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COPD in a basic health unit: an intervention project

DPOC em unidade básica de saúde: um projeto de intervenção

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Francinne Vitória Silva
https://orcid.org/0000-0002-1580-8315
Family and Community Physician. Master's student in Family Health at Universidade Federal de Pelotas/RS
E-mail: francinnevitoria1@hotmail.com

Camila Moraes
Medical Student, Teaching Institution: Fundação Universidade Regional de Blumenau (FURB)
E-mail: camilamoraes16@hotmail.com

Isabela Gretter Ferro Silva
Medical Student, Teaching Institution: Fundação Universidade Regional de Blumenau (FURB)
E-mail: isabelagretterferro@hotmail.com

Gabriel Padilha Stadnick
Medical Student, Teaching Institution: Fundação Universidade Regional de Blumenau (FURB)
E-mail: gabistad@hotmail.com

Luís Gabriel Blemer
Medical Student, Teaching Institution: Fundação Universidade Regional de Blumenau (FURB)
E-mail: luisgblemer@hotmail.com

Nathan Kulkys Marques
Medical Student, Teaching Institution: Fundação Universidade Regional de Blumenau (FURB)
E-mail: nathan.kulkys.marques@outlook.com

ABSTRACT

Chronic Obstructive Pulmonary Disease (COPD) and asthma are common respiratory diseases, but with complicated definitions. Spacers are devices used for the administration of inhaled medications, aiming to reduce the need for synchronization by the patient, allowing him/her to breathe normally during the administration of the medication. However, due to high cost and low availability, the use of commercial spacers is hampered in developing countries, such as Brazil. To solve this problem, several forms of homemade spacers have been developed. This project aims to expand knowledge on the main lung diseases seen in primary health care and their interventions based on the latest evidence and outpatient therapeutic updates, including the use of home-made inhaler devices. The aim is to promote adherence to inhalation treatment and improve patients' quality of life. The rationale for this project is that the use of spacers facilitates adherence to inhaled medication treatment for asthma and COPD, as well as for patients who have both conditions. The project aims to provide spacers for all patients using this type of medication, respecting the principles of universality, equity and equality of the Unified Health System. The method used was an intervention project carried out in the health strategy from 05/25/2021 to 07/02/2021. Homemade spacers were manufactured using 500mL PET bottles, both in the adult

and pediatric models. The spacers were distributed along with user manuals and guidance on the importance of asthma treatment. Users were randomly selected using a search for patients using the medications salbutamol spray and beclomethasone spray. The results of the project were positive, with the spacers being made and delivered within the stipulated timeframe. This contributed to a better administration of inhalation drugs, enabling a better control of the diseases analyzed and optimizing the treatment of users. In conclusion, the method of administration of inhaled drugs using a spacer reduces oral deposition and optimizes the inhalation of particles of adequate size. There was a good response from users and adherence to treatment with the offer of homemade spacers, in addition to a correlation between the improvement of the profiles of users served in the ESF.

Keywords: Asthma, COPD, Primary care, Public health.

1 INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a common respiratory disease that affects more than 5% of the population. It is characterized by airflow limitation and involves the association of lung tissue destruction (emphysema) and smaller airway injury (obstructive bronchiolitis) (HAN et al., 2021). Asthma, on the other hand, is a condition that is difficult to define. According to the Global Initiative for Asthma, it is a heterogeneous disease, generally characterized by chronic airway inflammation. Asthma manifests itself through respiratory symptoms, such as wheezing, dyspnea, chest tightness and cough, which vary in intensity and frequency, associated with a variable limitation of expiratory flow (FANTA, 2021). Spacers are devices used for the administration of inhaled medications, with the aim of reducing the need for synchronization by the patient, allowing him to breathe normally during the administration of the medication. In addition, the use of spacers has benefits, such as increasing the deposition of drugs in the lungs and reducing it in the oropharynx, as well as reducing the unwanted effects of inhaled drugs (RODRIGUEZ, 2008). However, the high cost and low availability hinder the use of commercial spacers in developing countries, such as Brazil. To solve this problem, several forms of homemade spacers have been developed. A Cochrane study conducted in 2008 demonstrated the absence of differences in efficiency between commercial and homemade spacers in acute asthma episodes in children. Thus, homemade spacers are a viable and affordable alternative to commercial options (RODRIGUEZ, 2008).

2 MATERIALS AND METHODS

In the period from 25/05/2021 to 02/07/2021, an intervention project was carried out in the family health strategy. The main objective of this project was to provide an affordable and effective solution for patients with asthma and COPD, through the manufacture of homemade spacers.

The spacers were produced using 500mL PET bottles, and models were made available for both adults and children, according to their specific needs. In addition, the distribution of the spacers was accompanied by user manuals and detailed guidance on the importance of asthma treatment. In order to ensure a fair and unbiased approach, the users benefiting from the project were randomly selected.

A search among those who use salbutamol spray and beclomethasone spray was used, ensuring the inclusion of a representative sample. With this initiative, we sought to expand access to spacers, overcoming the barriers imposed by the high cost and low availability of commercial devices, especially in developing countries such as Brazil. The manufacture of homemade spacers proved to be a viable and efficient alternative, contributing to the promotion of adherence to inhalation treatment and, consequently, improving the control of respiratory diseases and the quality of life of users served in the family health strategy.

3 RESULTS AND DISCUSSION

Respiratory diseases represent a public health problem in both developed and developing countries, in Brazil according to the Ministry of Health (DATASUS), between 1998 and 2005 pneumonia, asthma and chronic obstructive pulmonary disease (COPD) accounted for about 12% of Hospital Admission Authorizations (AIHs) issued (CONDE., 2015).

The BORG scale of perceived exertion, used in the study, is a tool for monitoring the intensity of physical effort, in a non-invasive way, easily applied and of low financial cost (KAERCHER et al., 2018). The modified Borg scale has been used to assess the perception of dyspnea related to physical exercise, and more recently it has been applied in patients with obstructive pulmonary diseases (asthma or COPD), the temporal, emotional and psychological adaptation factors appear as limitations of the study, however they do not invalidate it as an additional method of evaluation (CAVALCANTE et al., 2008).

Asthma and COPD can coexist, or overlap, particularly in smokers and the elderly, history and pattern of symptoms as well as past records can help distinguish asthma from a more fixed airflow limitation. Uncertainty should result in early referral to a pulmonologist, as overlapping COPD and asthma results in worse outcomes (GUSSO et al., 2019).

Chronic Obstructive Pulmonary Disease is a common respiratory disease characterized by airflow limitation, affecting more than 5% of the population. The pathogenesis of the disease consists of the

association of parenchymal destruction (emphysema) and small airway injury (obstructive bronchiolitis) (HAN et al., 2021).

The main risk factor for COPD is smoking burden. Patients with no genetic predisposition with a smoking load of less than 15 pack-years are unlikely to develop the disease, while more than 40 pack-years is a strong predictor for the onset of the disease. Some studies, however, suggest that duration of smoking may be more important than pack-years (HAN et al., 2021).

The three cardinal symptoms of COPD are dyspnea, chronic cough and sputum. The most common early symptom is dyspnea on exertion and the clinic is usually worse in the morning. On physical examination, reduced vesicular murmur, increased inspiration/expiration ratio, spontaneous wheezing or wheezing on forced expiration, barrel chest, among others, may be present (HAN et al., 2021).

Spirometry is the main diagnostic test, which attests to irreversible or partially reversible flow limitation with bronchodilator use. A ratio between forced expired volume in one second (FEV1) and forced vital capacity (FVC) of less than 0.7 is diagnostic of flow limitation. Laboratory tests are important for the exclusion of differential diagnoses. Complete blood count and evaluation for heart failure are essential. Blood glucose, urea, creatinine, electrolytes, calcium, phosphorus and TSH should be ordered depending on clinical suspicion. Increased bicarbonate may be an indirect indication of hypercapnia and indicates blood gas analysis. Imaging tests are not necessary for the diagnosis of COPD, although they are useful in the context of diagnostic doubt or exacerbations (HAN et al., 2021).

The etiology in most patients is long-standing smoking. It is important, however, to rule out other causes and complicating factors such as occupational exposure to smoke, history of tuberculosis and asthma (HAN et al., 2021).

The differential diagnosis of chronic productive cough and dyspnea in adult patients is broad (heart failure, COPD, interstitial lung disease, PTE). Chest radiography without cardiomegaly and an FEV1/FVC ratio <0.7 narrow the differential to COPD, chronic obstructive asthma, bronchiectasis, tuberculosis and bronchiolitis. Chronic obstructive asthma may arise in a patient with a history of asthma who has smoked, for example. Chronic bronchitis with normal spirometry is a possible condition among smokers. Bronchiectasis shares several features with COPD. Tuberculosis is both a comorbidity and a risk factor for the development of COPD (HAN et al., 2021).

Screening for COPD with spirometry is not indicated. However, a slight suspicion of COPD is sufficient to indicate that the test should be performed (HAN et al., 2021).

COPD can be categorized according to the degree of symptoms and exacerbations per year. The severity of symptoms is graded according to the modified *Medical Research Council* (mMRC) dyspnea scale. Grade 0 or 1 is taken as a mildly symptomatic patient. From grade 2 onwards, the patient is considered to be very symptomatic. An exacerbation that has led to hospitalization or two or more requiring systemic glucocorticoids or antibiotics classifies the patient as an exacerbator (HAN et al., 2021).

Based on these two criteria, patients are divided into 4 categories: A - mildly symptomatic and non-exacerbating, B - very symptomatic non-exacerbating, C - mildly symptomatic exacerbating and D - very symptomatic exacerbating. Low FEV1/FVC ratios are related to a higher number of exacerbations, but these are not a reliable indicator for clinical practice and should not guide treatment. Spirometry is important in follow-up to assess disease progression and surgical risk if any intervention is considered (HAN et al., 2021).

The goals of treatment are to improve symptoms, reduce the number of exacerbations and improve quality of life. Initial treatment is chosen according to the criteria mentioned. Adjustment is performed according to clinical response. Patients with severe disease, however, may benefit from a more intense approach from the start of treatment. The two pillars of treatment are bronchodilators and inhaled glucocorticoids (HAN et al., 2021).

All COPD patients should receive short-acting bronchodilators for relief of dyspnea attacks. Smoking cessation and vaccination (pneumococcal, influenza and pertussis) should be encouraged for all patients (HAN et al., 2021).

Group A management consists of the use of short-acting bronchodilators (beta agonists/SABA or antimuscarinics/SAMA), which last 4-6 hours. Medication is offered on demand (HAN et al., 2021).

Group B management consists of long-acting beta-agonists (LABA) or long-acting muscarinic antagonists (LAMA) associated with SABA or SAMA. The choice between LABA and LAMA is made individually. LABA may cause resting tachycardia or tremor. LAMA can cause xerostomia and sometimes urinary retention (HAN et al., 2021).

Alternatives for patients with severe dyspnea (CAT>20) at initial presentation are the association of LAMA and LABA. Patients with overlap of COPD and asthma will have a better response to the association of LABA with glucocorticoids (HAN et al., 2021).

Management of group C should be performed with a LAMA, which demonstrates lower exacerbation rates (HAN et al., 2021).

Group D should be managed with a combination of LAMA and LABA. An alternative, for those with > 300 eosinophils/ml blood or overlap with asthma, is the association with glucocorticoids. In cases of LAMA-LABA combination, formulations with both drugs are preferred over separate inhalers (HAN et al., 2021).

According to GOLD, COPD exacerbation is an acute event characterized by worsening of respiratory symptoms beyond daily variations, which leads to change in treatment. Nominally, increased dyspnea, cough or secretion. Treatment consists of SABA and oral glucocorticoids (HAN et al., 2021).

Inhaled medications can be used in children, adults and the elderly without the use of spacers, however it is known that their use doubles or triples the dose of aerosols deposited in the airways (RIBEIRO., 2005). According to a study conducted in Recife, similar clinical and functional improvement was found in patients using homemade or commercial spacers, both groups showed statistically significant

improvement in the study period (SCHOR et al., 2017). A study by Duarte et al. conducted in Juiz de Fora demonstrated similar efficacy between spacers and nebulization for the treatment of acute asthma attacks, with less observation time and fewer unwanted effects (DUARTE et al., 2002).

Asthma is a condition that is difficult to define. According to the *Global Initiative for Asthma*, it is a heterogeneous disease, usually characterized by chronic airway inflammation. It is marked by a history of respiratory symptoms such as wheezing, dyspnea, chest tightness and cough that vary in time and intensity, associated with variable expiratory flow limitation (FANTA, 2021).

Asthma is diagnosed before the age of 7 years in 75% of cases. Most children experience remission of the disease during puberty, with possible recurrence years later. Occupational asthma, aspirin-induced asthma and eosinophilic asthma are separate entities, with usual onset in adulthood (FANTA, 2021).

The typical history is of respiratory symptoms that arise after exposure to certain triggers (allergens, exercise, viral infections) and improve with cessation of this exposure or asthma medications. The classic symptoms are wheezing, commonly on expiration, cough (sometimes worse at night) and dyspnea. The clinical picture may contain all the symptoms as well as only one or two of these. A feeling of chest oppression is common, but severe chest pain is rare. The respiratory symptoms mentioned are common, and diagnosis based on history alone is difficult. On the other hand, episodic symptoms and characteristic triggering factors (exercise, cold air, aeroallergens) increase the likelihood of diagnosis (FANTA, 2021).

Exercise-induced symptoms usually appear within 5 to 15 minutes after 5 minutes of intense exercise or about 15 minutes of moderate exercise, and resolve within 30-60 minutes. Asthma episodes are more frequent when the inhaled air is cold. The chronology is different from exertional dyspnea, which starts earlier and resolves within a few minutes (FANTA, 2021).

Allergens that commonly trigger asthma are dust mites, mold, furry animals, cockroaches and pollen. The onset of lower respiratory symptoms after exposure to cats or dogs is virtually pathognomonic of asthma. Allergenic foods rarely generate respiratory symptoms alone and viral infections are common triggers of asthma, although they can cause exacerbations of other chronic respiratory diseases. Symptoms following exposure to irritants such as cigarette smoke, changes in weather, chemicals or dust are not specific to asthma. Personal or family history of atopy and asthma favor the diagnosis (FANTA, 2021).

Some factors decrease the chances of being treated for asthma: lack of response to inhaled bronchodilators or oral glucocorticoids, onset of symptoms after the age of 50, symptoms such as chest pain, feeling empty-headed, syncope and palpitations, and history of smoking more than 20 pack-years (FANTA, 2021).

On physical examination, the classic finding is wheezing, polytonal and diffuse, most commonly expiratory. This sign, however, is usually not present in the period between exacerbations of the disease, such as in an elective consultation. Moreover, wheeze is not a good predictor of the level of airflow obstruction, although it is quite interesting for this diagnosis. It is important to differentiate wheezing from laryngeal stridor and other upper airway sounds, which are more intense in the neck region than in the chest

and are usually single-voiced. Atopic dermatitis is a common finding in the asthma patient. Finger clubbing is not a sign of asthma, and should alert the clinician to the possibility of interstitial lung disease, lung cancer or bronchiectasis (FANTA, 2021).

Spirometry is very important in the diagnosis of asthma. Its results can demonstrate whether obstruction is present through the FEV1/FVC ratio, assess the reversibility of obstructive change after bronchodilator administration, characterize the severity of flow obstruction with FEV1 and, in patients with normal flow, identify a pattern of restrictive disease as an alternative explanation for dyspnea. The presence of bronchodilator response alone, however, is not sufficient to make the diagnosis of asthma (FANTA, 2021).

The bronchial provocation test is useful for the diagnosis of asthma in patients with atypical spirometry. It is a test with moderate sensitivity and high specificity. It consists of using a bronchoconstrictor stimulus and assessing the level of bronchoconstriction - asthmatics are hyper-responsive (FANTA, 2021).

Peak flow is an inexpensive device, useful in the follow-up of previously diagnosed asthma. A CBC is not necessary, but is often requested and may be useful. Eosinophilia >15% or >1500 eosinophils/ml may be explained by asthma but should raise suspicion of alternative or associated diagnoses such as parasitic infections. Severe anemia may cause dyspnea that does not respond to asthma treatments. Every non-smoking patient with obstructive pulmonary disease should have an alpha-1-antitrypsin test at least once in their lifetime to rule out this diagnosis. Chest X-ray is useful to rule out differential diagnoses, especially in the presence of atypical symptoms (FANTA, 2021).

A history of intermittent asthma symptoms associated with the finding of wheezing on physical examination is highly suggestive of asthma. Confirmation of the diagnosis is achieved by demonstrating pulmonary flow obstruction by spirometry together with exclusion of differential diagnoses. Patients with a suggestive history and normal spirometry should repeat the examination when symptomatic or perform the bronchial provocation test (FANTA, 2021).

The main differential diagnoses of wheeze are the causes of stridor (this is actually a distinct semiologic sign, but sometimes confused with wheeze) and foreign-body aspiration or lung cancer, when the wheeze is focal and monotonal (FANTA, 2021).

The main differential diagnoses of persistent cough are rhinosinusitis, gastroesophageal reflux, post-infectious syndrome, eosinophilic bronchitis, angiotensin-converting enzyme inhibitor-induced cough and whooping cough. Chronic cough in a patient with a history of smoking more than 10 pack-years suggests chronic bronchitis (FANTA, 2021).

The differential diagnosis of dyspnea is extensive, but common causes in the differential with asthma are COPD, heart failure, pulmonary thromboembolism and sarcoidosis (FANTA, 2021).

In adolescents and young adults, the main differentials are recurrent bronchitis, bronchiolitis, bronchiectasis, pulmonary thromboembolism, gastroesophageal reflux, panic disorder and sarcoidosis. In

older patients, the main differentials are COPD, heart failure, interstitial lung disease, lung cancer and recurrent oropharyngeal aspiration (FANTA, 2021).

The main goals of asthma management are to optimize symptom control and reduce the risk of exacerbations, while minimizing the unwanted effects of medications. The four pillars of treatment are patient education, control of trigger factors, monitoring of changes in symptoms and lung function, and pharmacologic therapy (FANTA, 2021).

Initial therapy is based on the intensity and frequency of symptoms, impaired respiratory function and prognosis. The classification is based on the most severe criterion presented, so that one criterion is enough to place the patient in a more advanced class (FANTA, 2021).

Intermittent asthma is characterized by daytime symptoms 2 or fewer times per week, 2 or fewer episodes of awakening for respiratory symptoms per month, use of SABA 2 or fewer times per week, normal activities between exacerbations, FEV1 between exacerbations consistently normal, FEV1/FVC ratio between exacerbations normal, 1 or no exacerbations requiring oral glucocorticoids per year. In the presence of any feature more severe than these, asthma should be characterized as persistent, with severity based on the most severe element. People who use SABA to prevent exercise-induced symptoms fall into this class even if they exercise more than twice a week (FANTA, 2021).

Mild persistent asthma is characterized by symptoms more than 2 times per week but not daily, 3 to 4 episodes of awakening for respiratory symptoms per month, use of SABA more than 2 times per week but not daily, minor interference with daily activities or normal FEV1 (FANTA, 2021).

Moderate persistent asthma is characterized by daily asthma symptoms, weekly respiratory symptom awakenings, daily SABA use, moderate limitation in activities or FEV1 between 60 and 80% and a FEV1/FVC ratio below normal (FANTA, 2021).

Severe persistent asthma is characterized by daily symptoms, daily awakenings, use of SABA several times a day or major limitation of activities due to asthma. These patients need immediate initiation of pharmacological treatment (FANTA, 2021).

During exacerbations, treatment consists of the administration of SABA. Patients presenting with acute exacerbation usually also need brief use of systemic glucocorticoids (FANTA, 2021).

Every asthmatic patient should have ready access to SABA, for use in exacerbations. Patients with intermittent asthma can be managed with SABA alone. An alternative is the use of inhaled glucocorticoid formulations with formoterol (e.g. ALENIA®), which is a rapid-onset LABA. Asthma prophylaxis, in situations such as physical exercise, can be performed with two inhalations of SABA or one of fast-acting LABA with glucocorticoid 5 to 20 minutes before exposure to the triggering factor (FANTA, 2021).

Patients with mild persistent asthma should be treated with low daily doses of inhaled glucocorticoid in addition to SABA for flares. Inhaled glucocorticoid formulations with LABA can also be used daily, or only in flares (in place of SABA) (FANTA, 2021).

Patients with moderate persistent asthma should be treated with low daily doses of inhaled glucocorticoid associated with a LABA, or moderate doses of inhaled glucocorticoid. LAMA can be used in place of LABA (FANTA, 2021).

Patients with severe persistent asthma should be treated with high or moderate doses of inhaled glucocorticoid associated with a LABA. Association with LAMA or immunobiologicals may be necessary (FANTA, 2021).

Spacers are inhaled drug delivery devices that aim to reduce the need for patient synchronization by allowing the patient to breathe normally during drug administration. In addition, the use of spacers has the benefit of increasing drug deposition in the lungs and reducing it in the oropharynx, as well as reducing the unwanted effects of inhaled drugs (RODRIGUEZ, 2008).

The high cost and low availability, however, make it difficult to use commercial spacers in developing countries such as Brazil. To solve this problem, various forms of homemade spacers have been invented. A 2008 Cochrane study demonstrated the absence of differences in the efficiency of commercial and homemade spacers in the context of acute asthma episodes in children. Thus, homemade spacers are a viable and affordable alternative to commercial alternatives (RODRIGUEZ, 2008).

4 CONCLUSION

There was a good response from users and adherence to treatment with the offer of homemade spacers and its correlation with the improvement in the profiles of users served in the ESF.

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