A literature review of rehabilitative intervention for chronic obstructive pulmonary disease patients

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Abstract

Pulmonary rehabilitation programs contribute to physical and psychological well-being and improved quality of life. Pulmonary rehabilitation reduces fear and depression, and increases self-esteem; it improves feelings of well-being and lowers levels of mood disturbance, but does not seem to change lung function and perfusion.

Patients with chronic conditions are reported to have problems complying with rehabilitation programs, especially when these programs require lifestyle modification. Community-based programs are therefore attractive for reasons such as addressing the specific needs of the population, cost-benefit and flexibility in delivery.

Introduction

The treatment of chronic obstructive pulmonary disease (COPD) has become an important part of the workload of professions such as physiotherapy (Ellis 1992, pp 163–5), and requires a multidisciplinary approach. Patients with pulmonary diseases, especially those with COPD, tend to get caught in a vicious circle (American Thoracic Society 1987, pp 225–44). Because they experience dyspnoea during physical activities, these activities will be rewarded negatively. This may eventually lead to inactivity, frustration, social isolation and a low exercise tolerance (Sandhu 1986, pp 629–42) which, in turn, causes reduced fitness and will impede further activities (Belman 1986, pp 585–97).

Rehabilitation goals and effects

Goals for rehabilitation of COPD patients have to be realistic and well understood by the patients as well as the provider because of the permanent and progressive nature of the disease process. FEV^1 (Forced expiratory value – the amount of air blown out in the first second of the forced vital capacity (FVC) manoeuvre) normally decreases with ageing at a rate of approximately 30 ml per year according to Kory et al. (1961, pp 243–58), while it decreases at a rate of 45 ml to 55 ml per year in COPD patients (Burrows 1985). It can even decrease at a rate of 60 ml to 80 ml per year in cigarette smokers (Johnson & Pierson 1992, p 214).

Even comprehensive ongoing rehabilitation programs do not alter the rate of spirometric decline significantly, and survival chances are not significantly increased by multidisciplinary intervention (Burrows 1985). However, this type of intervention leads to subjective improvement in dyspnoea severity (related to functional mobility and self-care) and a reduction in the average number of hospital days per year (Sahn et al. 1980). Objective performance improvement occurs in the first three months of training after which progress plateaus (Geul-Klaren & Hekking 1991, pp 190–5).

The aim of pulmonary rehabilitation (Folgering et al. 1991, pp 464–71) is to break the vicious circle of inactivity, frustration, social isolation and low exercise tolerance by:

1. decreasing the physical and psychological manifestations of the underlying disease – in other words, a reduction of the impairment due to the disease
2. increasing physical and mental fitness and performance, with a reduction of the disability of the patient
3. reducing the handicap by maximal social integration of the patient.

Alternatively, exercising can also cause more discomfort in COPD patients. Chronic dynamic exercising causes adaptations affecting the cardio-respiratory system and the peripheral muscles. A sense of discomfort and fatigue in exercising muscles is a component of perceived exertion in any patient with chronic illness, causing enforced periods of inactivity (Clausen 1976, pp 459–95). An increase in work capacity may occur by increased peripheral oxygen extraction through muscle fibre hypertrophy, increased capillary blood volume, and shunting of blood from inactive muscles to active muscles (Holloszi 1976, pp 445–58).

Although circumstantial, the evidence of skeletal muscle deconditioning as a contributory factor limiting exercise tolerance in COPD patients is convincing (Jones et al. 1989, part 2, A319). The intensity of leg discomfort at maximal

exercise appeared to be on average twice that expected for normal subjects at the same exercise intensity. Guell, Gimenez and Marchand (1989, p 385s) found some evidence that muscle fatigue occurred at maximal exercise in patients with COPD.

Pulmonary rehabilitation is defined by Petty (1977, pp 68–77) as the

> *art of medical practice where an individually tailored, multidisciplinary program is formulated, which, through accurate diagnosis, therapy, emotional support and education, stabilises or reverses both the physiological and psychological pathology of pulmonary diseases, and attempts to return the patient to the highest possible functional capacity allowed by his pulmonary handicap and overall life situation.*

The goals of therapeutic intervention may be achieved by designing a methodical program, tailored to each individual patient (American Thoracic Society 1987, pp 225–44), consisting of:

1. an accurate diagnosis of the disease and of the functional limitations of the patient
2. education about the disease, its pathophysiology, the use of a peak-flow meter, the use of medication (Note: Some researchers argue that prolonged use of beta-mimetica contributes to an increased morbidity and mortality from asthma – Postma & Kraan 1995, pp 5–7), and the avoidance of aggravating or harmful influences such as smoking
3. physical training to improve the physical fitness and performance
4. psychosocial support of the patient.

A satisfactory program can only be based on an adequate diagnosis of the extent and the specific character of the limitations of each individual patient (van Herwaarden 1990, pp 9–10). The limitation can be cardiocirculatory, ventilatory, diffusion-perfusion or psychophysiological (Folgering et al. 1991, pp 464–71). Folgering therefore describes the need for three different basic programs, namely, for:

1. the lightly affected patient who has a condition problem
2. the more severely affected patient with a poor performance of the breathing pump, especially in regard to CO^2 elimination
3. the patient with severe pathology such as emphysema who is hypoxic during activity.

Decramer and Dekhuijzen (1995, p 12) note progress in treatment of patients with a FEV^1 of 40 per cent or less than the predicted value. However, these