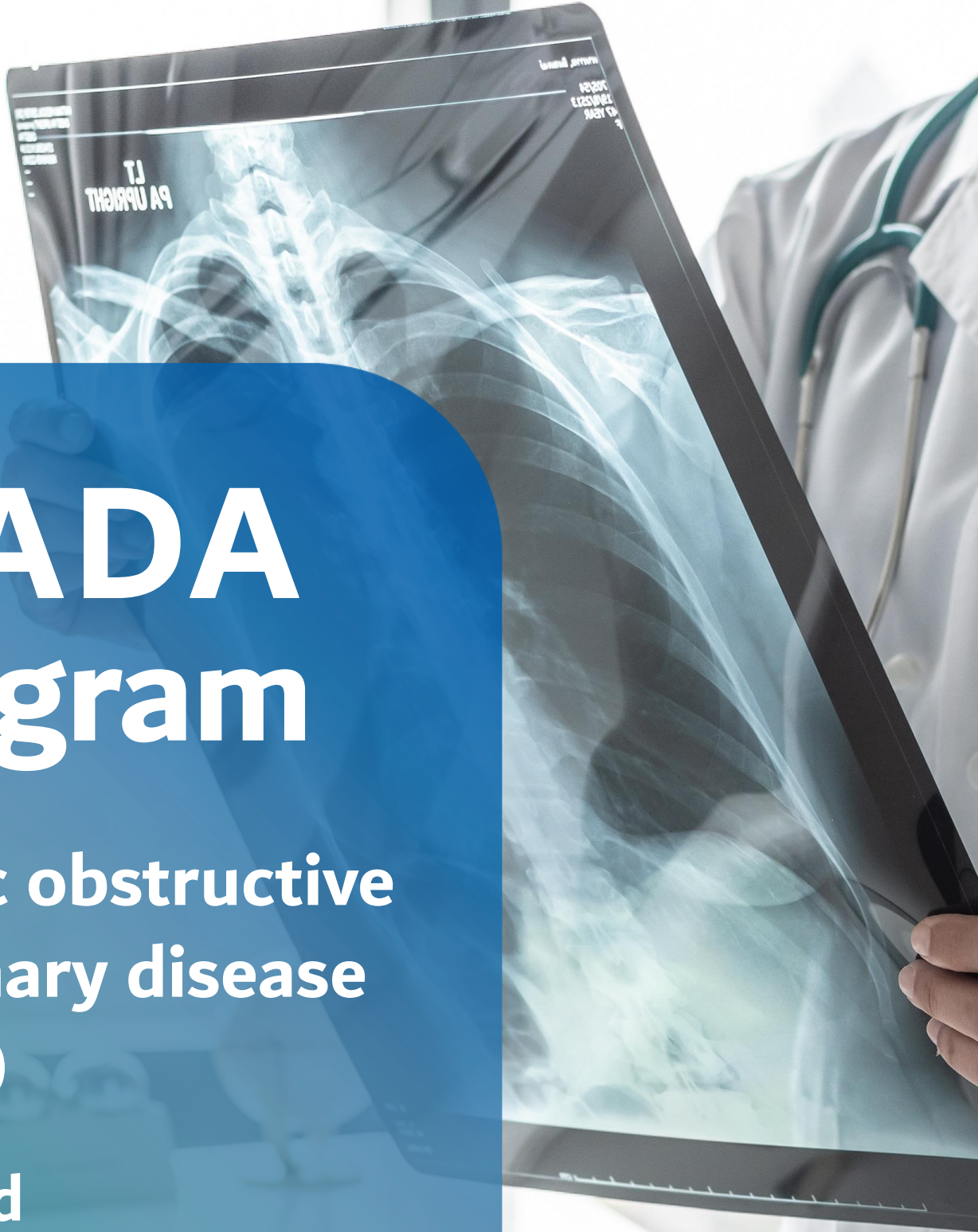


EJADA Program

Chronic obstructive
pulmonary disease
(COPD)

KPIs and
Recommendations

2023



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Introduction

Chronic obstructive pulmonary disease (COPD) is a respiratory condition which is characterized by persistent respiratory symptoms and restricted airflow. The symptoms of COPD include dyspnea, cough and/or sputum production. The risk factors for COPD include aging population and continued exposure to tobacco smoke, occupational dusts and chemicals, biomass fuel and air pollution. COPD can be prevented by reducing the exposure to the risk factors.

COPD being a heterogeneous, multifaceted disease is influenced by both genetic and environmental factors. Both pharmacologic and non-pharmacologic treatment strategies are available for the management of symptoms and prevention of exacerbations to improve long-term outcomes and quality of life. Pharmacologic treatment strategy for COPD is to treat the symptoms, reduces the frequency and severity of exacerbations, and improve exercise tolerance. The usual pharmacological agents used for COPD treatment include long-acting β_2 -agonists (LABAs), long-acting muscarinic antagonists (LAMAs) and inhaled corticosteroids (ICS).

Once the clinical and spirometric diagnosis of COPD is confirmed, for rapid alleviation of COPD symptoms, short-acting bronchodilators are usually prescribed. However, the persistent use of these medications is not often advised. A long-acting bronchodilator is then usually offered. As initial treatment, a combination treatment such as LAMA/LABA may be administered in the patients with severe breathlessness. Additionally, a combination of LABA/ICS may be preferred for patients with a high risk of exacerbations and higher blood eosinophil counts. Patients should be monitored for the achievement of treatment goals after beginning of therapy, and adaptations should be made as needed. If response to initial treatment does not alleviate the symptoms, it is important to consider whether symptoms or exacerbations are the predominant characteristic and follow the most appropriate pharmacologic path.

In addition to pharmacologic therapies, pulmonary rehabilitation is considered an important component of integrated patient management. Pulmonary rehabilitation has been shown reduce dyspnea and fatigue, improve emotional function, health-related quality of life and exercise capacity. Several studies have demonstrated that patients who exercise regularly have a lower risk of exacerbations, hospital admissions and all-cause mortality.

Although only a few novel therapies have been approved for COPD in the last 5 years, there have been advancements in targeting existing therapies to specific subpopulations of COPD patients using new biomarker-based strategies, which could pave the way into implementing more individualized therapy for COPD patients.

Scope

The Ejada KPIs are quality indicators and ratings for physicians, facilities and insurance companies based on information collected by DHA systems from providers, payers and patients.

The COPD KPIs and Recommendations are based on national and international guidelines. The KPIs are designed for healthcare practitioners and providers to follow international best practices in the management of COPD patients.

The COPD KPIs cover the following aspects of COPD management:

- Screening, diagnosis and monitoring of COPD patients
- Pharmacological management of COPD
- Hospitalization/ICU admission for COPD patients
- Referral recommendations and pulmonary rehabilitation

The KPIs and recommendations have been reviewed by leading experts in the UAE.

List of Abbreviations

S.No.	Abbreviation	Full form
1	COPD	Chronic Obstructive Pulmonary Disease
2	COVID	Corona Virus Disease
3	EOS	Blood eosinophil count (cells/ μ L)
4	FDC	Fixed-dose combinations
5	FEV ₁	Forced expiratory volume in 1 second
6	GOLD	Global Initiative for Chronic Obstructive Lung Disease
7	ICS	Inhaled corticosteroids
8	ICU	Intensive care unit
9	LABA	Long-acting β 2-agonists
10	LAMA	Long-acting muscarinic antagonist
11	mMRC	Modified Medical Research Council dyspnea questionnaire
12	NPPV	Noninvasive positive pressure ventilation
13	PDE4	Phosphodiesterase-4

KPIs and their Measuring Parameters

Reporting Frequency: Monthly

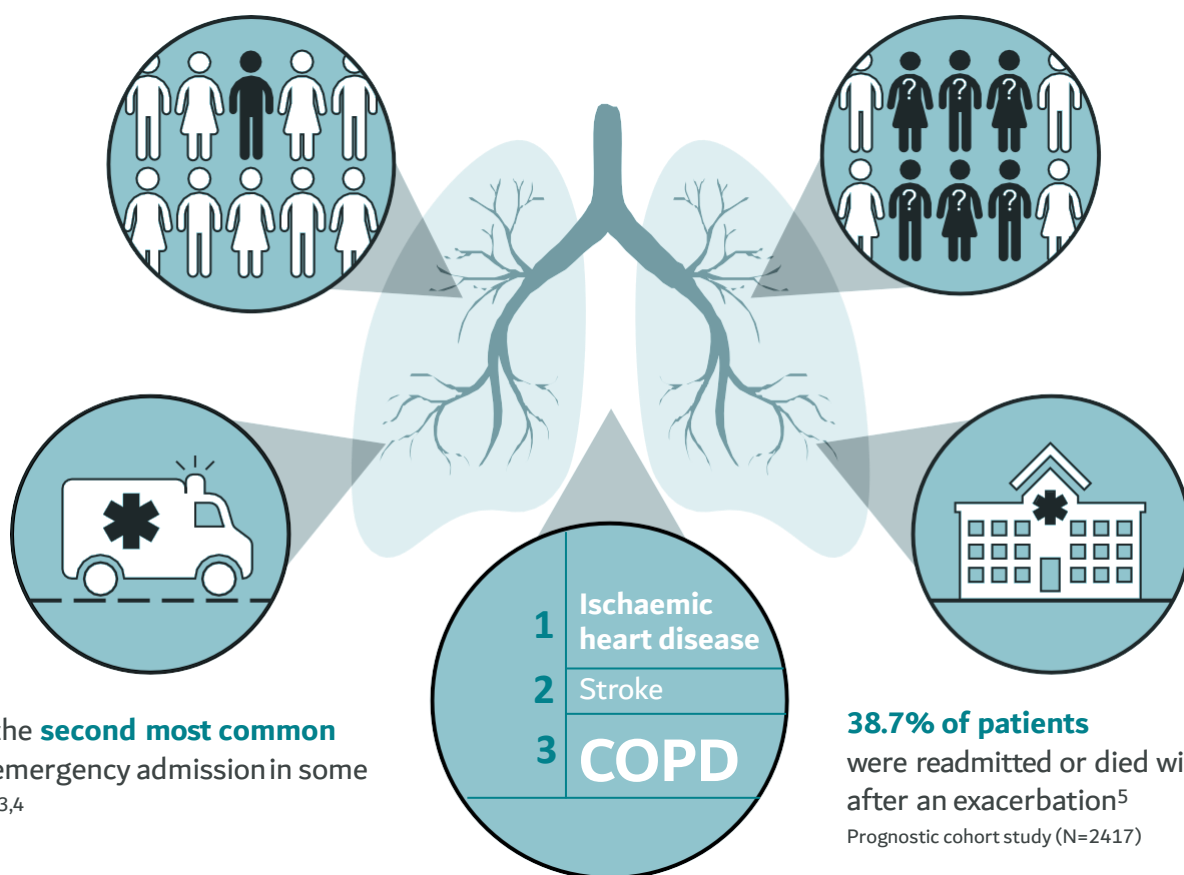
S.No.	KPIs	Measuring Parameters
1	Screening for COPD Using Spirometry	Spirometry, Diagnosis, Assessment
2	Long-acting Bronchodilator Monotherapy for Patients with Stable COPD	DDC list of drugs
3	Short-acting Bronchodilator Combination Therapy for Patients with Stable COPD	DDC list of drugs
4	Long-acting Bronchodilator Combination Therapy to Reduce Risk of Exacerbation in Patients with Stable COPD	DDC list of drugs
5	Maintenance Therapy with Inhaled Corticosteroid (ICS)/Long-acting Bronchodilator Combination Therapy for COPD Patients	DDC list of drugs
6	Triple Therapy For COPD Patients with Recurrent Exacerbation on LABA/ICS	DDC list of drugs
7	Phosphodiesterase-4 (PDE4) Inhibitor for Severe to Very severe COPD Patients with Chronic Bronchitis and Exacerbation	DDC list of drugs
8	Antibiotics Treatment for Patients with Acute COPD Exacerbation	DDC list of drugs
9	Long-term Oxygen Therapy for COPD patients	Supplemental Oxygen, Arterial Hypoxemia
10	Ventilation Support for COPD Patients with Exacerbation and Acute Respiratory Failure	Ventilations support
11	Bronchoscopic Interventions to Reduce Hyperinflation in COPD Patients with Severe Emphysema	Bronchoscopic Interventions, Hyperinflation, Severe Emphysema
12	Hospitalization of COPD patients Due to Severe Exacerbation	Hospitalization, Severe Exacerbation
13	Intensive Care Unit Admission (ICU) of COPD patients Due to Severe Exacerbation	ICU, Severe Exacerbation
14	Nicotine Replacement Therapy for Smoking Cessation in COPD Patients	DDC list of drugs
15	Pharmacological Therapy for Smoking Cessation in COPD Patients	DDC list of drugs
16	Pulmonary Rehabilitation for COPD Patients	Pulmonary Rehabilitation
17	Vaccination for COPD Patients	Influenza, pneumococcal, COVID-19, Tdap, & zoster vaccination
18	Eosinophil Count to Assess Treatment Response to Triple FDC Therapy in COPD Patients	Blood Eosinophil Count
19	Triple FDC Therapy in COPD patients to Prevent Exacerbation	DDC list of drugs
20	Average incurred cost due to emergency department visits in patients with severe COPD exacerbations	Claims related to ED visit
21	Reported Cardiovascular Events in COPD Patients	Cardiovascular Events

COPD is a major healthcare burden and cause of mortality worldwide

~**384 million** people globally have COPD, equivalent to **11.7% of adults**^{1*}

Random effects meta-analysis was conducted on extracted crude prevalence rates of COPD

65–80% of patients with COPD may be **undiagnosed**



COPD is the **second most common** cause of emergency admission in some countries^{3,4}

38.7% of patients were readmitted or died within 90 days after an exacerbation⁵
Prognostic cohort study (N=2417)

COPD is the **third leading cause of death** worldwide, accounting for **~3 million deaths annually**⁶

WHO global health estimate

*Data from 2010; †studies in 2008–2018; ‡in 2019; §calculated as 6% of 55.4 million deaths reported worldwide in 2019⁶
WHO, World Health Organization

1. Adeloye D, et al. J Glob Health 2015;5:020415; 2. Diab N, et al. Am J Respir Crit Care Med 2018;198:1130–1139; 3. Lane ND, et al. BMJ Open Respir Res 2018;5:e000334; 4. Nardini S, et al. Multidiscip Respir Med 2014;9:46; 5. Echevarria C, et al. Thorax 2017;72:686–693; 6. World Health Organization (WHO). The top 10 causes of death. Available from: <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death> (Accessed 13 July 2022)

The global treatment paradigm for managing COPD is one of stepwise treatment escalation^{1,2}

Initial Pharmacological Treatment

≥ 2 moderate exacerbations or ≥1 leading to hospitalization

Group E

LABA + LAMA*
consider LABA+LAMA+ICS* if blood eos ≥ 300

0 or 1 moderate exacerbations (not leading to hospital admission)

Group A

A bronchodilator

mMRC 0-1, CAT < 10

Group B

LABA + LAMA*

mMRC ≥ 2, CAT ≥ 10

*single inhaler therapy may be more convenient and effective than multiple inhalers
Exacerbations refers to the number of exacerbations per year

Goals for treatment of stable COPD

- Relieve Symptoms
- Improve Exercise Tolerance
- Improve Health Status



Reduce symptoms

AND

- Prevent Disease Progression
- Prevent and Treat Exacerbations
- Reduce Mortality



Reduce risk

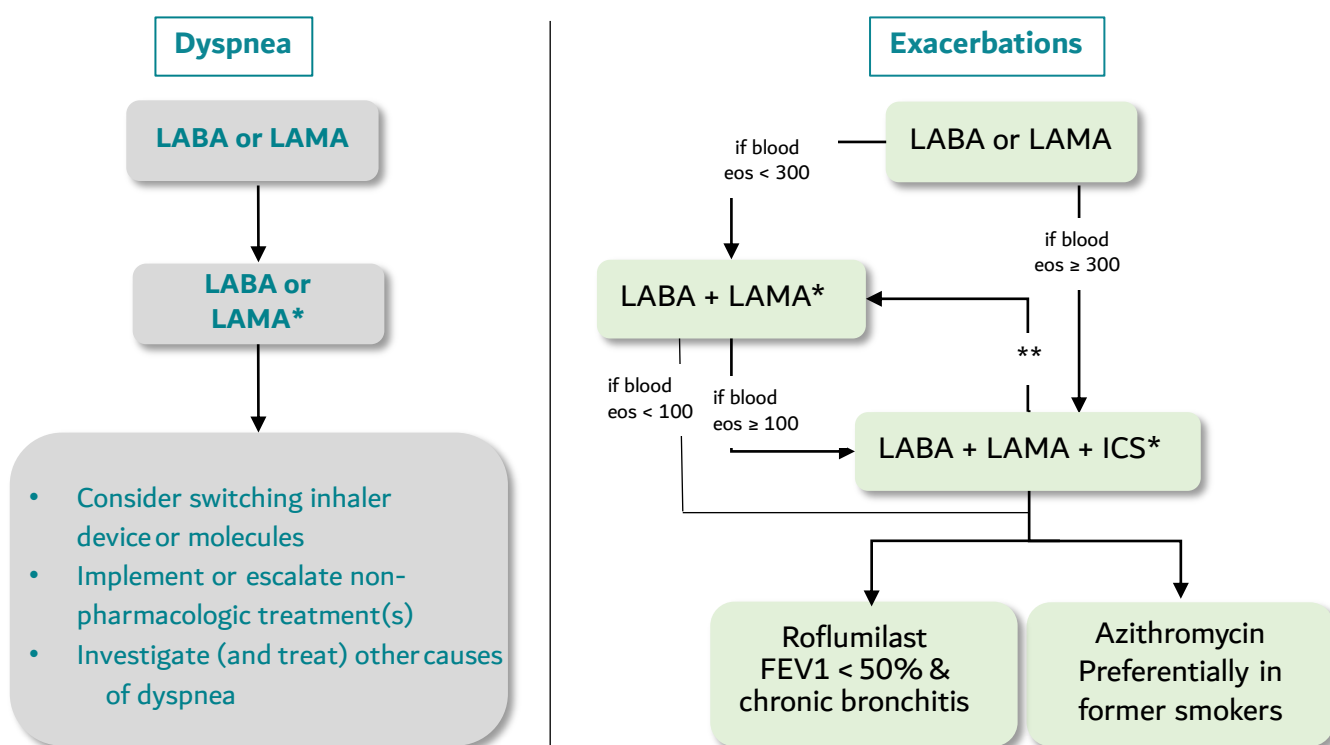
CAT, COPD Assessment Test; eos, blood eosinophil count (cells/ μ L); FEV₁, forced expiratory volume in 1 second; GOLD, Global Initiative for Chronic Obstructive Lung Disease; ICS, inhaled corticosteroid(s); LABA, long-acting β_2 -agonist; LAMA, long-acting muscarinic antagonist; mMRC, modified Medical Research Council dyspnoea questionnaire

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2022 report; 2. Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2023 report available at : https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-1.1-2Dec2022_WMV.pdf

The global treatment paradigm for managing COPD is one of stepwise treatment escalation^{1,2}

Follow-up Pharmacological Treatment

- If response to initial treatment is appropriate, maintain it.
- If not:
 - Check adherence, inhaler technique and possible interfering comorbidities
 - Consider the predominant treatable trait to target (dyspnea or exacerbations) — Use exacerbation pathway if both exacerbations and dyspnea need to be targeted
 - Place patient in box corresponding to current treatment & follow indications
 - Assess response, adjust and review
 - These recommendations do not depend on the ABE assessment at diagnosis



*Single inhaler therapy may be more convenient and effective than multiple inhalers

**Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eos ≥ 300 cells/II de-escalation is more likely to be associated with the development of exacerbations

Exacerbations refers to the number of exacerbations per year

CAT, COPD Assessment Test; eos, blood eosinophil count (cells/ μ L); FEV₁, forced expiratory volume in 1 second; GOLD, Global Initiative for Chronic Obstructive Lung Disease; ICS, inhaled corticosteroid(s); LABA, long-acting β_2 -agonist; LAMA, long-acting muscarinic antagonist; mMRC, modified Medical Research Council dyspnoea questionnaire

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Health Outcomes Indicators

COPD Diagnosis and Treatment Assessment Using Spirometry

Description Title	COPD Diagnosis and Treatment Assessment Using Spirometry
Definition	Percentage of COPD patients who received spirometry testing for confirmation of diagnosis or treatment assessment (atleast once a year) during the measurement year
Numerator	Number of COPD patients who received spirometry testing for confirmation of diagnosis or treatment assessment (atleast once a year) during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better (at-least once a year is mandatory)
Rationale	Spirometry is required to make the diagnosis in this clinical context as the presence of a post-bronchodilator FEV1/FVC < 0.70 confirms the presence of persistent airflow limitation. It is recommended as the preferred method for diagnosing COPD. Also, spirometry is recommended at least once a year to monitor the patients who were under treatment.

Long-acting Bronchodilator Monotherapy for Patients with Stable COPD

Description Title	Long-acting Bronchodilator Monotherapy for Patients with Stable COPD
Definition	Percentage of patients with stable COPD who were prescribed with long-acting bronchodilator monotherapy during the measurement year
Numerator	Number of patients with stable COPD who were prescribed with long-acting bronchodilator monotherapy during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Bronchodilators (inhaled long-acting beta2-agonists [LABA]/inhaled long-acting muscarinic antagonists [LAMA]) that increase FEV1 and/or change other spirometric variables. They act by altering airway smooth muscle tone and the improvements in expiratory flow reflect widening of the airways. Bronchodilator medications in COPD are most often given on a regular basis to prevent or reduce symptoms.

Short-acting Bronchodilator Combination Therapy for Patients with Stable COPD

Description Title	Short-acting Bronchodilator Combination Therapy for Patients with Stable COPD
Definition	Percentage of patients with stable COPD who were prescribed short-acting bronchodilator combination therapy during the measurement year
Numerator	Number of patients with stable COPD who were prescribed short-acting bronchodilator combination therapy during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Bronchodilator combinations (inhaled short-acting beta2-agonists [SABA]/inhaled short-acting muscarinic antagonists [SAMA]) are superior compared to either medication alone in improving FEV1 and symptoms. Combining bronchodilators with different mechanisms and durations of action may increase the degree of bronchodilation with a lower risk of side-effects compared to increasing the dose of a single bronchodilator.

Maintenance Therapy with Long-acting Bronchodilator Combination Therapy in Patients with Stable COPD

Description Title	Maintenance Therapy with Long-acting Bronchodilator Combination Therapy in Patients with Stable COPD
Definition	Percentage of patients with stable COPD who were prescribed long-acting bronchodilator combination therapy during the measurement year
Numerator	Number of patients with stable COPD who were prescribed long-acting bronchodilator combination therapy during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Long-acting Bronchodilator Combination Therapy (LABA/LAMA) have been shown to improve lung function, lung hyperinflation, exercise capacity, quality of life and exacerbation frequency thereby slowing disease progression in COPD.

Maintenance Therapy with Inhaled Corticosteroid (ICS)/Long-acting Bronchodilator Combination Therapy for COPD Patients

Description Title	Maintenance Therapy with Inhaled Corticosteroid (ICS)/Long-acting Bronchodilator Combination Therapy for COPD Patients
Definition	Percentage of patients with COPD exacerbation who were prescribed with combination of ICS and LABA during the measurement year
Numerator	Number of patients with COPD exacerbation who were prescribed with combination of ICS and LABA during the measurement year
Denominator	Total number of patients with COPD exacerbations during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	In COPD patients with history of exacerbations, inhaled corticosteroid (ICS) in combination with long-acting beta2-agonist (LABA) improves lung function, health status and reducing exacerbations.

Triple Therapy for COPD Patients with Recurrent Exacerbation on LABA/ICS

Description Title	Triple Therapy for COPD Patients with Recurrent Exacerbation on LABA/ICS
Definition	Percentage of COPD patients with recurrent exacerbations (on LABA/ICS therapy) who were prescribed with inhaled triple therapy (LABA/LAMA/ICS) during the measurement year
Numerator	Number of COPD patients with recurrent exacerbations (on LABA/ICS therapy) who were prescribed with inhaled triple therapy (LABA/LAMA/ICS) during the measurement year
Denominator	Total number of COPD patients who experienced recurrent exacerbations on LABA/ICS during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Triple therapy (LABA/LAMA/ICS) is recommended for COPD patients who experience recurrent exacerbations despite treatment with either a dual bronchodilator (preferred initial therapy) or LABA/ICS combination (alternative initial therapy).

Phosphodiesterase-4 (PDE4) Inhibitor for Severe to Very severe COPD Patients with Chronic Bronchitis and Exacerbation

Description Title	Phosphodiesterase-4 (PDE4) Inhibitor for Severe to Very severe COPD Patients with Chronic Bronchitis and Exacerbation
Definition	Percentage of severe/very severe COPD patients with chronic bronchitis and exacerbation who were treated with PDE4 inhibitor during the measurement year
Numerator	Number of severe/very severe COPD patients with chronic bronchitis and exacerbation who were treated with PDE4 inhibitor during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Roflumilast is an PDE4 inhibitor that reduces moderate and severe exacerbations treated with systemic corticosteroids in patients with chronic bronchitis, severe to very severe COPD, and a history of exacerbations. The effects on lung function are also seen when roflumilast is added to long-acting bronchodilators, and in patients who are not controlled on fixed-dose LABA/ICS combinations.

Antibiotics Treatment for Patients with Acute COPD Exacerbation

Description Title	Antibiotics Treatment for Patients with Acute COPD Exacerbation
Definition	Percentage of COPD patients with an acute COPD exacerbation who were treated with an antibiotic during the measurement year
Numerator	Number of COPD patients with an acute COPD exacerbation who were treated with an antibiotic during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should be 5-7 days. Azithromycin (250 mg/day or 500 mg three times per week) or erythromycin (250 mg two times per day) for one year in patients prone to exacerbations reduced the risk of exacerbations compared to usual care

Long-term Oxygen Therapy for COPD patients

Description Title	Long-term Oxygen Therapy for COPD patients
Definition	Percentage of COPD patients with arterial hypoxemia who were treated with long-term oxygen therapy during the measurement year
Numerator	Number of COPD patients with arterial hypoxemia who were treated with long-term oxygen therapy during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	Long-term oxygen therapy is indicated for stable patients who have arterial hypoxemia [PaO ₂ < 55 mmHg (7.3 kPa) or SaO ₂ < 88% or PaO ₂ > 55 but < 66 mmHg (> 7.3 kPa but < 8 kPa) with right heart failure or erythrocytosis]. Once placed on long-term oxygen therapy, the patient should be reevaluated after 60 to 90 days with repeat arterial blood gas (ABG) or oxygen saturation while inspiring the same level of oxygen or room air.

Ventilation Support for COPD Patients with Exacerbation and Acute Respiratory Failure

Description Title	Ventilation Support for COPD Patients with Exacerbation and Acute Respiratory Failure
Definition	Percentage of COPD patients with exacerbation or acute respiratory failure who were treated ventilation support during the measurement year
Numerator	Number of COPD patients with exacerbation who were treated with noninvasive positive pressure ventilation (NPPV) support during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	Non-invasive positive pressure ventilation (NPPV) is the standard of care for decreasing morbidity and mortality in patients hospitalized with an exacerbation of COPD and acute respiratory failure particularly in those with pronounced daytime persistent hypercapnia (PaCO ₂ >52 mmHg). Non-invasive mechanical ventilation should be the first mode of ventilation used in COPD patients with acute respiratory failure who have no absolute contraindication because it improves gas exchange, reduces work of breathing and the need for intubation, decreases hospitalization duration and improves survival.

Bronchoscopic Interventions to Reduce Hyperinflation in COPD Patients with Severe Emphysema

Description Title	Bronchoscopic Interventions to Reduce Hyperinflation in COPD Patients with Severe Emphysema
Definition	Percentage of COPD patients with severe emphysema who were prescribed with bronchoscopic interventions to reduce hyperinflation during the measurement year
Numerator	Number of COPD patients with severe emphysema who were prescribed with bronchoscopic interventions to reduce hyperinflation during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	Bronchoscopic Interventions (endobronchial valve placement) can reduce the lung volume and hyperinflation, and improve the lung function, chest wall and diaphragm mechanics at 6 to 12 months of treatment.

Hospitalization of COPD patients Due to Severe Exacerbation

Description Title	Hospitalization of COPD patients Due to Severe Exacerbation
Definition	Percentage of COPD patients who were hospitalized due to severe exacerbation during the measurement year
Numerator	Number of COPD patients who were hospitalized due to severe exacerbation during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	Hospitalization is required for COPD patients experiencing severe exacerbation that include acute respiratory failure, severe symptoms such as sudden worsening of resting dyspnea, high respiratory rate, decreased oxygen saturation, confusion and drowsiness, failure to respond to initial medical treatment, presence of serious comorbidities and insufficient home support.

Intensive Care Unit Admission of COPD patients Due to Severe Exacerbation

Description Title	Intensive Care Unit Admission (ICU) of COPD patients Due to Severe Exacerbation
Definition	Percentage of COPD patients who required ICU admission visits due to severe exacerbation during the measurement year
Numerator	Number of COPD patients who required ICU admission visits due to severe exacerbation during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	ICU admission may be required for COPD patients experiencing severe exacerbation that include actual respiratory failure; severe dyspnea, and persistent or worsening hypoxemia (PaO ₂ < 5.3 kPa or 40 mmHg). Other indications for ICU admission are change in mental status (confusion, presence of other end-organ dysfunction, (i.e. shock, renal, liver or neurological disturbance; and/or hemodynamic instability).

Nicotine Replacement Therapy for Smoking Cessation in COPD Patients

Description Title	Nicotine Replacement Therapy for Smoking Cessation in COPD Patients
Definition	Percentage of COPD patients who are smokers for whom nicotine replacement therapy (gum, inhaler, nasal spray, transdermal patch, sublingual tablet, lozenge) was prescribed for smoking cessation during the measurement year
Numerator	Number of COPD patients who are smokers for whom nicotine replacement therapy (gum, inhaler, nasal spray, transdermal patch, sublingual tablet, lozenge) was prescribed for smoking cessation during the measurement year
Denominator	Total number of patients with COPD who were smokers during the measurement year
Exclusion criteria	COPD patients who are non-smokers
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Smoking cessation has the greatest capacity to influence the natural history of COPD. If effective resources and time are dedicated, long-term quit success rates of up to 25% can be achieved. Nicotine replacement therapy reliably increases long-term smoking abstinence rates and is significantly more effective than placebo.

Pharmacological Therapy for Smoking Cessation in COPD Patients

Description Title	Pharmacological Therapy for Smoking Cessation in COPD Patients
Definition	Percentage of COPD patients who are smokers for whom pharmacological therapy (varenicline, bupropion, or nortriptyline) was prescribed for smoking cessation during the measurement year
Numerator	Number of COPD patients who are smokers for whom pharmacological therapy (varenicline, bupropion, or nortriptyline) was prescribed for smoking cessation during the measurement year
Denominator	Total number of patients with COPD who were smokers during the measurement year
Exclusion criteria	COPD patients who are non-smokers
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Smoking cessation has the greatest capacity to influence the natural history of COPD. If effective resources and time are dedicated, long-term quit success rates of up to 25% can be achieved. Pharmacological products have been shown to increase long term quit rates but should always be used as a component of a supportive intervention program rather than a sole intervention.

Pulmonary Rehabilitation for COPD Patients

Description Title	Pulmonary Rehabilitation for COPD Patients
Definition	Percentage of COPD patients who were referred for pulmonary rehabilitation during the measurement year
Numerator	Number of COPD patients who were referred for pulmonary rehabilitation during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Pulmonary rehabilitation relieves dyspnea and fatigue, improves emotional function and enhances the sense of control among COPD patients. It also reduces hospitalization in patients who have had a recent exacerbation.

Vaccination for COPD Patients

Description Title	Vaccination for COPD Patients
Definition	Percentage of COPD patients who had vaccination (influenza, pneumococcal, COVID-19, Tdap, & zoster) during the measurement year
Numerator	Number of COPD patients who had vaccination (influenza, pneumococcal, COVID-19, Tdap, & zoster) during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Influenza vaccination can reduce morbidity (such as lower respiratory tract infections requiring hospitalization) and mortality in COPD patients. Pneumococcal vaccinations, PCV13 and PPSV26, are recommended for all patients ≥65 years of age. COVID-19 vaccination protects infection through the development of systemic and airway immune responses. Tdap vaccination (also called dTaP/dTPa) protects against pertussis (whooping cough), tetanus and diphtheria, in those who were not vaccinated in adolescence. Zoster vaccine protects against shingles for adults with COPD aged ≥50 years

Eosinophil Count to Assess Treatment Response to Triple FDC Therapy in COPD Patients

Description Title	Eosinophil Count to Assess Treatment Response to Triple FDC Therapy in COPD Patients
Definition	Percentage of COPD patients in whom blood eosinophil count was done to assess response to ICS in triple FDC during the measurement year
Numerator	Number of COPD patients in whom blood eosinophil count was done to assess response to ICS in triple FDC during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Eosinophil count < 100 cells/μL can be used to predict a low likelihood of a beneficial ICS response. A beneficial response after the treatment escalation of ICS along with LABA/LAMA may be observed at blood eosinophil counts ≥ 100 cells /μL, with a greater magnitude of response more likely with higher eosinophil counts.

Triple FDC Therapy in COPD patients at high-risk of exacerbation

Description Title	Triple FDC Therapy in COPD patients at high-risk of exacerbation
Definition	Percentage of COPD patients at high-risk of exacerbation (history of previous hospitalization/ED visit due to COPD, concomitant Asthma or CV disease) who were prescribed with triple fixed dose combination therapy (budesonide/glycopyrrolate/formoterol fumarate metered dose inhaler) to prevent exacerbation during the measurement year
Numerator	Number of COPD patients at high-risk of exacerbation (history of previous hospitalization/ED visit due to COPD, concomitant Asthma or CV disease) who were prescribed with triple fixed dose combination therapy (budesonide/glycopyrrolate/formoterol fumarate metered dose inhaler) to prevent exacerbation during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Higher is better
Rationale	Early intervention with triple FDC therapy (budesonide / glycopyrrolate / formoterol fumarate metered dose inhaler) has been more effective, well tolerated, and could be a more appropriate treatment than the corresponding dual therapies (glycopyrrolate/formoterol fumarate or budesonide/formoterol fumarate) for symptomatic patients with moderate-to-very severe COPD, irrespective of history of exacerbation.

Average incurred cost due to emergency department visits in patients with severe COPD exacerbations

Description Title	Average incurred cost due to emergency department visits in patients with severe COPD exacerbations
Definition	Average incurred costs due to emergency department visits in patients with COPD with severe exacerbations who visited the ED during the measurement year
Numerator	Total costs incurred in COPD patients who visited emergency department for COPD with severe exacerbations in the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	Asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	ED admission may be required for COPD patients experiencing severe exacerbation that include actual respiratory failure; severe dyspnea, and persistent or worsening hypoxemia (PaO ₂ < 5.3 kPa or 40 mmHg). Other indications for ED admission are change in mental status (confusion, presence of other end-organ dysfunction, (i.e. shock, renal, liver or neurological disturbance; and/or hemodynamic instability). It is important for appropriate management of COPD patients experiencing severe exacerbation to reduce the emergency department visits and associated healthcare costs

Reported Cardiovascular Events in COPD Patients

Description Title	Reported Cardiovascular Events in COPD-treated patients
Definition	Percentage of COPD patients who had reported cardiovascular events (myocardial infarction, stroke, unstable angina, and transient ischemic attack) during the measurement year
Numerator	Number of COPD patients who had reported cardiovascular events (myocardial infarction, stroke, unstable angina, and transient ischemic attack) during the measurement year
Denominator	Total number of COPD patients during the measurement year
Exclusion criteria	COPD patients without CV disease events, asthma, pulmonary hypertension, and occupational lung diseases
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure target and/or threshold	Lower is better
Rationale	Cardiovascular events should be considered in all COPD patients depending on their risk factor profile. The cardiovascular risk may be assessed by the global risk calculator, which can be found on the US National Heart Blood Lung Institute website and treatment initiated based on the current recommendations. During, and for at least 90 days after, acute COPD exacerbations there is an increased risk of cardiovascular events (death, myocardial infarction, stroke, unstable angina, and transient ischemic attack) in patients at high risk of concomitant IHD. Hospitalization for an acute COPD exacerbation has been associated with 90-day mortality of acute myocardial infarction, ischemic stroke, and intracranial hemorrhage.

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