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Self-management and integrated pulmonary care as an essential part of treatment of patients with chronic obstructive pulmonary disease

Abstract

Chronic obstructive pulmonary disease (COPD) is a common, chronic and progressive disease that is a major public health problem worldwide. Treatment for stable COPD relies on pharmacological and non-pharmacological procedures. Education, self-management interventions and personalized pulmonary rehabilitation should be part of chronic care for patients with COPD at all stages of their disease.

The comprehensive care should be provided by integrated pulmonary care based on pulmonary centers and a multidisciplinary team to all patients with COPD. Holistic approach to the patient with COPD and his involvement in therapy and working closely with healthcare professionals will improve quality of life of COPD patients. It also modifies the course of the disease, prevents progression and may reduce the frequency of exacerbations. In this article, we present the proposed model of integrated pulmonary care, structures necessary for multidisciplinary treatment and self-management intervention as essential elements in the treatment of patients with COPD.

Key words: chronic obstructive pulmonary disease, COPD treatment, self-management, integrated pulmonary care

Adv Respir Med. 2021; 89: 291–298

Introduction

Chronic obstructive pulmonary disease (COPD) is currently the 3rd leading cause of death in the world. It is predicted that COPD morbidity will increase in the coming years due to the constant exposure to risk factors and the aging of the population [1]. The disease can be treated, and more importantly, we could prevent it by taking appropriate prophylaxis. Due to its chronic nature, it also poses a significant challenge to public health worldwide [2].

So far, no epidemiological studies of COPD have been conducted in Poland, which would include a representative sample of the entire population of the country. In partial studies, symptoms of the disease were found in 10% of the respondents over 40 years of age [3]. It is estimated that approximately 80% of COPD patients

in Poland have mild or moderate illness, which causes delays in diagnosis and underestimates the actual number of cases [4]. The prognosis of advanced stages of COPD, often complicated by hypercapnic respiratory failure, is severe. Five-year survival in this group of patients is 26–50% [5].

Treatment of stable COPD is based on pharmacological (Table 1) and non-pharmacological management. Reduction of the disease symptoms, improvement of general health and exercise tolerance, prevention of exacerbations and disease progression, and thus decreased mortality, are the main goals of the treatment [2, 6].

The therapeutic management is modified individually for each patient with particular emphasis on the frequency of exacerbations and dyspnea. The pharmacological treatment regimen should be personalized, and the physician should

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DOI: 10.5603/ARM.a2021.0057 | Received: 20.12.2020 | Copyright © 2021 PTChP | ISSN 2451–4934 | e-ISSN 2543–6031

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Table 1. Initial pharmacological treatment of COPD according to GOLD reports ([2] self modified)

Initial COPD drug therapy depending on symptoms and risk of exacerbation		
Group	Treatment	Comments
A. Mild symptoms and low risk of exacerbations	A bronchodilator	In patients with sporadic dyspnea, it may be a short-acting drug, in others — a long-acting drug. Treatment should only be continued if it causes improvement
B. Severe symptoms and low risk of exacerbations	A long-acting bronchodilator (LABA or LAMA)	In patients with severe symptoms, it may be considered LABA + LAMA
C. Mild symptoms and high risk of exacerbations	LAMA	
D. Severe symptoms and high risk of exacerbations	LAMA or LAMA + LABA (with severe symptoms) or LABA + ICS (when blood eosinophil count > 300/ μ L) ^a	When bronchodilators are used alone, the treatment is usually initiated with LAMA, except in patients with severe symptoms

^aIn optimally treated patients (LAMA + LABA + ICS) with recurrent exacerbations, addition of roflumilast in patients with chronic bronchitis and FEV₁ < 50% or azithromycin in ex-smokers should be considered; COPD — chronic obstructive pulmonary disease; ICS — inhaled corticosteroids; LABA — long-acting β 2-agonists; LAMA — long acting muscarinic antagonists

also take into account possible side effects, the availability and cost of drugs used, comorbidities, as well as preferences and the ability to use various devices for drug distribution to the respiratory tract [2, 7].

In the natural course of the disease, the so-called exacerbations, i.e. acute episodes characterized by an increase in respiratory symptoms above their usual daily intensity force the patient to change the current treatment [8]. Frequent exacerbations accelerate the annual decline in FEV and worsen the patient quality of life. They are also a major cause of increased mortality among these patients. Numerous outpatient visits and hospitalizations of individuals with COPD exacerbations significantly increase the costs of treatment and burden the healthcare system [9].

Patients with COPD experience much lower satisfaction with the treatment they receive compared with persons treated for advanced lung cancer [5]. This is probably due to the low interest in prognosis and therapeutic options. This may be due to a lack of integrated medical care and insufficient awareness of self-management of the disease [10].

The main form of non-pharmacological treatment to prevent disease progression is the identification and elimination of the exposure to risk factors. The most important procedure with proven effectiveness is smoking cessation [11]. In order to improve the efficiency and thus the quality of life of all COPD patients, physical activity should be encouraged according to their clinical status [12]. An important element of care is also personalized pulmonary rehabilitation

[2, 13]. Unfortunately, the long-term effect of the conducted rehabilitation programs, usually in the form of several-week sessions, is rather controversial [14–16]. An alternative or a valuable supplement for them is the patient’s active participation in treatment plan, going beyond the rehabilitation program period.

Education and self-management motivation provided by healthcare professionals should be the primary focus of continuing care for COPD patients. The idea of intervening in self-control is to involve patients in the treatment process as early as possible in order to positively adjust their health behaviors and develop the ability to better cope with the disease on a daily basis [2, 17]. As a result, it may modify the course of the disease and reduce the frequency of exacerbations.

Integrated medical care for patients with COPD

Comprehensive care for patients with COPD in Poland is still insufficient. This is due to the imperfections of the current health care system, its limited financing, the lack of understanding of the importance of the patient complicity in holistic therapy from day one, and not only in alleviating the effects of respiratory failure. During recent years there were many improvements in Polish pulmonary care of patients with advanced COPD. A long-term oxygen therapy and non-invasive ventilation are more common and available nowadays. We also observe a better cooperation of respiratory physicians with palliative care specialists. However, there is still no full, comprehensive care for patients with mild and moderate disease.

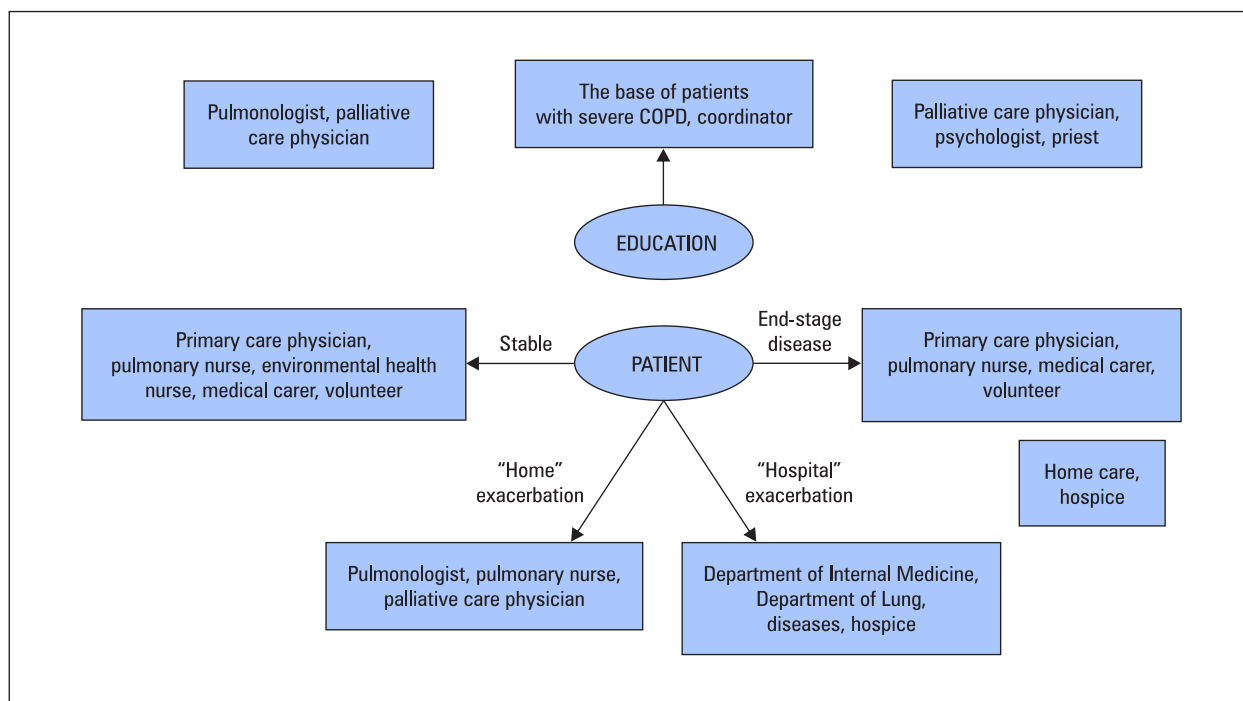


Figure 1. Integrated care for patients with advanced COPD according to Damps-Konstańska *et al.* ([15] self modified)

Integrated care models recommended and effective for chronic diseases, such as diabetes, should also be used in patients with lung diseases. The role of comprehensive care including medical assistance, in accordance with the applicable standards, and supervision treatment, support for patients and their families at home is emphasized by all physicians. The recommendations of the Polish Society of Lung Diseases regarding the organization of integrated pulmonary care take into account almost exclusively the aspect of palliative care in the end stage of advanced respiratory failure in advanced COPD [18].

Identifying essential components, which can bring measurable benefits, is crucial for integrated medical care of COPD patients. Casas *et al.* in an international study conducted in Belgium and the Netherlands on patients with severe COPD requiring hospitalization due to exacerbations, have confirmed that integrated care after discharge from hospital resulted in a lower number of exacerbations in a one-year follow-up [19].

In their study, the essence of the integrated program was based on the following four basic elements:

- detailed assessment of the patient’s condition including determination of the severity of the disease, comorbidities and social needs,
- intensive education on the principles of drug treatment and use,

- an individual treatment plan in accordance with applicable recommendations, provided to the patient, nurse and primary care physician,
- constant contact with qualified medical personnel via the Internet.

In 2009, Damps-Konstańska *et al.* [20] proposed a Polish model of organization of integrated care for patients with advanced COPD, including hospital and outpatient structures. This model emphasizes the role of close, multifaceted collaboration between lung disease specialists, primary care physicians and palliative medicine practitioners. They emphasized the important role of pulmonary and community nurses, as well as psychologists and volunteers, but again, exclusively in relation to patients with advanced disease — patients with severe COPD (Figure 1). They also showed that it is important to create standards for appropriate care for patients with severe and terminal COPD, which would improve the overall quality of life of patients, as well as would reduce the frequency of hospitalization and costs of medical care [20]. Unfortunately, this proposed model of comprehensive care does not apply to patients with mild or moderate COPD, who, as mentioned earlier, may constitute up to 80% of cases [4]. They also require the earliest possible intervention in the form of multidisciplinary, long-term treatment, especially as part

of outpatient care, personalized rehabilitation, in order to inhibit disease progression, prevent exacerbations and maintain the optimal quality of life [2, 12, 13].

COPD self-management intervention

Disease self-control (the day-to-day actions undertaken by the patient) is extremely important, especially in case of chronic diseases [21, 22]. The basis for disease self-management interventions is the ability to properly implement pro-health behaviors in everyday life, responsibility for therapeutic decisions and improving the quality of disease control (reduction of symptoms and disease progression) [23, 24]. The sooner it is taken, the greater the potential impact on the course of the disease. Interventions taken by patients with chronic obstructive pulmonary disease (COPD self-management intervention) include not only simple activities, such as learning to use inhalers and reading information materials about the disease, but also the complex ones, requiring the involvement of more people and resources [25, 26]. Among them, it is worth mentioning the extensive educational programs and training or regular support from trained personnel [27, 28].

In 2003, Bourbeau *et al.* [29] noticed that COPD self-management patients who are under the systematic care of properly prepared and trained healthcare professionals reduce the need for medical services and significantly improve their health. Their definition of self-management was based primarily on the effects of the educational programs which were introduced earlier. In turn, in 2012, Wagg *et al.* [30] showed that the concept of self-management is broader than education itself and also includes an action plan, symptom observation process, medical management, and control of exacerbations.

Lenferink *et al.* [32] in Cochrane Review compared the effectiveness of COPD self-management interventions-based action plans for acute exacerbations of COPD with usual care. They also analyzed respiratory-related hospital admissions and other health outcomes. 22 studies that involved 3,854 participants with COPD were included in the study. They concluded that self-management interventions were associated with improvements in health-related quality of life and lower risk of respiratory-related hospital admissions. On the other hand, they did not confirm the benefit of reduction of respiratory-related mortality rate.

Similarly, Zwerink *et al.* [33] analyzed the efficacy of self-management interventions for patients with COPD. They evaluated whether

self-management interventions in COPD can improve health outcomes or reduce healthcare utilization. Over 3,500 patients were included in the study. They also concluded that self-management interventions in patients improve health-related quality of life and reduce respiratory-related hospital admissions. Moreover, self-management interventions in patients with COPD improved dyspnea measured by the (modified) Medical Research Council Scale.

Understanding the current need to precisely define the intervention in self-management of COPD, Effing *et al.* in 2016 [17] developed a definition based on the proposals of an international group of experts. The consensus of their suggestions is that interventions in self-management of COPD are a personalized element of an often multicomponent organizational structure that aims to:

- motivating, engaging and supporting patients in positively adjusting their health behavior, and developing skills to better manage the disease;
- optimization and maintenance of physical health;
- relieving symptoms and functional impairment in everyday life;
- improving emotional and social well-being and quality of life;
- establishing and strengthening contacts between patients and healthcare professionals, family, friends and the community.

The implementation of this process is possible through repeatable actions between patients and health professionals who are competent to undertake self-management activities [17]. Patient-centered activities focus on:

- identifying needs, beliefs about health and strengthening internal motivations;
- striving for personalized goals;
- formulating appropriate strategies (e.g., exacerbation management) to achieve these goals;
- evaluation and possible readaptation of the strategy;
- the use of behavioral change techniques to motivate patients and improve their trust and competence;
- incorporation of patients' reading and writing skills to increase their comprehension.

The next step in understanding the role of interventions in management, education, as well as on-line monitoring of the effects and cooperation of patients with stable COPD is the understanding of their influence on the clinical course and the cost of treatment [33]. The idea behind disease self-management programs is to

help patients manage their symptoms of a stable disease on a daily basis, as well as in the event of exacerbations. In most cases, these programs are multifaceted and most often include the following areas of activity:

1. Educational sessions:
 - a. about COPD;
 - b. pulmonary function tests and oximetry;
 - c. importance of smoking cessation, immunization and pulmonary rehabilitation
2. Smoking cessation counseling:
 - a. support;
 - b. goal setting;
 - c. treatment of tobacco dependence
3. Training in the proper use of inhalers
4. Exercise plans and tips for physical activity
5. Action plans (how to recognize and what to do in the event of an exacerbation)
6. Control and management of dyspnea
7. Tips and nutritional goals.

Self-management programs can be disseminated through educational materials and self-study manuals, or in group sessions, mostly interactive, focused on personalizing goals. Mobile devices, such as tablets or phones can help in their application. Self-management by reducing exposure to risk factors and changing behavior can reduce the risk of a COPD exacerbation and enable earlier treatment. In turn, the motivational interview can also be used to modify the habits of COPD patients, which will result in faith in the possibility of change [33].

Analysis of studies in which COPD patients participated according to the PICO scheme (Population, Interventions, Comparison Outcome) (Table 2) in terms of interventions in management, education and telemonitoring of effects as well as patient cooperation, gave an objective answer to the question about the effectiveness and efficiency of actions carried out as part of disease self-management [33].

It seems that the implementation of the COPD self-management program has a positive effect on: quality of life, number of hospitalizations, as well as patients' knowledge of the disease and compliance with medical recommendations. However, it does not affect the exacerbation rate [33].

Pulmonary centers

Taking into account the current health needs of patients, diagnostic possibilities and often the multicentre location of structures which are essential for the treatment of COPD patients, in our opinion, it is necessary to transform the existing pulmonary departments, especially in terms of

expanding their outpatient clinic, into Pulmonary Centers. In their structure, in addition to hospital departments, i.e. Lung Diseases Ward with extensive diagnostic facilities, intensive care unit, intensive pulmonary supervision units dedicated to patients requiring non-invasive mechanical ventilation (NIV) the establishment of a Chronic Respiratory Failure Treatment Center with ambulatory oxygen therapy and NIV and a sleep lab included. Pulmonary rehabilitation should be expanded to contain components coordinating both rehabilitation and educational programs in the field of self-management of the disease with the widest possible participation of pulmonary nurses, physiotherapists, psychologists and educators. Extending the scope of services offered as part of specialist outpatient care is aimed at shifting the main burden of diagnosis and treatment of COPD to the clinic, leaving the need for hospitalization only for justified cases. Moreover, the efficient functioning of such centers requires good, partnership cooperation with primary care physicians who have close contact with the patient and his environment, hence the so-called Local Reference Network (Figure 2) [34].

When thinking about the structure of Pulmonary Centers, it is impossible not to mention its two very important employees: a medical coordinator and a pulmonary nurse. The first of them, by integrating the work of individual departments, workshops or plants, guarantees efficient operation, also by transferring time-consuming procedures to the responsibilities of associate professionals, and enables doctors to perform purely medical activities [35]. Furthermore, new and more advanced specialized pulmonary procedures concerning patients with chronic respiratory diseases have highlighted the need to establish pulmonary nursing specialization as soon as possible (Table 3) [20].

Conclusions

Recent years have brought a lot of new data about the care of patients with COPD: the diagnostic and therapeutic possibilities and the approach to treatment of the disease. The Polish Respiratory Society has implemented this and improved it in some areas. However, there is still urgent need for systemic solutions that would allow for effective integration into one organism of all structures necessary for multidisciplinary treatment of patients. These changes would result in comprehensive care for all COPD patients, regardless of their stage progress and change in

Table 2. Effectiveness and efficiency of COPD self-management according to the PICO Strategy (Population, Interventions, Comparison, Outcome)

Population	Patients with COPD
Interventions	Self-management interventions (structured interventions for patients to improve their own health behavior and self-management skills) Self-management plans (e.g., self-defined goals and predetermined plans) Multicomponent with educational intervention, exercise training and action plan in case of exacerbations Training to help in self-management psychological therapy (e.g., cognitive behavioral therapy) targeting COPD-related variables (e.g., panic related to shortness of breath) Telephone applications Mutual Support Groups Education (information provided to support wider knowledge of health), Information leaflets (e.g., on the use of inhalers, lung function) Structured information sessions Educational websites/applications Telemedicine monitoring (data and feedback from healthcare professionals, including data on exercise as well as health status)
Comparison	Peer comparison No intervention (placebo, no treatment) Combination of activities
Outcome	Quality of life (SGRQ) Symptoms, shortness of breath (Borg mMRC and orthopnea scale) Change in FEV ₁ , rate of change in FEV ₁ Exercise/physical capacity tolerance (6MWD, SWT) Hospital admissions, remissions and sleep days Depression (PHQ9; HADS) Anxiety (GAD7; HADS) Exacerbations Mortality Knowledge about COPD (Bristol questionnaire) Adherence to treatment plans Self-sufficiency (CSES) Resource use and costs

COPD — chronic obstructive pulmonary disease; CSES — COPD self-efficacy scale; GAD7 — general anxiety disorder-7; HADS — hospital anxiety depression scale; mMRC — modified medical research council; PHQ9 — patient health questionnaire-9; SGRQ — St. George’s respiratory questionnaire; SWT — shuttle walking test; 6MWD — 6 minute walk distance

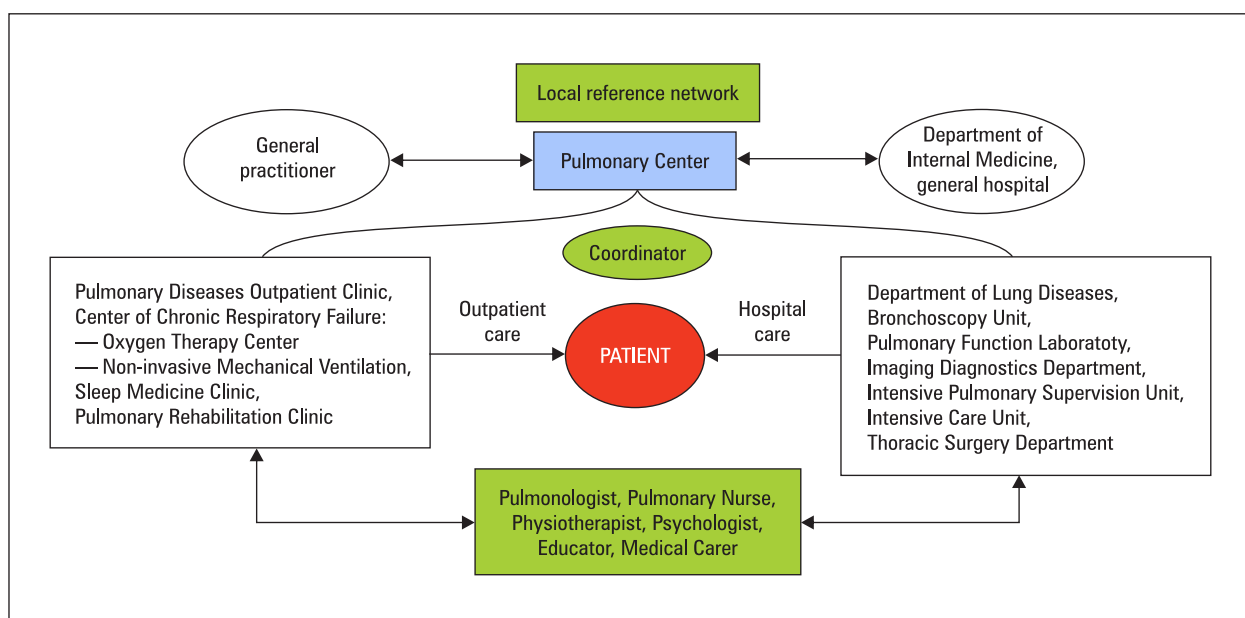


Figure 2. Proposed model of integrated pulmonary care for the diagnosis and treatment of COPD

Table 3. Areas of activity of the pulmonary nurse

1. Management of patients with chronic lung diseases leading to respiratory failure (COPD, interstitial lung diseases)
2. Functional tests of the respiratory system
3. Endoscopic examination of the respiratory system
4. Oxygen therapy and NIV
5. Inhalation therapy
6. Obstructive sleep apnea and obesity hypoventilation

COPD — chronic obstructive pulmonary disease; NIV — non-invasive mechanical ventilation

the attitudes of medical staff and patients to the disease. Their broadly understood awareness and deep commitment, would allow for better self-control of the disease.

Conflict of interest

None declared.

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