

Pulmonary Rehabilitation

Future Directions

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KEYWORDS

- Pulmonary rehabilitation • Chronic obstructive pulmonary disease • Self-management
- Physical activity

KEY POINTS

- Pulmonary rehabilitation appears to be effective in earlier stages of COPD severity and in chronic respiratory diseases other than COPD.
- Pulmonary rehabilitation appears to significantly reduce subsequent health care utilization in patients with an exacerbation of COPD; this has important implications to current health care systems.
- Pulmonary rehabilitation may be effective in the home and community settings, where telehealth may be a uniquely valuable adjunct.

PULMONARY REHABILITATION: STATE OF THE SCIENCE

As outlined in the preceding articles of this issue, pulmonary rehabilitation has certainly come of age! This interdisciplinary and patient-centered intervention, which includes structured exercise training and behavioral interventions aimed at promoting collaborative self-management, is now an established standard of care for patients with chronic obstructive pulmonary disease (COPD). Furthermore, an increasing body of evidence now indicates that it is also effective in other chronic respiratory diseases, probably because their disablement processes share common features addressed by pulmonary rehabilitation.

Pulmonary rehabilitation addresses the systemic effects of chronic respiratory disease, including peripheral muscle wasting and dysfunction, physical deconditioning, symptoms of anxiety and depression, and maladaptive behaviors such as a sedentary lifestyle and poor adherence to prescribed therapies. Often these systemic effects are complex and intertwined. As an example, the exercise training component of pulmonary

rehabilitation in the COPD patient results in an increase in oxidative enzymes in ambulatory muscles, leading to less lactate production and consequently less ventilatory requirement at a given workload. In turn, this allows for a slower respiratory rate at that particular workload. The resultant longer expiratory time permits greater emptying of the lung at each exhalation, thereby reducing dynamic hyperinflation. The adaptive muscle changes and reduction in dynamic hyperinflation result in less exertional dyspnea. This decreased symptom burden, coupled with greater self-efficacy and less anxiety associated with dyspnea-producing activity, results in improved health-related quality of life.

The ascendancy of pulmonary rehabilitation for COPD to its current inclusion in major guidelines for this disease¹ reflects the fact that it works, and generally works very well. Although pulmonary rehabilitation has no appreciable direct effect on static measurements of lung function, it arguably provides the greatest benefit of any available therapy (including pharmacotherapy) across multiple outcome areas important to the patient with respiratory disease, including dyspnea, exercise

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performance, and health-related quality of life. It also appears to be a potent intervention that reduces COPD hospitalizations, especially when given in the periexacerbation period. These beneficial effects have been summarized earlier in this issue (Box 1).

EXPANDING THE APPLICABILITY OF PULMONARY REHABILITATION

Pulmonary Rehabilitation for the Non-COPD Respiratory Patient

Traditionally, most patients beginning outpatient pulmonary rehabilitation have had COPD as a primary diagnosis. However, as outlined in detail in a previous article in this issue by Rochester and colleagues, a considerable body of evidence has

accumulated showing that pulmonary rehabilitation, always modified to meet the needs of the individual patient, has benefits in respiratory diseases other than COPD. To date, the evidence supporting pulmonary rehabilitation for the non-COPD respiratory patient is similar to that for COPD in the early 1990s. Undoubtedly, this body of evidence will continue to grow. Research in this area will include building on the body of evidence demonstrating its effectiveness in various respiratory diseases, determining the specific mechanisms underlying this effectiveness, and then determining the best ways to adapt the pulmonary rehabilitation intervention to maximize benefits.

Pulmonary Rehabilitation in Earlier Stages of COPD

Most studies evaluating the effectiveness of pulmonary rehabilitation in COPD have enrolled patient groups with a mean forced expiratory volume in 1 second (FEV₁) less than 50% of predicted.² Although reasoning from this observation may lead to the conclusion that it is not effective in milder disease, this thinking represents a fallacy in informal logic (argumentum ad ignorantiam). In fact, a recent study demonstrated that community-based pulmonary rehabilitation is effective in COPD patients with mild and moderate spirometric severity and concurrent impaired exercise performance.³ This finding brings to the forefront a concept that the pulmonary rehabilitation professional community has always held: that symptoms and functional status limitation, not FEV₁ thresholds, are the relevant inclusion criteria. It is anticipated that this principle will lead to a shift in referral patterns, with patients with less severe disease (and a greater potential for disease-modifying therapies to work) referred for pulmonary rehabilitation. For this to occur, clinicians and third-party payers must realize this widened applicability, which to date has not yet occurred.

Pulmonary Rehabilitation in the Periexacerbation Period

Providing pulmonary rehabilitation during or shortly after a serious exacerbation of COPD, often at the time of hospitalization, is an exciting new application of this comprehensive intervention. Interest in this application is heightened by the knowledge that exacerbations are very costly in terms of morbidity, mortality, and dollars, and that pulmonary rehabilitation has a demonstrable benefit in this clinical situation. Pulmonary rehabilitation can be beneficial when provided before, during, and immediately after the exacerbation. These benefits, which have been documented in a

Box 1

Pulmonary rehabilitation in 2014

- Pulmonary rehabilitation is defined as “a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies, which include, but are not limited to, exercise training, education and behavior change, designed to improve the physical and emotional condition of people with chronic respiratory disease and to promote the long-term adherence of health-enhancing behaviors”¹
- It has become standard care and is now incorporated into major COPD guidelines
- Its effectiveness depends on its ability to reduce the systemic consequences of chronic respiratory disease and its ability to promote adaptive behavior change through promoting self-efficacy
- It is typically provided in a hospital-based, outpatient setting, but can be effectively provided in inpatient, home, and community settings
- Its effectiveness has been demonstrated across multiple patient-centered outcome areas in COPD, including dyspnea, exercise performance, and health-related quality of life; it arguably provides the greatest benefits in these areas in comparison with any other therapy
- It appears to significantly reduce subsequent health care utilization in patients discharged following an exacerbation of COPD; this obviously has important implications to current health care systems
- Evidence suggests it is effective in earlier stages of COPD severity and in chronic respiratory diseases other than COPD

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