Approaches to Outcome Assessment in Pulmonary Rehabilitation

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KEYWORDS

• Pulmonary rehabilitation • Assessment • Outcomes

KEY POINTS

- A thorough, patient-centered outcome assessment is considered a necessary component of a successful pulmonary rehabilitation program.
- All tests should follow recommended procedures, including standard operating procedures for exercise testing.
- The assessments, which vary widely across centers, usually include measures of exercise performance, peripheral muscle strength, health-related quality of life, and anxiety and depression. Other aspects of outcome assessment that may be measured include functional performance, physical activity, and knowledge/self-efficacy.

INTRODUCTION

The patient-centered outcome assessment, performed before and after rehabilitation, plays an important role in delivering a successful pulmonary rehabilitation program. This assessment is conducted by a health care professional who is mindful of the complex nature of chronic obstructive pulmonary disease (COPD) and the physical and psychological comorbidities frequently associated with chronic respiratory diseases, who has experience in managing such patients, and who has experience in exercise testing. The recent American Thoracic Society/European Respiratory Society statement on pulmonary rehabilitation[1] clearly articulates the importance of the assessment.

> *Pulmonary rehabilitation is 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 to health-enhancing behaviors.*

This article addresses several components of the assessment. There is an assumption that the individual has been screened by the referring physician and the medical director of the pulmonary rehabilitation program and deemed safe to participate in an exercise-based rehabilitation program. The construction of the assessment has not been formally cataloged, but common outcomes are exercise capacity, health-related quality of life, functional status, and anxiety and depression. There are additional outcomes that are reported with increasing frequency, such as quadriceps strength, COPD-related knowledge and self-efficacy, and physical activity.

The assessment may be completed by a single individual with expertise in the field or by an interdisciplinary team; members of the team are responsible for the components of the assessment when they have expert knowledge. There is undeniably a scientific basis to the components of the

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assessment, but personal interactions among the patients and testers that occur during the assessment may influence the assessment. Examples of this potential bias include the indirect assessment of an individual's level of motivation to participate, the discussion of barriers to rehabilitation, and the appropriate negotiation of patient-related goals to encourage engagement and active participation in rehabilitation process. Pulmonary rehabilitation has been described most widely in patients with COPD, but there is an increasing evidence base for the delivery of rehabilitation to respiratory disease other than COPD; however, the fundamental characteristics of the assessment persist.

There have been numerous studies defining the properties of the measures described later, particularly in relation to exercise tests and measures of health-related quality of life.[2,3] One important property of these outcome measures is their sensitivity to detect change after pulmonary rehabilitation. More recently, the change in outcome measure after rehabilitation is compared with published data describing the minimum clinically important difference (MCID). The MCID has been defined as the smallest difference, in either direction, that is detectable by the patient or clinician. The MCID is usually dictated by the approach taken, using a patient preference or a statistical technique.

The timing of the outcome measures largely reflects the duration of the pulmonary rehabilitation program, because few studies report interim measures.[4,5] One advantage of incorporating interim measures is that it allows for an understanding of the trajectory of the particular outcome over the course of the intervention: the dose-response curve to rehabilitation may be different for different outcome measures and different modes of delivery. Measures are often also collected after the participant has graduated from the program to understand the longevity of the response and develop strategies to enhance and maintain the benefits associated with the intervention.

PATIENT OUTCOME ASSESSMENTS FOR PULMONARY REHABILITATION

Exercise Capacity

The assessment of exercise capacity is one of the 2 most commonly reported outcome measures for pulmonary rehabilitation, alongside measures of health status.

Field walking tests are the tests of choice for most rehabilitation programs; they require little equipment and are relatively straightforward to perform for both the operator and participant. Not surprisingly, walking is a highly desired activity by patients with COPD[6] and is therefore a clinically relevant outcome to measure in these individuals. In more sophisticated centers, cardiopulmonary exercise tests may be performed as part of the outcome assessment. The decision to incorporate this technically sophisticated test often depends on the expertise, philosophy, and available resources of the particular rehabilitation center.

In the context of pulmonary rehabilitation, the exercise test has several important functions. The referring physician should confirm that the individual referred has no significant contraindications to performing an exercise program and therefore an exercise test. The American College of Sports Medicine[7] has an exhaustive list of relative and absolute contraindications that should be considered if there are any concerns over the patient's well-being (**Box 1**).

The most established exercise test in pulmonary rehabilitation is the 6-minute walking test (6MWT). The test simply requires an individual to cover as much ground as possible over 6 minutes, being allowed to stop and rest if required.[8] The course should be 30 m long, unobstructed, and instructions and encouragement should be standardized. The test does require a practice walk to overcome any learning effect. Not performing a practice test may add a significant bias, because often, the learning effect from test 1 to test 2 is substantial. The 6MWT has been widely reported in rehabilitation studies in COPD[5–10] and other chronic respiratory diseases such as interstitial lung disease.[11] Its MCID was originally estimated to be 54 m (95% confidence interval 37–71 m),[12] but more recently, lower values have been described, using slightly different approaches from the original work.[13] Generally, the change in 6MWT distance achieved with rehabilitation is around 50 m,[14] which reflects a clinically meaningful improvement.

Box 1
Commonly cited reasons for conducting an exercise test

1. Creating an outcome measure to identify a response to therapy (ie, pulmonary rehabilitation)
2. Creating a threshold to identify suitability for further interventions (eg, surgery)
3. Identifying the reasons for exercise intolerance
4. Defining the level of disability
5. Understanding the limitation to exercise
6. Developing a prescription for an exercise training regimen