized increasingly that PR also improves clinical outcomes for persons with many respiratory disorders other than COPD. Although the published literature regarding PR for non-COPD disorders remains less extensive than that available for COPD, a strong scientific rationale exists for providing PR to persons with many forms of non-COPD respiratory disease, and nearly all published clinical trials have reported beneficial effects of PR for such patients. Recognition of the benefits of PR has led to consideration of PR as part of the standard of routine care in disease management guidelines for both pulmonary

fibrosis and pulmonary hypertension (PH).^{2,3} In the United States, payer reimbursement for PR for non-COPD disorders remains limited, and challenges remain in provision of PR to diverse patient groups. This review highlights the rationale for and documented benefits of PR for several non-COPD respiratory disorders.

RATIONALE FOR PR IN NON-COPD DISORDERS

The scientific rationale for PR for persons with COPD is that it can stabilize or reverse many systemic manifestations of the disease, including skeletal muscle dysfunction.^{4,5} Participation in PR also improves exercise capacity, reduces knowledge deficits, promotes use of long-term health-enhancing behaviors, reduces depression and anxiety,⁶ helps patients manage complex

^a Section of Pulmonary, Critical Care and Sleep, Yale University School of Medicine, 333 Cedar Street, Building LCI-105, New Haven, CT 06520, USA; ^b Duke Cardiopulmonary Rehabilitation, Duke University School of Medicine, 1821 Hillandale Road, Suite 25B, Durham, NC 27705, USA

* Corresponding author.

E-mail address: carolyn.rochester@yale.edu

medical regimens and exacerbations, reduces hospitalizations,^{7,8} improves patients' QOL,^{1,9} and can improve physical activity levels.¹

Many persons with respiratory disorders other than COPD also have skeletal muscle dysfunction,^{10–14} with associated reduction in exercise capacity, as well as disabling symptoms such as dyspnea, cough, fatigue, anxiety, depression, and impaired QOL, in addition to abnormalities in their respiratory system per se. As is the case for COPD, these features can be improved by participation in PR. Moreover, many patients with non-COPD disorders face complex medical regimens and experience intermittent exacerbations of disease. In many disorders, including interstitial lung disease (ILD), cystic fibrosis (CF), pulmonary hypertension (PH), and lung cancer, low exercise capacity is associated with worse survival.^{15–18} Improvement in exercise capacity via participation in PR has the potential to improve long-term outcomes of the disease. Consideration of PR for persons with disorders other than COPD is recommended formally in both the 2013 American Thoracic Society (ATS)/European Respiratory Society (ERS) Statement on PR¹ and in the joint American College of Chest Physicians/American Association of Cardiovascular and Pulmonary Rehabilitation evidence-based guidelines on PR.⁹ Retrospective analyses of outcomes of PR have shown that participants with non-COPD respiratory disorders achieve similar improvements in exercise tolerance, symptoms, and QOL after PR to those achieved by persons with COPD.^{19,20} Such findings have prompted an emerging wealth of studies showing beneficial effects of PR for individual disease groups; these are considered further below. Disorders other than COPD for which PR can be beneficial are shown in **Box 1**.

PR FOR OTHER CONDITIONS ASSOCIATED WITH AIRFLOW OBSTRUCTION

Asthma

Asthma affects all age groups and is a leading cause of chronic illness in children and adults. As a result of airflow obstruction, increased work of breathing and symptom exacerbation (including exercise-induced bronchoconstriction [EIB] for some persons), patients with asthma often experience dyspnea, show less tolerance for exercise despite optimized pharmacologic therapy, and have low physical activity levels.^{21,22} Poor asthma control is associated with a greater prevalence of functional impairment, depression, sleep disturbances, and reduction in daily activities.²³ Lower fitness and physical activity levels are associated with decreased ability to perform activities of daily

Box 1 Non-COPD respiratory disorders for which PR may be beneficial

Other conditions associated with airflow obstruction

Asthma

CF

Non-CF diffuse bronchiectasis

Respiratory disorders associated with restrictive physiology

ILD/pulmonary fibrosis

Acute respiratory distress syndrome survivors

Restrictive chest wall disease (scoliosis or kyphosis)

Selected patients with neuromuscular disease

Obesity-related respiratory disorders

Other respiratory conditions

PH

Lung cancer

Before and after lung transplantation

Respiratory impairment related to spinal cord injury

living (ADLs), increased psychological distress, impaired QOL,^{24–27} and increased risk of asthma exacerbations.²⁸ Exacerbations may lead to hospitalizations and loss of work and school days. PR has the potential to improve patients' health status and outcomes in regard to all of these issues.

Many studies have reported benefits of exercise training for patients with asthma.²² Physical exercise has been recognized as having equal or greater importance than other interventions for the deconditioning effects of asthma. A recent systematic review of randomized controlled trials (RCTs) examined 16 studies involving 516 patients between 6 and 18 years with asthma of varying severity.²⁹ Aerobic capacity, as measured by maximal oxygen uptake ($V_{O_{2max}}$) improved after exercise training. Physical training can also improve QOL outcome measures. A Cochrane review published in 2012 examined 19 randomized studies (695 participants) including patients older than 8 years with diagnosed asthma.²² These trials evaluated patients who performed physical training (ie, running, gymnastics, cycling, swimming, weights, or walking) for at least 20 minutes, 2 times per week, over a minimum period of 4 weeks. The exercise improved $V_{O_{2max}}$ and maximum ventilation significantly. Physical

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