

Management of stable COPD[☆]

Paul van der Valk^{a,*}, Evelyn Monninkhof^a, Job van der Palen^a,
Gerhard Zielhuis^b, Cees van Herwaarden^c

^a Department of Pulmonary Medicine, Medisch Spectrum Twente, P.O. Box 50000, 7500 KA Enschede, The Netherlands

^b Department of Epidemiology and Bio Statistics, University Medical Centre Nijmegen, Nijmegen, The Netherlands

^c Department of Pulmonary Medicine, University Medical Centre Nijmegen, Nijmegen, The Netherlands

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Abstract

Chronic obstructive pulmonary disease (COPD) is a systemic disease with major impact worldwide. In the treatment of COPD a holistic approach should be taken. In order to reach this, an individual treatment plan should be made which includes at least elements of smoking cessation, optimisation of pulmonary status by pharmacotherapy and exercise embedded in a new lifestyle. Furthermore, more research on nutritional and metabolic intervention strategies for COPD patients is needed. With the availability of all these treatment options, a nihilistic attitude toward the patient with COPD is no longer justified.

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a disease characterised by the progressive development of airflow limitation that is not fully reversible. COPD is caused by an abnormal inflammatory response of the lungs to noxious particles or gases [1] in particular cigarette smoking. COPD constitutes a major public health burden worldwide [1]. The World Health Organisation [2] estimates COPD to be the world's fifth most common disease and fourth leading cause of death. Both prevalence and mortality are expected to increase in the coming decades [3]. The economic impact of COPD is huge, with an annual cost in the United States alone of more than 23 billion dollars, due to medical expenditures and to indirect costs of morbidity and premature mortality among COPD patients [4]. There is no doubt that the main risk factor for developing COPD is cigarette smoking. Inhaled smoke acts in conjunction with underlying host susceptibility and environmental factors and results in COPD in 10–20% of chronic smokers [5,6]. Apart from the irreversible respiratory impairment, COPD has also sys-

temic consequences [7]. In particular, there is accumulating evidence of skeletal muscle impairment contributing to exercise intolerance, a frequent complaint in COPD [8]. Also, up to 35% of clinically stable patients with COPD experience involuntary weight loss as the severity of the disease progresses [9], which is not only related to a disturbed energy balance but also to altered metabolism [7]. Therefore, a holistic approach should be taken in the treatment of COPD.

As patients become symptomatic from COPD, the most common complaints are breathlessness with exercise intolerance, cough with or without sputum production and fatigue. Dyspnea leads to inactivity, which leads to physical deconditioning, and a vicious circle ensues with serious consequences such as depression [10].

The clinical course of COPD is one of gradual progressive pulmonary impairment, which may eventually lead to respiratory failure. An acute exacerbation of COPD is defined as a sustained worsening of a patient's condition, from stable state and beyond normal day-to-day variations, that is acute in onset and necessitates a change in regular medication [11].

The frequency of these exacerbations increases with the severity of COPD [5]. Exacerbations have a major impact on health-related quality of life [12]. Early identification of patients at particular risk for exacerbations may reduce morbidity and mortality from complications associated with COPD exacerbations.

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* Corresponding author. Tel.: +31-53-4872610; fax: +31-53-4308127.
E-mail address: valkpapa@knmg.nl (P. van der Valk).

The goals of effective COPD management [1] are to prevent disease progression, relieve symptoms, improve exercise tolerance, improve health status, prevent and treat complications, prevent and treat exacerbations and reduce mortality. The management strategy is based on an individualised assessment of disease severity and response to various therapies [1]. In order to reach this goal an individual treatment plan should be made with the following important elements: smoking cessation, optimisation of pulmonary status by pharmacotherapy, physical activity, nutrition, and self-management.

2. Smoking cessation

Smoking cessation [13,14] is the mainstay of the management of COPD because it reduces the decline in pulmonary function, improves the prognosis [13,15] and enhances quality of life [16]. As COPD patients generally have a long smoking history, they are considered strongly addicted to smoking, both physically and psychologically. A strong nicotine addiction is likely to require structured counselling to achieve cessation success [17].

Various smoking cessation programs including pharmacological and/or behavioural elements have been applied, but most of them are unstructured and not especially developed for COPD patients [13,18,19]. There is an urgent need to develop a smoking cessation programme targeted at COPD patients, because there is evidence that this group is particularly heavily addicted.

3. Optimisation of pulmonary status by pharmacotherapy

None of the existing medications for COPD has been shown to modify the long-term decline in lung function. Therefore, pharmacotherapy is only used to decrease symptoms and complications [1]. Standards for pharmacological treatment of COPD recommend a stepwise approach guided by the severity of the disease [20]. Bronchodilator therapy [14] is the first step and remains [13] the mainstay of the management of COPD. This may significantly reduce symptoms of dyspnea by reducing hyperinflation, and may also improve exercise tolerance [21]. A second step is a trial with of inhaled corticosteroids (ICS) since it is not clear whether or not ICS are beneficial in all COPD patients [22,23].

Several studies have indicated beneficial effects on respiratory symptoms [24], decreased frequency [25] or severity [26] of exacerbations and health-related quality of life (HRQoL) [25], but ICS have shown to be ineffective in arresting long-term decline in lung function [21]. Safety of long-term, high-dose ICS has not been well established [27]. An alternative step is a trial treatment with *N*-acetylcysteine (NAC) for patients with recurrent exacerbations. Treatment

with oral NAC may reduce the risk of exacerbations and improve symptoms in patients with COPD [28,29].

Finally, patients with severe COPD and hypoxemia may need long-term oxygen therapy.

Long-term administration of oxygen to patients with severe COPD and hypoxemia, pulmonary hypertension, congestive heart failure or polycythemia has been shown to increase survival [30].

4. Physical activity

Exercise intolerance is a characteristic and disturbing manifestation of COPD. The pathophysiological basis of exercise intolerance is often multifactorial. Dyspnea leads to inactivity, which leads to physical deconditioning, and a vicious circle ensues with devastating responses [10]. Exercise training, undertaken alone or in the context of pulmonary rehabilitation, can improve the exercise intolerance of patients with COPD. Exercise training is considered to be a mandatory part of pulmonary rehabilitation. A pulmonary rehabilitation programme is a multidisciplinary programme of care for COPD patients that is individually tailored and designed to optimise physical and social performance and autonomy [31]. Several simple designed, primarily home based or near home programmes of exercise training also achieved improvement in exercise tolerance and health-related quality of life (HRQoL) [32–35]. Pulmonary rehabilitation as well as more simple primarily home based or near home programmes of exercise training have shown to produce short-term beneficial effects on exercise tolerance and quality of life in COPD-patients [36–41]. Maintenance of these initial improvements, however, is disappointing as many of the initial improvements tend to disappear [32,33,37] in most studies. There is a need for developing programs which focus on the implementation of exercise in the normal daily pattern, in order to maintain long-term improvement in exercise capacity.

5. Nutrition

Up to 35% of clinically stable [42,43] patients with moderate to severe COPD experience involuntary weight loss as their condition progresses [9]. Those who do lose weight have more dyspnea and less exercise capacity than those who do not, even when their underlying levels of pulmonary impairment are similar. Moreover, body weight has an independent effect on survival in COPD [44].

The consequences of weight loss in COPD patients particularly relate to the decrease in muscle mass and can be measured indirectly in clinically stable patients by assessment of fat-free mass (FFM) [45]. In COPD, tissue depletion is indicated by a body mass index (BMI) below 22 kg/m² or a fat-free mass index below 16 in males and 15 in females. Nutritional depletion contributes to respiratory and

peripheral skeletal muscle weakness and to decreased exercise performance, independent of impaired lung function. Recent studies have shown that nutritional abnormalities in COPD patients not only relate to a disturbed energy balance but also to altered regulation of substrate metabolism caused by changes in anabolic and catabolic stimuli [45]. In a recent meta-analysis [9] nutritional supplementation (2 weeks or more) has not been demonstrated to be successful in improving anthropometric measures, lungfunction or exercise capacity in stable COPD patients. But many factors were not optimally fulfilled in those interventions such as duration of the intervention, adequate composition of the supplementation, lack of an anabolic stimulus such as exercise training to avoid an expansion of fat mass only and compliance with the therapy. Not in all patients with COPD the negative effect of low body weight can be reversed by appropriate therapy [44]. More knowledge of the pathogenesis of weight loss and muscle wasting is essential to develop new nutritional and metabolic intervention strategies for COPD patients.

6. Self-management

Self-management of COPD is defined as effective behaviour, based on sufficient knowledge about COPD and its provoking factors, adequate coping behaviour, compliance with inhaled medication, attention to changes in the severity of the disease, and adequate inhalation technique. One of the components of self-management believed to be of importance is the self-adjustment of the medication by the patient in case of an exacerbation. The term “self-treatment” is used when COPD patients are provided with guidelines to self-adjust their dose of bronchodilators or to start a short course of oral steroids and/or antibiotics, based on symptom perception, in case of an exacerbation. The idea of self-management is as follows: (a) to achieve effective self-management behaviour, COPD patients are educated about the nature of their disease, the medication used and the influence of extraneous factors such as smoking and regular exercise; (b) in addition they are trained in the correct use of their inhaled medication and symptom perception; (c) by using the attained knowledge and practising the skills they learned, patients should then be able to cope with the disease in daily life, to control their symptoms and to treat themselves in case of an exacerbation; (d) in this way, exacerbations could be curtailed at an early stage, quality of life could be increased and health care contacts could be reduced [46,47].

There is a global consensus, that an increase in disease-specific knowledge, is not sufficient to develop successful self-management behaviour [48,49]. Education should also focus on attitude, social support and self-efficacy according to behavioural principles [49,50]. In asthma, sustained patient education and self-management programmes have proven to be successful in improving quality of life and lung function and in reducing the economic burden of disease

[51–54]. There is very little known so far, about the effectiveness of self-management and self-treatment of COPD. A Cochrane review of published studies demonstrates insufficient evidence to conclude about the effectiveness of self-management programmes for COPD-patients [55]. Indeed, pulmonary rehabilitation has been proven to increase exercise tolerance and quality of life [40] in COPD patients but pulmonary rehabilitation is expensive and time consuming for both professionals and patients. Self-management programmes combined with a low-intensity exercise programme may be more easily implemented and more cost-effective. New studies with sufficient size and follow-up are initiated to fill the knowledge gap on the effect of these programmes.

7. Conclusion and practice implication

COPD is a systemic disease with major impact worldwide. In the treatment of COPD a holistic approach should be taken. In order to reach this, an individual treatment plan should be made which includes at least elements of smoking cessation, optimisation of pulmonary status by pharmacotherapy and exercise embedded in a new lifestyle. Furthermore, more research on nutritional and metabolic intervention strategies for COPD patients is needed. With the availability of all these treatment options, a nihilistic attitude toward the patient with COPD is no longer justified.

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