Article Review

Update on the Global Initiative for Chronic Obstructive Lung Disease (GOLD 2023)

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Abstract

The overall increase in morbidity and mortality associated with chronic obstructive pulmonary disease (COPD) is inextricably linked to the concept of Global Initiative for Chronic Obstructive Lung Disease (GOLD) updates. An element of every GOLD update is directed toward policymakers, healthcare professionals, and people in general in order to evaluate the immediate and prolonged consequences of COPD. At this time, international interest is focused on the acceleration of the GOLD 2022 update to GOLD 2023 in an effort to enhance clinical management approaches for COPD, including individualized and comprehensive COPD treatment. The GOLD 2023 update will encompass the following aspects: definition and taxonomy, screening and case identification, diagnosis pathway, pharmacological and non-pharmacological approaches to managing stable COPD, and exacerbation management, as discussed in this review. GOLD 2023 explains that the diagnosis of emphysema has been classified as a pathologic diagnosis, in comparison with GOLD 2022. In the meantime, the clinical and epidemiological diagnosis of COPD is chronic bronchitis. The risk factor for tobacco smoke, which was once thought to be the primary cause of COPD, is described in GOLD 2023, together with the most recent taxonomy that has been developed to identify additional contributing components. The word "GET", which refers to the interaction of three risk factors-gene (G), environment (E), and lifetime (T)-that can cause lung damage and accelerate the aging or development of the lungs, is also linked to the most recent taxonomy of COPD. The switch from the "ABCD" approach to the "ABE" method for diagnosis and management of stable COPD is another significant modification included in the GOLD 2023 update. The number of COPD cases worldwide is expected to rise in the upcoming years as an outcome of long-term exposure to risk factors. Consequently, with the goal of increasing patient survival rates, GOLD 2023 highlights the significance of screening and early case discovery through the provision of non-pharmacological care.

Keywords: COPD, GOLD 2023, update

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Submitted: February 27th, 2023
Accepted: October 30th, 2023
Published: January 30th, 2024

J Respirol Indones. 2024
Vol. 44 No. 1: 98–105
https://doi.org/10.36497/jri.v44i1.451

INTRODUCTION

Globally, the prevalence of COPD is 10.3% and quite high in several aspects, such as smokers, age ≥40 years, and male gender. In 2017, the Global Burden of Disease Study reported an estimated COPD mortality rate of 42/100,000, and approximately 4.72% of all causes of death. With the increasing prevalence of smokers and the elderly population in developed countries, the predicted mortality caused by COPD will be more than 5.4 million deaths by 2060.[1]

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) is a collaboration program between the World Health Organization (WHO) and the National Heart Lung and Blood Institute to address the impact, management, and prevention of COPD. The first report was published in 2001, “the Global Strategy for the Diagnosis, Management, and Prevention of COPD”, which then progressed through research studies until the publication of the current GOLD 2023.[1,2] Updates in GOLD 2023 include definitions, epidemiologic variations, risk factors, and therapeutic strategies for stable cases and exacerbations.[2]

In this GOLD 2023 update review, five subsections of COPD updates will be discussed. These sub-sections consist of definition and taxonomy, screening and case finding, diagnosis flow, stable COPD management (both pharmacological and non-pharmacological), and exacerbation management.

DEFINITION AND TAXONOMY

According to GOLD 2022, COPD is defined as “a common, preventable, and treatable disease characterized by persistent respiratory symptoms

and airflow limitation due to airway and/or alveoli abnormalities caused by significant exposure to harmful particles or gases influenced by host factors, including abnormal disease progression." This definition was revised in GOLD 2023 to "a heterogeneous lung condition characterized by chronic respiratory symptoms such as shortness of breath, cough, sputum production, and exacerbations due to airway abnormalities such as bronchitis or bronchiolitis and/or alveoli abnormalities such as emphysema that cause persistent and progressive airflow obstruction."[3,4]

Risk factors for COPD are related to the interaction between gene/genetic (G), environment (E), and lifetime (T). Genetic risk factors for COPD are caused by mutations in the Serine Protease Inhibitor (SERPINA) 1 gene and α-1 antitrypsin protein deficiency. Smoking, air pollution, and exposure to irritants in the work environment are environmental risk factors for COPD. Lifetime is influenced by gender, development, and degenerative changes in lung structure, as well as a history of asthma, chronic bronchitis, and infection.[5]

Smoking history in GOLD 2022 is the main factor that causes COPD, while in GOLD 2023 it is stated that the mechanism of COPD is expanded by the establishment of a taxonomy design that describes risk factors for COPD other than smoking. Table 1 describes the taxonomy of COPD, divided into six factors: genetics, developmental disorders from birth, environment, infection, asthma, and factors of unknown cause. Environmental factors are divided into two: repeated exposure to cigarette smoking and exposure to irritants or substances from the work environment. Exposure to irritants comes from exposure to household pollution, air pollution, forest fires, and occupational exposure.[6]

Air pollution is an important risk factor to target for COPD prevention on a global scale. Air pollution is caused by a large variety of airborne particles and pollutants. Particulate identification is utilized to categorize air pollution into two distinct types: indoor and outdoor.[6] Cigarette smoke and kitchen vapors constitute indoor pollution. The primary sources of indoor pollution are fuels, including wood, sawdust, coal, and petroleum. At-risk populations for COPD include communities that rely on biomass and coal fuels for energy inputs. COPD risk factors in developing countries comprise approximately 30–40% of non-cigarette smoke exposure.[7,8]

Occupational exposures to irritants, hazards, and toxic vapors, along with motor vehicle emissions and road dust, contribute to outdoor pollution. Particle matter (PM), nitrogen oxides, sulfur, air pollutants, and greenhouse gases comprise air pollution. In developing and impoverished countries, these pollutants account for 50% of the COPD risk factors.[9] Particle/gas exposure duration and size determine the potential risk of respiratory system diseases associated with air pollution. Concurrently, policymaker support, resource availability, cultural shifts, and increased self-prevention measures are required to mitigate these air pollution exposures.[10]

Table 1. Taxonomy of COPD

Classification	Description
Genetically determined COPD (COPD-G)	• Alpha-1 antitrypsin deficiency (AATD) • Other genetic variations
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birth weight, among others
Environmental COPD • Cigarette smoking COPD (COPD-C) • Biomass and pollution exposure COPD (COPD-P)	• Exposure to tobacco smoke, including in utero or via passive smoking • Vaping or e-cigarette use • Cannabis Exposure to tobacco smoke, ambient air pollution, wildfire smoke, and occupational hazards
COPD due to infections (COPD-I)	Childhood infection, tuberculosis-associated, HIV-associated COPD
COPD Asthma (COPD-A)	Particularly childhood asthma
COPD of Unknown Cause (COPD-U)	

SCREENING AND CASE FINDING

Based on GOLD 2023, it is important to do screening and case finding before patients are diagnosed with COPD. Screening spirometry is not recommended for asymptomatic individuals without significant risk factor exposure. Spirometry examinations are only performed in patients with clinical COPD or who have risk factors such as

smoking >20 packs/year, respiratory infection from thoracic photographs, and a history of lung disease since childhood.[11]

DIAGNOSIS

The diagnosis is based on clinical and spirometry tests, which are characterized by irreversible airflow limitation with FEV1/FVC values <0.7 post-bronchodilator. However, the GOLD 2023 terminology update also delineates the concepts of pre-COPD and preserved ratio-impaired spirometry (PRISm), which relate to populations of individuals who have an increased likelihood of developing COPD in the future.[11,12]

Pre-COPD is a clinical categorization applied to patients of any age who present with respiratory complaints and/or structural and functional abnormalities that are measurable on spirometry but do not exhibit an indicator of obstruction. A considerable portion of this demographic may eventually exhibit clinical symptoms consistent with persistent airway obstruction. As of now, research studies continue to assess the pre-COPD group's study.[13]

PRISm describes individuals who meet the criteria for a FEV1/FVC ratio above normal limits (>70% post-bronchodilator) but show reduced spirometry outcomes (FEV1 and/or FVC <80% post-bronchodilator). The incidence rate of the condition ranges from 7.1% to 20.3% among the general population. It is characterized by features that are frequently observed in individuals who have a high or extremely low of body mass index (BMI), smokers, or ex-smokers.[14] Several studies show that the PRISm group is related to increased mortality rates in the future. The disease may eventually change to "spirometric obstruction" even if the name "PRISm" is usually not a permanent phenotype.[15]

According to the GOLD 2023 investigation, these two groups are classified as patients due to their respiratory complaints or confirmed structural and functional lung problems. Therefore, both groups exhibit signs that need treatment; however, the proper strategy for administering both groups remains uncertain.[15]

Table 2. Clinical Indicators for Considering a Diagnosis of COPD

Clinical	Description
Dyspnea that is	• Progressive over time • Worse with exercise • Persistent
Recurrent wheeze	---
Chronic Cough	May be intermittent and may be unproductive
Recurrent lower respiratory tract infections	---
History of risk factors	• Tobacco smoke (including popular local preparations) • Smoke from home cooking and heating fuels • Occupational dust, vapors, fumes, gases, and other chemicals • Host factors (e.g, genetic factors, developmental abnormalities, low birthweight, prematurity, childhood respiratory infections, etc)

The clinical features of COPD include shortness of breath, wheezing, coughing with or without sputum production, activity limitation, and acute exacerbation with increased respiratory symptoms (Table 2). Shortness of breath is chronic and aggravated by physical activity. Cough, with or without sputum production, is a frequent symptom experienced by patients due to smoking and/or exposure to environmental factors. Sputum production may occur in periods of flare-ups interspersed with periods of remission. Increased sputum production can also potentially lead to bronchiectasis. Purulent sputum indicates an increase in inflammatory mediators.[16,17]

The spirometry result that indicates airway obstruction is a post-bronchodilator FEV1/FVC ratio <0.7. Current clinical experience is assessed through two validated questionnaire parameters, namely the modified Medical Research Council (mMRC) and the COPD Assessment Test (CAT).[18]

Airway obstruction examination results that do not match the patient's symptoms need to be examined as additional investigations focusing on pulmonary function examination, radiological examination, and other supporting examinations (Table 3).[19]

Table 3. Additional Investigation

Inspection Criteria	Type of Inspection
Physiological Tests	• Lung volume • *DLco* • Oximetry • Blood gas measurement • Exercise test and assessment of physical activity
Imaging	• Chest X-ray • Computed tomography (CT)
Other checks	• AATD • Composite scores • Biomarkers • Treatable Traits (TTs)

One of the updates in GOLD 2023 is the computed tomography (CT) scan of the thorax, which is used to evaluate differential diagnosis, lung volumes, and cancer screening. Thoracic CT-scan examination in COPD patients is considered for patients with persistent exacerbation, a predicted FEV1 value <45% with hyperinflation, and who meet lung cancer screening criteria.[19]

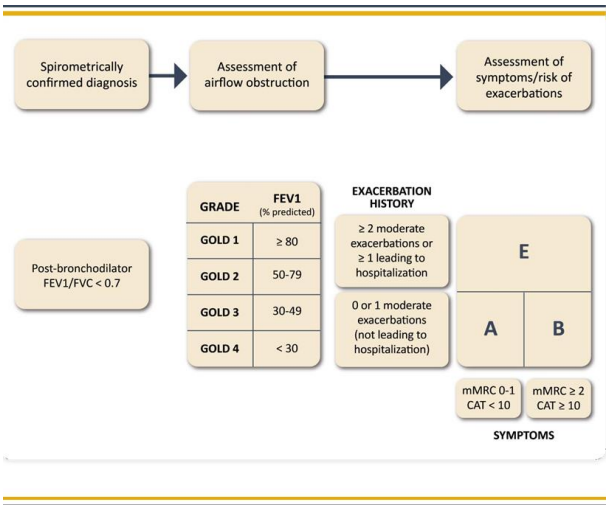

Figure 1.GOLD A-B-E Assessment Tool

GOLD 2023 also proposes changes of the previous “ABCD” scoring system into the “ABE” scoring system. Group A and group B remained unchanged, but group C and group D were merged into a single entity called "group E" (Figure 1). This was done to emphasize the clinical relevance of exacerbations.[18,19]

PHARMACOLOGICAL AND NON-PHARMACOLOGICAL THERAPY

The initial pharmacologic management is determined by the patient’s symptoms according to the A-B-E classification (Figure 2).[20–22] Group A patients were given bronchodilator therapy, either short- or long-acting bronchodilators. Group B therapy was initiated using a combination of long acting beta2-agonists (LABA) and long-acting muscarinic antagonists (LAMA). A randomized clinical trial showed that in patients with the use of LABA+LAMA was superior to the use of LAMA alone.[22]

Several meta-analysis journal reviews comparing the combination of two therapies with the use of long-acting bronchodilators showed that LABA+LAMA had a better rating for reducing COPD exacerbations. LABA+LAMA is a good initial therapy option for group E patients. For conditions that require indications for inhaled corticosteroid (ICS) administration, then LABA+LAMA+ICS shows superiority compared to LABA+ICS. The LABA+ICS combination therapy in COPD is still not recommended. If eosinophil count results >300 cells/uL, then giving LABA+LAMA+ICS is considered.[22]

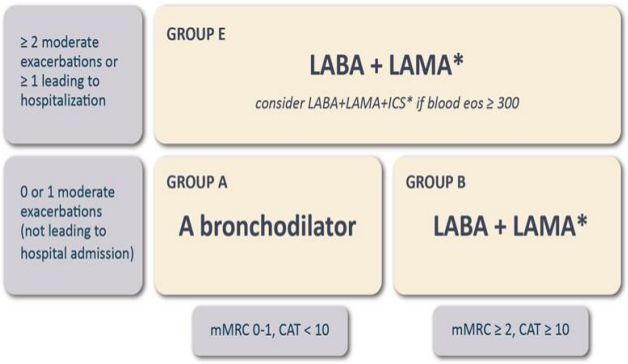

Figure 2.Initial Pharmacological Treatment

The non – pharmacological management complements the pharmacological management, which forms a comprehensive management for COPD. Non-pharmacological management emphasizes the importance of education about exposure to smoke-free environments, disciplined medication, ensuring proper inhaler use technique, regular physical activity or exercise, vaccination, and rehabilitation.[23,24]

The patient’s follow-up plays an important role, as lung function may deteriorate over time despite optimal treatment. Symptoms, exacerbations, and

objective measures of airway obstruction should be routinely checked to determine when to modify management and also identify complications and/or comorbidities that may develop. In monitoring COPD patients, it is important to assess symptoms, exacerbations, adherence and appropriate medication use, smoking status, FEV1 measurements, imaging, and comorbidities.[23,24]

EXACERBATION MANAGEMENT

A change in the definition of an exacerbation in GOLD 2023, which is defined as an attack characterized by an increase in symptoms of shortness of breath and/or cough with increased and discolored sputum that worsens in <14 days, followed by tachypnea and/or tachycardia due to local or systemic inflammation.[25]

There are three degrees of exacerbation: no respiratory failure, non-life-threatening acute respiratory failure, and life-threatening acute respiratory failure.[25,26]

Signs of exacerbation without respiratory failure are respiratory rate ≤24 x/min, heart rate <95 x/min, no use of respiratory muscles, no change in mental status, hypoxemia improves with oxygen supplementation with FiO_2 24–35%, and no increase in $PaCO_2$. Signs of exacerbation of non-life-threatening acute respiratory failure are respiratory frequency >24 x/min, use of respiratory muscles, no change in mental status, hypoxemia improves with oxygen supplementation requiring FiO_2 >35%, and hypercarbia with an increase in $PaCO_2$ of 50–60 mmHg. Signs of life-threatening acute respiratory failure are respiratory frequency >24 x/min, use of respiratory muscles, an acute decline in consciousness, hypoxemia that does not improve with oxygen supplementation or requires FiO_2 >40%, and hypercarbia with an increase in $PaCO_2$ >60% accompanied by acidosis with pH ≤7.25.[25,27]

Initial treatment in COPD exacerbations is the administration of bronchodilators, corticosteroids, and antibiotics. The recommended initial bronchodilator is SABA+SAMA. Corticosteroids that can be used are budesonide nebulization or IV methylprednisolones. Antibiotics (if indicated) are empirically given for 5–7 days. Additional therapy includes oxygen supplementation (venturi mask, high flow nasal cannula/HFNC, non-invasive ventilation, or mechanical ventilation).[20,26,28]

Oxygen supplementation should be titrated to address hypoxemia with a target saturation of 88-92%. Evaluation of oxygen titration is based on arterial blood gas analysis (ABG) to ensure the oxygen demand is achieved without carbon dioxide retention and/or worsening of acidosis. Oximetry is not as accurate as ABG in patients with ≤92% arterial oxygen saturation, and it does not provide information such as $PaCO_2$ and pH. Thus, oxymetry is not recommended as an evaluation parameter. A study showed that venous blood gas analysis had the same accuracy as arterial blood gas analysis in assessing blood bicarbonate and pH levels.[26,27]

SURGICAL THERAPY

Indications for surgery in COPD patients are structural changes in the airway and lung parenchyma (Figure 3). Unilateral or bilateral lung volume resection surgery (LVRS) can be considered in patients with emphysema and lung hyperinflation that are refractory to pharmacologic management. Bullectomy is indicated if the bulla occupies >1/3 of the hemithorax and compresses the surrounding lung tissue.[25–27]

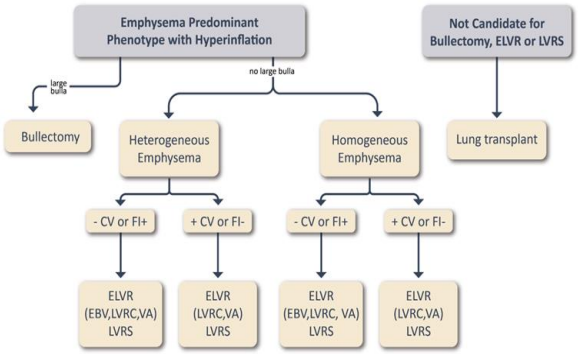

Figure 3. Surgical and Interventional Therapies in Advanced Emphysema

In very severe COPD patients, lung transplantation can be considered as the last option. This management indications are: Bodymass, Obstruction, Dyspnea, Exercise (BODE) index >7,

FEV1 <15–20%, and have had ≥3 episodes of severe exacerbations during the previous year, one severe exacerbation with hypercapnic respiratory failure, or a moderate exacerbation complicating into severe pulmonary hypertension.[26,27]

CONCLUSIONS

The key goal of the GOLD 2022 to GOLD 2023 concept shift is to diminish the worldwide impact of COPD cases in relation to both death rates and disease burden. The distinctions in the GOLD 2023 update mostly revolve around definitions, taxonomy, screening and case identification, the diagnostic process, the care of stable COPD (pharmacological and non-pharmacological), and the management of exacerbations. The terms emphysema and chronic bronchitis have been excluded from the concept of COPD, according to their specific meaning. The distinction clarifies that emphysema is a diagnosis based on pathologic diagnosis, whereas chronic bronchitis is a diagnosis made based on clinical and epidemiological diagnosis.

Risk factor identification is a crucial component in the prevention and management of COPD. Therefore, according to the GOLD 2023 report, virtually all COPD risks are determined by the interaction of genes and the environment over the course of an individual's lifetime, and the risk increases with age. Formerly attributed exclusively to cigarette smoke, COPD can now be induced by additional factors. A cause that significantly contributes to COPD is air pollution, which is further subdivided into domestic and outdoor air pollution.

In consideration of a variety of risk factors, GOLD 2023 recommends that screening and case identification be enhanced once more. Prior to this, screening and case finding were emphasized as significant factors in reducing the burden of COPD cases (GOLD 2022). However, GOLD 2023 provides additional detail by stating that the indication for a CT scan with contrast can serve as a screening instrument for identifying structural lung abnormalities. In replacement of spirometry, which had been considered contraindicated for purposes of screening, the utilization of peak flow meters is recommended as a clinical indicator for patients with COPD.

Following its discontinuation, the ABCD method has been substituted with the ABE method. The combination of groups C and D into group E is based on the presumption that groups C and D will encounter more incidents of exacerbation potential. In COPD, the combination of LAMA and LABA as recommended has the potential to minimize exacerbations and improve quality of life.

The GOLD 2023 review of COPD exacerbations focused on clinical progression characterized by tachypnea and/or tachycardia following an onset of <14 days. At this point, the exacerbation is classified into three distinct levels: no respiratory failure, non-life-threatening acute respiratory failure, and life-threatening acute respiratory failure. The main factors that serve as indicators of the extent of exacerbation are the values of pH, $PaCO_2$, and FiO_2.

It is anticipated that adherence and discipline in accordance with the GOLD 2023 guidelines will decrease mortality and morbidity associated with COPD on a global level. On the basis of research conducted to optimize the management of COPD cases worldwide, the GOLD concept will continuously progress.

ACKNOWLEDGMENTS

None.

CONFLICT OF INTEREST

The authors affirm no conflict of interest.

FUNDING

None.

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