

# CHRONIC OBSTRUCTIVE PULMONARY DISEASE: PERSPECTIVES FOR PRIMARY HEALTH CARE

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## ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD) has become a major health challenge worldwide due to its increasing incidence and mortality, which have serious repercussions for health-care systems. **Methods:** We conducted a review of international efforts to control COPD in primary care. **Results:** The WHO created the Alma-Ata declaration which established for the first time, access to health care as a human right. This precept led to the implementation of numerous programs including practical approach to Lung Health and variants in several countries; schemes designed to centralize medical care; and resources to improve attention of respiratory diseases by adapting approaches to the health-care needs of local populations. Primary respiratory health care should include actions for timely detection, health education, and targeted treatment, but the challenge for all health systems is to ensure that their programs function adequately, for they still show shortcomings in terms of their application. **Conclusions:** We conclude that offering primary health care based on models that combine opportune diagnoses with suitable treatment can positively influence the course of COPD by treating early stages, thus slowing its progression. However, more extensive education and broader dissemination of information are necessary to achieve this goal. (REV INVEST CLIN. 2019;71:55-63)

**Key words:** Pulmonary disease. Chronic obstructive. Primary health care. Early diagnosis.

## INTRODUCTION

### Definition and epidemiology of chronic obstructive pulmonary disease (COPD)

COPD is defined as a common, preventable, and treatable condition characterized by airway obstruction that is not completely reversible with bronchodilators. It is caused mainly by inhaling smoke, especially from

tobacco products. At present, together all forms of chronic pulmonary disease comprise the third-leading cause of death worldwide among non-communicable illnesses, led by COPD, which was responsible for 2.3 million deaths in 2016, according to the most recent Global Burden of Diseases report<sup>1-3</sup>. In medium-low-income countries, it is the fourth-leading cause of death, while in high-income nations, it holds the fifth place<sup>4</sup>. COPD represents a worldwide challenge to

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health systems, precisely because it is both preventable and treatable<sup>5</sup>. While medical specialists have elaborated several guides for managing COPD patients, few of them deal with primary health care<sup>6,7</sup> where, logically, most such patients are detected and treated. Guidelines for clinical practice generally focus on defining: (1) the spectrum of at-risk populations and (2) suitable diagnostic criteria. Guidelines also stress the importance of managing modifiable factors; for example, by organizing workshops, talks and support groups for at-risk sectors where patients are encouraged to quit smoking or inhaling other harmful smokes<sup>8</sup>.

## METHODS

For this review, we conducted a systematic search of articles published between 1978 and 2018 using keywords from the Mesh dictionary in PUBMED/NIH, filtered for complete text documents. We then searched using the following term combinations: primary health care, pulmonary disease, and chronic obstructive disease. Of the 522 documents found, 75 were controlled studies and two were meta-analyses. For primary health care, pulmonary disease, chronic obstructive, and spirometry, 77 documents were located, six of which were controlled clinical studies.

## RESULTS

### Poor adherence to guidelines for clinical practice in primary health care

A multinational study conducted in Latin America by Laniado-Laborín et al. found poor application of existing guidelines at the primary level of health care (PHC). The main causes cited were as follows: "I've never read them" (42%), "lack of access to information" (20%), and "little time to read" (6%). However, poor adherence to such recommendations is a global problem<sup>9</sup>. Discussing the use of the  $FEV_1/FVC < 0.70$  as criteria for airflow obstruction, Schermer and Quanjer observed that it generated a high number of false positives, so they suggested using the lower limit of normality (LLN) instead<sup>10</sup>. Takahashi et al. found that up to 31% of COPD patients that seek PHC does not receive any kind of treatment<sup>11</sup>. Other studies underscore factors such as poor adherence,

inadequate understanding of guidelines, infrequent use of spirometry for diagnosis (mean 26%; range 10–48%), and distrust of X-rays as a diagnostic tool (mean 14%; range 5–22%)<sup>12,13</sup>. An analysis of PHC in Germany found a significant disparity in the use of guidelines (Global Initiative for Chronic Obstructive Lung Disease [GOLD] vs. German PHC criteria for COPD), and insufficient adherence to diagnostic measures, treatment programs, and patient education<sup>13</sup>. Studies in 56 primary care centers in Sweden documented inadequate implementation of established processes for detecting COPD patients coupled with poor follow-up on exacerbated cases<sup>14</sup>. The main obstacles to adherence to these guidelines include unfamiliarity and disagreement with recommendations due to perceptions of few benefits and inefficacy<sup>15</sup>.

### Social and economic burden of COPD

COPD carries a huge social burden, considering the range of disability-adjusted life years (DALYs), an index that totals the years lost to premature death plus the years of life with disability. COPD was once the eighth-leading cause of DALYs worldwide, but by 2013 it rose to the third place. Europe invests €38.6 billion to treat this disease, a figure that represents 56% of all outlays on respiratory ailments. The U.S. has a similar level of spending (\$50 billion USD), of which a significant percentage goes to treat exacerbated cases<sup>5</sup>. Finally, health-care systems rarely provide chronic care to patients in advanced stages of COPD, an omission that affects not only the patients themselves but also people around them at work and at home who must help care for their ill family member. Clearly, this has consequences for both the family's economy and the community as a whole.

### Diagnosing COPD

COPD diagnosis of at-risk patients is confirmed by post-bronchodilator spirometry that detects an obstructive pattern ( $FEV_1/FVC$  relation  $< 0.7$ , or  $< LLN$  the lower fifth percentile of age- and gender-adjusted  $FEV_1/FVC$ )<sup>16</sup>. The most common risk factors are smoking, exposure to solid-fuel smoke, workplace exposure, and genetic factors. Disease severity is expressed as the degree of obstruction estimated by  $FEV_1$  expressed as percentage of predicted<sup>5,6,8,17</sup>, although emphasis has recently shifted to giving greater importance to respiratory symptoms or

multidimensional indices like BODE, which considers the body mass index (BMI), the degree of obstruction assessed by FEV<sub>1</sub>, the 6 min walking distance, and the severity of dyspnea. The practice of using spirometry should not be limited to respiratory specialists. Indeed, it is necessary that the first-contact physicians have access to this test, given the high prevalence of COPD in middle-aged populations who present with dyspnea, coughing, or chest tightness or wheezing, which may appear in as many as three of every 10 individuals going to primary care, being more frequent in men<sup>18</sup>. Smokers can also be monitored using spirometry. Although in a study in Spain in primary health care, up to 16% of asymptomatic patients were diagnosed with COPD during 3 years of follow-up, they had a heavy smoking history: 31 pack-years on average. In addition, 22% of smokers studied stopped smoking during the 3 years of follow-up<sup>19</sup>. The American Association of Family Physicians recommends spirometry to diagnose COPD in patients with symptoms or signs or with risk factors for COPD<sup>20</sup>. One study of 278 family physicians found that 76% reported using spirometry to diagnose COPD, but only 32% utilized post-bronchodilator spirometry<sup>21</sup>. Using spirometry without the bronchodilator can increase COPD diagnosis by as much as 30%, likely including patients with bronchial asthma and reversible obstruction<sup>22</sup>. Observations in 12 primary health care centers in the U.S. showed that 71% of spirometry procedures were interpreted appropriately, and 76% of those interpretations agreed with respirologists. However, only 48% of the results led to modifying the treatment prescribed<sup>23</sup>. In developing countries, the use of spirometry in at-risk patients was seen in 26% of cases<sup>12</sup>, but this figure was as low as 10% in PHC in studies in Asia, which revealed that even specialists may use spirometry in only 50% of cases<sup>24</sup>. In Mexico, general practitioners seldom use spirometry<sup>12</sup>, and some studies suggest that merely 34% follow the GOLD guidelines<sup>9</sup>.

## Case finding and screening for COPD

Screening asymptomatic patients who have risk factors for a disease, whether genetic, environmental, including occupational<sup>5</sup> can have a huge impact on health. Workers exposed to smoke have a higher risk of developing COPD (1.64; 95% CI, 1.25-2.14) than non-exposed individuals<sup>25</sup>, so it is reasonable to argue that a search strategy applied to identify cases,

instead of simply diagnosing symptomatic patients, would bring greater benefits to the general population. A strategy designed to detect asymptomatic COPD cases found that in at-risk individuals over 35 years old, this was more effective<sup>26</sup>, especially if a spirometry is combined with a questionnaire<sup>27</sup>. Jordan et al., combining a survey and peak flow meters, found that the number of new cases diagnosed in their study group was greater than in a control group (5% vs. 2%, OR 2.34 [2.06-2.66];  $p < 0.0001$ ) and that cost-effectiveness improved (€333 vs. €376)<sup>28</sup>. A study conducted in Japan that applied a screening strategy to detect cases with follow-up on patients aged 40 and over in the form of regular visits and use of a portable spirometer generated a sensitivity of 40.7%, a specificity of 96.4%, a PPV of 78.6%, and an NPV of 83.5%<sup>29</sup>. These results clearly indicate the need to screen subjects with risk factors in the fourth decade of life and not simply diagnose already symptomatic cases.

## Benefits of primary care

In September 1978, the WHO issued a call to health systems worldwide to guarantee health care as a universal right and to explore related social, economic, and political factors in their respective countries. The proposal urged national states to promote and protect health not only as a right of individuals but also as an indispensable factor for economic and social development. The Alma-Ata Declaration proposed reaching these objectives by orienting PHC to ameliorate the most pressing problems of each community and emphasize self-responsibility and local participation<sup>30</sup>. In 1988, the WHO reviewed the advances of Alma-Ata, considering in addition issues of universal health coverage, vaccination campaigns, and maternal and infant mortality. The report revealed a huge gap between developed and developing countries<sup>31</sup>. In 2008, the United Nations' consensus after 30 years of the Alma-Ata Declaration was republished to reinforce its principles, taking into account social changes in the world since 1978<sup>32</sup> and insisting on the indispensable need for broad, high-quality PHC programs for communities worldwide<sup>33</sup>. The key characteristics underscored in that report are promoting health, universal coverage centered on people, solidarity, social inclusion, and greater decision-making at the community level.

## Primary care schemes for COPD

Several proposals for primary care exist, but they differ in how they seek to incorporate the care of respiratory illnesses, including COPD. Programs for COPD primary care include single-subject programs (only COPD), integrated respiratory schemes (several respiratory diseases), and programs dealing with a variety of health problems among which COPD is included.

### Specific primary care programs for COPD

Finland established a National Program for Chronic Bronchitis and COPD whose main objectives were to improve diagnosis in PHC to reduce: disease prevalence, the number of moderate-to-severe cases, the frequency of hospitalizations, and treatment costs<sup>34</sup>. This program includes guidelines on smoking and spirometry use and efforts to enact anti-smoking legislation. Reported results include a 39.7% reduction in days spent in hospital and lower costs of medical care. The prevalence of smoking among men decreased from 30% to 26%, although this change did not modify the prevalence of COPD or its level of mortality. This scheme did, however, quickly contribute to improving detection and reducing the number of moderate-to-severe cases<sup>34</sup>. The WHO judged this program a success but suggested that integrating other illnesses would ensure its long-term viability while reducing redundancies and overlaps<sup>33</sup>. Because implementing specific programs for individual illness are clearly unviable, it is necessary to formulate integrated programs. Another problem with single-subject plans for COPD like the one in Finland is that they compete for attention and resources with programs that manage other diseases, perhaps even some in the same area of specialization. Obviously, this could threaten their long-term sustainability.

### Integrated respiratory care programs

Practical Approach to Lung Health (PAL) was created as a proposal for a comprehensive syndromic approach to respiratory symptoms that would expand services through existing tuberculosis clinics around the world<sup>35</sup>. One premise was that people with cough or phlegm who tested negative for tuberculosis would be invited to take a broader evaluation to determine

the cause of their symptoms. This scheme has been implemented in several nations where it has reduced treatment costs, improved control of tuberculosis, and lessened both the use of antibiotics to treat acute respiratory infections and the frequency of referrals to higher levels of medical care<sup>35</sup>. Of course, PAL must be adapted to the specific conditions that exist in each country based on assessments of their baseline situation and, later, of their post-intervention results. South Africa's version of the program - called PAL Health in South Africa (PALSA) - for example, includes guidelines for diagnosing and treating four respiratory diseases (tuberculosis, COPD, and upper and lower airway infections). It takes a syndromic approach, applies diagnostic algorithms<sup>36</sup>, and includes a training program for nurses designed and supervised by physicians, anthropologists, and researchers, which set out to develop a personalized form of instruction accompanied by continuous evaluation of results in the population<sup>37</sup>. This program was later broadened to include HIV/AIDS patients and called PALSA PLUS. It achieved a much greater impact than routine approaches adopted in typical health centers (OR 1.25, 95% CI: 1.01-1.55)<sup>38</sup>. PALSA PLUS results have demonstrated efficacy in primary care in terms of diagnoses and the breadth of coverage of antiretroviral therapy. Today, nurses also benefit from this training program<sup>39</sup>. Respiratory programs of this kind have many advantages for family doctors who do not focus on one single disease but are trained to attend patients' main respiratory problems. Implementing such respiratory programs, however, entails competing with other disease groups that may receive more substantial resources from states. For these reasons, the creation of integrated primary health-care centers has better long-term perspectives.

### Integrated primary health-care programs that include respiratory diseases

The WHO has produced programs for non-communicable diseases (NCD) like the recently instituted package essential NCD, which focuses on chronic respiratory, cardiovascular, and metabolic diseases<sup>40</sup>. While, in principle, it would seem to have advantages over other approaches developed earlier to deal with acute and chronic illnesses, we do not yet have any studies or evaluations of its implementation and effectiveness. The Knowledge Translation Unit of the pulmonary institute at the University of Cape Town

developed the adult practical approach to care kit (PACK) program that has proven effective in enhancing PHC in South Africa. Designed as an extension of the PALSA PLUS system to include NCD (or NCD, such as hypertension, diabetes, and cardiovascular disease), mental health, palliative care, and women's health, it incorporates guidelines based on evidence, applicable policies, team training through analysis of clinical cases at its work centers, prescriptions by non-medical health personnel, and a cascade system applied to the jurisdiction. The starting point of the specific tool involved requires evaluating symptoms with algorithms, combined with completing information forms that include a verification list which helps health workers assess and advise patients, and then treat their chronic conditions. The training program emphasizes continuous education, short visits to clinics by trained personnel, facilitating information flows, and inviting teams of professional health workers to participate in the daily application of the PACK program<sup>41</sup>. PACK has also been adapted and implemented in Botswana, while Malawi, Gambia, Brazil, and Mexico have tested pilot PALSA PLUS programs. Given the evidence of the efficacy of such approaches, their use could be extended to many countries, although this would entail adapting guidelines to each community's needs and integrating them with local policies<sup>41</sup>. Integrated programs of this kind fulfill the WHO's proposals and greatly reduce competition among interest groups associated with different diseases because their success depends largely on achieving a consensus that is respected and promoted by everyone involved. Adequate PHC is urgently required throughout the world, regardless of individual countries' levels of development. South Africa's efforts to adapt the plan are remarkable, while Finland's program required restructuring and decentralizing the health-care system to favor primary care centers supported by sufficient state funding and legislation to guarantee that health policies will center on local needs<sup>42</sup>. Australia provides another example of the integration of a primary care health system made necessary, in part, by its very diverse geographic and social regions characterized by enormous variations in disease prevalence and incidence. This heterogeneity coupled with a health system subsidized by both the public and private sectors, demands integrating all health systems with the support of health education resources and preventive medicine<sup>43</sup>.

## Essential medicines and medical equipment recommended by the WHO for chronic pulmonary diseases

The WHO's chart of essential medicines is a document that orients countries in the purchase of a group of basic medicines, including a limited number of respiratory drugs for treating COPD and asthma, namely beclomethasone, budesonide/formoterol, epinephrine, salbutamol, and ipratropium bromide<sup>44</sup>. Unfortunately, this list omits long-acting bronchodilators and antimuscarinics that many studies -mostly conducted in developed or medium-income countries - have shown are effective in preventing exacerbations and improving patients' quality of life<sup>5</sup>. In this regard, it is important to perform cost-benefit studies that consider the economic conditions of developing countries, as these could produce quite different results from those generated in developed nations. Another aspect drawing our attention is that the WHO specifies as "basic medical equipment" for testing the respiratory function devices which analyze gas diffusion and measure airway resistance or total pulmonary volume, like the plethysmograph<sup>45</sup>. These devices are not used routinely but are only available in specialized health centers. Thus, greater emphasis must be placed on the spirometer and the pulse oximeter as the main diagnostic tools because of portability and cost, and health personnel must become familiar with their features and limitations.

## Primary health care in countries with socialized medicine

Programs of medical care that offers universal access to health are based on integrated schemes that cover a full range of diseases, among them, COPD. Because of COPD's high incidence in Sweden, specialized centers exist to offer primary care that includes spirometry and trained nursing personnel. This approach has reduced the number of exacerbations from 2.2 to 0.9 visits/year<sup>46</sup>, despite the limited use of spirometry (available at only 50% of centers), and a moderate anti-smoking advice (50%), increased influenza vaccinations (60%), and substantially lowered the number of referrals to pulmonary rehabilitation (19%)<sup>47</sup>.

In Switzerland, discrepancies between PHC guidelines and real practice were found, especially with respect



to educating COPD patients, referrals to pulmonary rehabilitation, and erroneous prescription of inhaled corticosteroids in 38% of mild cases and 43% of moderate ones<sup>48</sup>.

In Denmark's health-care service, 99% of citizens are registered at state-funded primary care centers<sup>49</sup>; despite the high prevalence of COPD, 74% of patients never consulted a doctor on feeling the initial symptoms of this disease<sup>50</sup>. This has led to greater emphasis being placed on detecting asymptomatic patients with risk factors<sup>51,52</sup>, including a screening project implemented in Copenhagen based on exposure to smoking and the presence of dyspnea, chronic coughing, and sputum<sup>53</sup>. When a person with COPD is detected, the patient is referred to a pulmonary rehabilitation program at a primary care center. This project, called KOALA, has shown excellent acceptance and functionality<sup>54</sup>.

France's health system was funded with payments from workers and employers and is operated by state-controlled insurance companies that pay doctors' fees, which causes that physicians concentrate in the cities rather than the communities<sup>55</sup>. The use of spirometry in PHC was judged to be inefficient due to the time required to perform testing ( $15.2 \pm 5.9$  min) and the often low quality of tests (58% of all spirometries have curves and only 30% are deemed acceptable)<sup>56</sup>. The lack of timely diagnosis of COPD prevents patients from consulting physicians and beginning treatment opportunely, thus increasing the economic costs of the disease<sup>57,58</sup>.

In summary, even countries with socialized medicine and universal access to health services have limitations in terms of adequate care of COPD patients, including poor spirometry use and insufficient efforts to ensure timely detection and begin preventive care.

## Initiatives in Mexico

Mexico's health-care system has a standardized program for detecting tuberculosis in persons with respiratory symptoms (cough or phlegm), but most subjects who receive negative test results (smear acid-fast bacilli search) are discharged without follow-up<sup>59</sup>. In 2017, the National Institute of Respiratory Diseases elaborated the AIRE guidelines (integral

action for respiration) based on PALSA but adapted to local conditions. AIRE was developed for use by primary care physicians, analyzing respiratory symptoms, daytime somnolence, and smoking, diagnosis of asthma or COPD, or suspicions of tuberculosis/HIV. Many primary care physicians in Mexico city and several states have received training in the AIRE program. Recently, Mexico's Federal Department of Health implemented the Specific Action Program for the Prevention and Control of Respiratory Diseases and Influenza (PAE-ERI). Its objectives are to prevent acute cases of pneumonia and influenza while providing primary care for up to 80% of asthma and COPD patients<sup>60</sup>.

## Guidelines for treating COPD in primary care

In 1997, a panel of experts began to meet to create the GOLD standard and develop the now well-known international COPD guidelines (2001), which establish norms for diagnosing, managing, treating, and preventing this disease. In addition, it establishes goals for reducing the number of exacerbations and hospitalizations<sup>61</sup>. This approach received criticisms because it provides few recommendations for primary care, palliative care, and treatment of such comorbidities as depression, anxiety, and social impact<sup>62</sup>. The pocket-sized version of GOLD is more useful for PHC personnel, as it emphasizes non-pharmacological treatments including adherence to supplementary oxygen, vaccination, education, self-care, exercise, nutrition, and orientations on palliative care. The COPD-X Plan by the Thoracic Association of Australia and New Zealand and Australia's Lung Foundation<sup>63</sup> were disseminated to all health-care personnel involved in caring for COPD patients. They summarize the key points of primary care, namely diagnoses by spirometry, suspected COPD in people > 35 years old with a history of smoking or workplace exposure to gases and dust, support to help patients quit smoking, referrals to pulmonary rehabilitation services, advice to take the influenza vaccination annually, and pneumococcal immunization. Moreover, they recommend developing an action plan that helps patients recognize the signs of exacerbation and immediately seek attention, invites them to verify their medications, and refers them to local Lung Foundations for group support and education<sup>64</sup>.

Britain's National Institute for Health and Care Excellence created COPD guidelines for first- and second-level health care in 2004. Designed for PHC, it recommends - in all cases - quitting smoking, offering education, evaluating comorbidities, measuring the BMI, promoting exercise and vaccinations, recognizing the symptoms of exacerbation, evaluating functional limitations and hypoxemia, providing social support, and assessing options for palliative care<sup>65</sup>. The Guidelines for Diagnosing and Managing COPD for PHC were issued by the International Primary Care Respiratory Group. While they largely follow the GOLD approach, they also focus on the resources to which first-level doctors have access<sup>66</sup>. Today, this organization is devoted to disseminating research, training health personnel to develop abilities in education, evaluating the most useful diagnostic tools, doing follow-up on COPD patients, and assessing PHC initiatives like the "pilot" multidisciplinary educational program for diagnosing and managing asthma and COPD that was tested in Sao Paulo, Brazil, as part of wider efforts to treat this disease and improve patient handling by organizing workshops and groups discussions with professionals from various fields<sup>67</sup>.

The PROMET study (Madrid's Telehealth Project for COPD) demonstrated the effectiveness of in-house monitoring by a telemedicine program in patients with severe COPD<sup>68</sup>, by significantly reducing the number of hospitalizations. The EDGE-platform (Self-management and Support Program)<sup>69</sup> and COMET (European trial for COPD patient management) aim to assess in-home self-care programs supported by electronic media and online platforms<sup>70</sup>. The use of online rehabilitation in the CORE trial study demonstrated benefits compared to other common approaches<sup>71</sup>. While resources of this kind could be used to support PHC, this would require larger investments in health-care systems in this field accompanied by guarantees of sustainability.

## CONCLUSIONS

The importance of implementing programs such as the ones mentioned in this review in primary health care lies in the expansion of the population over 65 years of age, which has reached an annual rate of 3.8%. This means that by 2025 this sector will

outnumber the childhood population and bring an increase in the incidence of chronic respiratory diseases<sup>72</sup>. Caring for COPD and other common non-communicable but high incidence illnesses (diabetes, cardiovascular, and cerebrovascular disease) demands the participation of primary care because it far exceeds the capacity of specialists in the field. Providing comprehensive care to handle the most common respiratory illnesses, including COPD, appears to be the best option for most regions of developing countries, compared to single-subject programs. Indeed, it seems clear that an integral primary care program that covers the main respiratory and non-respiratory health problems has many advantages over other approaches.

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