

Promoting Long-Term Benefits of Pulmonary Rehabilitation

The Role of Reducing the Impact of Respiratory Exacerbations

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KEYWORDS

- Pulmonary rehabilitation • Chronic obstructive pulmonary disease • Maintenance program
- Exacerbation • Self-management • Hospital readmission

KEY POINTS

- Pulmonary rehabilitation generally provides substantial benefits in exercise capacity, dyspnea, and quality of life, but these positive outcomes tend to diminish gradually over time.
- Although a key focus of pulmonary rehabilitation is to provide strategies to maintain long-term benefits from the intervention, the most effective approaches to achieve this goal are not currently known.
- Extending the duration of pulmonary rehabilitation seems to prolong its benefits, but this may not be feasible in all areas.
- Exacerbations of COPD are associated not only with substantial deteriorations in symptoms, functional status, and health status, they also negatively impact long-term adherence with the adaptive behaviors achieved in pulmonary rehabilitation.
- Targeting the exacerbation through nonpharmacologic interventions, such as pulmonary rehabilitation or its components, should prolong the long-term benefits from pulmonary rehabilitation.

INTRODUCTION

Pulmonary rehabilitation arguably provides the most beneficial effects of any treatment in the outcome areas of dyspnea, exercise performance, functional status, health status, and health care use. Despite this impressive track record, there is often a gradual decline in benefit over time after the formal pulmonary rehabilitation intervention.¹ An example of this is given in [Fig. 1](#).

There are multiple reasons for this drop-off in outcomes months after the formal pulmonary rehabilitation program has ended. These include

the progressive nature of the underlying respiratory disease, the development of comorbidity, exacerbations of the respiratory disease, and sub-optimal adherence to the long-term exercise prescription. Perhaps it is too much to administer what is often a short-duration, acute care intervention and expect it to achieve long-term benefits in a disease that can span several decades. Instead, pulmonary rehabilitation must be fitted into a chronic care model of disease management. Thus, this intervention must promote self-efficacy in its patients, with the adoption of healthy behaviors, such as regular exercise in the home or

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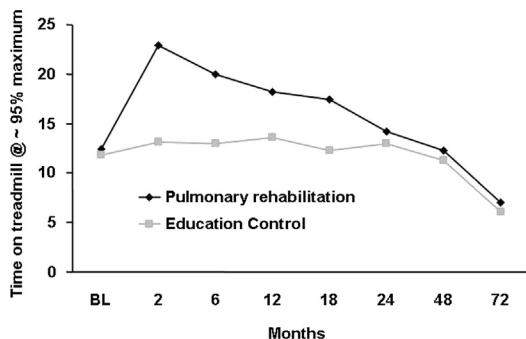


Fig. 1. Long-term effects of comprehensive pulmonary rehabilitation (x-axis) on submaximal exercise capacity (y-axis) in patients with COPD. Compared with a control group that was given didactic education, the pulmonary rehabilitation group had a significant increase in exercise capacity out to about 18 months. Thereafter, exercise capacity in both groups was similar and seemed to diminish gradually in time, possibly reflecting the progression of the disease. (Data from Ries AL, Kaplan RM, Limberg TM, et al. Effects of pulmonary rehabilitation on physiologic and psychosocial outcomes in patients with chronic obstructive pulmonary disease. *Ann Intern Med* 1995;122(11):823–32.)

community setting, and the use of collaborative self-management strategies at the time of the respiratory exacerbation.

There have been several systematic efforts to prolong the beneficial effects of pulmonary rehabilitation. These are listed in **Box 1**. Some of the approaches are clearly not practical or financially feasible, and none has unequivocally been shown to work. However, they provide current thinking on how the problem of drop off in outcomes might be approached.

These approaches either have had some success in maintaining the benefits or conceptually should do so. The remainder of this article discusses three additional approaches to prolong the beneficial effects of pulmonary rehabilitation. The first approach is to get patients to begin pulmonary rehabilitation in the first place. It should be obvious that prolongation of beneficial outcomes can be maintained only if the patient participates in pulmonary rehabilitation to achieve these initial positive outcomes. The second approach is to offer long-term postrehabilitation maintenance programs. To promote long-term gains, many pulmonary rehabilitation programs have set up maintenance programs. However, the benefits of participation in on-going, postrehabilitation exercise maintenance programs are not as widely researched, and consequently there is less awareness of this option among health care providers, hospitals, third-party payers, and most importantly

Box 1

Initiatives aimed at prolonging the benefits of pulmonary rehabilitation

1. Extending pulmonary rehabilitation out for longer duration (lifetime would be best)²
2. Arranging for monthly patient visits to the rehabilitation center, supplemented by telephone calls in the interim³
3. Providing weekly telephone contacts and monthly supervised reinforcement sessions⁴
4. Giving repeated pulmonary rehabilitation at intervals (booster shots; these could be given in the perioxacerbation period, which often leads to prolonged physical activity)⁵
5. Providing user-friendly pulmonary rehabilitation in the home setting, supplemented by visits to professionals in the center⁶
6. Offering structured daily self-monitored postrehabilitation walking exercise training at home, possibly incorporating feedback to the rehabilitation team⁷
7. Providing weekly supervised hospital-based exercise sessions⁸
8. Actively determining barriers to maintaining exercise by interview during formal rehabilitation, then working to reduce their impact⁹
9. Incorporating a home plan of exercise training early on in the formal rehabilitation program that fits the needs of the specific patient

patients. The third approach is to prevent exacerbations of chronic obstructive pulmonary disease (COPD). It is known that respiratory exacerbations result in increased symptoms, decreased functional status, increased health care use, and increased mortality risk. Additionally, exacerbations play a prominent role in reducing long-term adherence to the adaptive behaviors (eg, regular exercise training) that had resulted from pulmonary rehabilitation. Thus, respiratory exacerbations should be discussed when dealing with long-term maintenance of benefits following pulmonary rehabilitation.

GETTING PATIENTS TO PARTICIPATE IN PULMONARY REHABILITATION

Initial patient enrollment into a pulmonary rehabilitation program can be challenging for several reasons. First, health care providers may not be aware of the effectiveness or availability of hospital-based, inpatient, community-based, or home-based pulmonary rehabilitation in their

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