



CODEN [USA]: IAJPBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF  
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.5047255>Online at: <http://www.iajps.com>

Research Article

**ADVANCES IN CHRONIC OBSTRUCTIVE PULMONARY  
DISEASE MANAGEMENT AND ROLE OF OXYGEN THERAPY**Mohammed Saeed Alghamdi<sup>1</sup>, Osama Abdullallah Alzahrani<sup>1</sup>, Mohammed Ayed Ali  
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Article Received: May 2021

Accepted: May 2021

Published: June 2021

**Abstract:**

**Introduction:** Chronic obstructive pulmonary disease (COPD) is a global health problem and is anticipated to be the third leading cause of mortality worldwide by 2020. It is characterized by persistent airflow limitation and acute episodes of symptom worsening, or exacerbations, that are beyond normal daily variation and that lead to a change in treatment.

**Aim of work:** This review aims at discussing the various therapies and new management strategies developed for chronic obstructive pulmonary disease and the role of oxygen therapy.

**Methodology:** The review is a comprehensive research of PUBMED, Google Scholar, and WHO official page from the year 1992 to 2019.

**Conclusion:** Recent studies have shown that withdrawal of inhaled corticosteroids (ICS) is safe in some patients, making the combination of LAMA/LABA pharmacotherapy a judicious option for many patients, particularly those who are on a single long-acting bronchodilator. The growth of new dual-agent long-acting bronchodilator inhalers may decrease the excessive over-prescription of combination ICS/LABAs. However, additional investigations are needed to establish whether bronchoscopic lung volume reduction can be a potential approved therapy in patients with severe COPD.

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Please cite this article in press Osama Abdullallah Alzahrani et al., *Advances In Chronic Obstructive Pulmonary Disease Management And Role Of Oxygen Therapy.*, Indo Am. J. P. Sci, 2021; 08(06).

## INTRODUCTION:

The pulmonary disease consists of a broad range of illnesses. This includes both neoplastic (e.g., squamous cell cancer, non-small cell carcinoma) and infectious (i.e., tuberculosis, pneumonia). These causes of lung disease lead to significant morbidity and mortality. Chronic lung diseases like chronic obstructive pulmonary disease (COPD), emphysema, idiopathic pulmonary fibrosis, and interstitial lung diseases are particularly destructive in nature and are a major cause of mortality within the pulmonary disease category. COPD is responsible for premature mortality and high cost to health systems. <sup>[1]</sup>

### Diagnosis of COPD

The diagnosis for lung diseases is based on spirometry, i.e., lung function tests and the saturation of oxygen within the arterial blood. <sup>[2]</sup> The role of spirometry is to measure the amount of air passing through the respiratory passages of the lungs during inspiration and expiration. The diagnosis for lung disease is made by measuring two major components of spirometry: 1) (FEV<sub>1</sub>): Forced expiratory volume - In the first second of a breath, the greatest volume of air that can be breathed out, and 2) (FVC): forced vital capacity - the total amount of air exhaled during the FEV test. <sup>[3]</sup>

The need for long-term oxygen therapy is determined on the basis of oxygen saturation analysis. This therapy is usually recommended for patients with an FEV<sub>1</sub> less than 35% of age-adjusted predicted value and/or those with a peripheral oxygen saturation of less than 92% (GOLD Staging System) (Table 1). <sup>[3]</sup>

### GOLD Staging System

**Table 1. Gold staging system for lung function based on the forced expiratory volume in one second (FEV<sub>1</sub>).** <sup>[3]</sup>

Severity	FEV <sub>1</sub> % of Predicted Value
Mild (GOLD-1)	> 80
Moderate (GOLD-2)	50 – 79
Severe (GOLD-3)	30 – 49
Very Severe (GOLD-4)	<30 or chronic respiratory failure

### Advances in COPD Management

#### Ultra-long-acting beta-2 agonists (LABA)

Long-acting bronchodilators are used to improve lung function, thereby improving symptoms and exercise performance and prevent exacerbations. <sup>[4]</sup> A lot of long-acting beta-2 agonists (LABAs) have become available over the past several years, with indacaterol,

olodaterol, and vilanterol being the newest. The existing drugs like beta-2 agonists and muscarinic receptor antagonists act by relaxing the airway smooth muscle tone, causing reduced respiratory muscle activity and subsequent reduction in airway resistance which makes it easier for the patients to breathe. The purpose of bronchodilation is to relieve bronchial obstruction airflow limitation, to reduce hyperinflation, to improve emptying of the lung, and to exercise performance, thereby reducing dyspnea. <sup>[5,6]</sup>

There were two randomized, double-blind, placebo-controlled, parallel-group phase 3 studies done which showed long-term efficacy and safety of once-daily olodaterol 5 and 10 µg in patients with moderate to severe COPD with their usual-care maintenance therapy. <sup>[7]</sup>

#### Long-acting muscarinic antagonists (LAMA)

For the longest time, tiotropium was the only globally available ultra-LAMA with a rich database of efficacy outcomes in COPD patients. New data have surfaced over the last few years documenting the efficacy of other drugs in the LAMA class. According to the ACCLAIM trials, with once-daily aclidinium therapy, there was an improvement in FEV<sub>1</sub> and delayed time to first exacerbation. <sup>[8]</sup> Moreover with twice-daily aclidinium in the ATTAIN trial showed a considerable rise in trough and peak FEV<sub>1</sub>, and an overall improvement in quality of life (QOL) scores. <sup>[9]</sup>

#### Dual-agent long-acting bronchodilators

For patients with uncontrolled COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommends the use of dual long-acting bronchodilators. Various studies have shown the benefit of combining LABA and LAMA in separate devices with both short- and long-acting components. <sup>[10]</sup> This resulted in the development of a single component with multiple long-acting bronchodilators. Umeclidinium/vilanterol was the first ultra-LAMA/LABA combination inhaler to be approved. Umeclidinium/vilanterol seems to be safe, produces greater improvements in lung function when compared with monocomponent treatment, and in some studies, it also reduces the risk of exacerbations. <sup>[11]</sup>

#### Emerging bronchoscopic therapies

Lung volume reduction surgery may lengthen life in COPD and is perhaps the only surgical procedure that does so. However, only those patients with known upper lobe predominant emphysema and low post-

rehabilitation exercise capacity could derive benefits from it. <sup>[12]</sup> Another possible treatment for patients with severe emphysema is bronchoscopic lung volume reduction with the use of one-way endobronchial valves. A single-center, double-blind, sham-controlled trial in patients with severe COPD, with significant hyperinflation, and restricted exercise tolerance with a target lobe with intact interlobar fissures on chest computed tomography showed substantial improvement in lung function at three months. <sup>[13]</sup>

### **Role of oxygen therapy in COPD**

Apart from relieving the hypoxia associated with COPD, supplemental oxygen therapy also reduces symptoms of dyspnea both in ordinary individuals and in those with severe COPD. Breathing supplemental oxygen improved dyspnea and endurance during exercise in COPD patients. In patients who showed an improvement in exercise tolerance following long-term oxygen therapy (LTOT), cardiac output was also increased. To achieve appropriate levels of oxygenation, controlled oxygen therapy is required with the patient's oxygen level monitored and the supplemental oxygen therapy titrated to achieve acceptable saturations. <sup>[14]</sup>

### **CONCLUSION:**

Recent studies have shown that withdrawal of inhaled corticosteroids (ICS) is safe in some patients making the combination of LAMA/LABA pharmacotherapy a judicious option for many patients, particularly those who are on a single long-acting bronchodilator. The growth of new dual-agent long-acting bronchodilator inhalers may decrease the excessive over-prescription of combination ICS/LABAs. However, additional investigations are required to determine whether bronchoscopic lung volume reduction can be a potential approved therapy in patients with severe COPD.

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