

Chronic Obstructive Pulmonary Disease (COPD) Diagnosis and Treatment Guideline

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Last guideline approval: April 2023

Guidelines are systematically developed statements to assist patients and providers in choosing appropriate health care for specific clinical conditions. While guidelines are useful aids to assist providers in determining appropriate practices for many patients with specific clinical problems or prevention issues, guidelines are not meant to replace the clinical judgment of the individual provider or establish a standard of care. The recommendations contained in the guidelines may not be appropriate for use in all circumstances. The inclusion of a recommendation in a guideline does not imply coverage. A decision to adopt any particular recommendation must be made by the provider in light of the circumstances presented by the individual patient.

Major Change as of April 2023

Long-acting muscarinic antagonists (LAMAs) are now preferred first-line therapy over long-acting beta-2 agonists (LABAs) unless LAMAs are not tolerated or are contraindicated. Previously, LAMAs and LABAs were considered equally effective, and LAMAs were preferred only for patients with high exacerbation risk.

Background

Chronic obstructive pulmonary disease (COPD), the fourth leading cause of death in the United States, is a major public health problem that is both preventable and treatable. COPD is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and lungs to noxious particles or gases. Exacerbations and comorbidities contribute to overall severity in individual patients.

Recommendations for the diagnosis and treatment of patients with **concurrent COPD and asthma** are excluded from this guideline because these patients should be managed in consultation with a pulmonologist.

Risk Factors

- Cigarette smoking is the cause of 80% of COPD cases.
- Passive exposure to cigarette smoke
- Indoor air pollution, especially from burning biomass fuels in confined spaces
- Occupational dusts and chemicals
- Genetic factors, including deficiency of the antiprotease enzyme alpha₁-antitrypsin

Prevention

Smoking cessation is the most effective way to reduce the risk of developing COPD or to slow its progression. See the [KPWA Tobacco and Nicotine Cessation Guideline](#) for recommendations on helping patients quit smoking.

Screening

Screening for COPD is not recommended in asymptomatic adults.

Diagnosis and Assessment

COPD should be considered in any patient who has persistent dyspnea that worsens with exercise, chronic cough, wheezes, or sputum production, and/or a history of exposure to risk factors for the disease such as smoking and occupational or environmental exposures.

Diagnosis of COPD using spirometry

Spirometry with post-bronchodilator testing is required to confirm a clinical suspicion of COPD and to rule out asthma, as well as to assess COPD severity. (See Spirometry Resources.)

Table 1. Diagnosing COPD and determining COPD severity based on post-bronchodilator spirometry		
Interpretation Stage	Results Post-bronchodilator FEV ₁ /FVC ratio	Results FEV ₁ % of predicted
Normal or at-risk ¹	Higher than 0.70	80% or higher
GOLD stage 1 = mild	0.70 or lower	80% or higher
GOLD stage 2 = moderate	0.70 or lower	50–79.9%
GOLD stage 3 = severe	0.70 or lower	30–49.9%
GOLD stage 4 = very severe	0.70 or lower	Lower than 30%

¹ Patients who may be at risk of developing COPD include those who smoke or are exposed to pollutants; have cough, sputum, or dyspnea; and/or have a family history of respiratory disease.

Methods for assessing symptoms

COPD Assessment Test (CAT)

The [CAT](#) is a validated tool for assessing the impact on COPD on wellbeing and daily life. There are eight questions on a 1- to 5-point scale, which focus on cough, sputum, breathlessness, chest tightness, confidence, activity, sleep, and energy levels. Scores of 10 or higher indicate that COPD symptoms are not well controlled.

Modified Medical Research Council (mMRC) dyspnea scale

Use of the MRC dyspnea scale is recommended to assess the severity of dyspnea related to activity level. Scores of 2 or higher indicate poor control of COPD symptoms.

mMRC Dyspnea Scale	
Mahler DA, Wells CK. Evaluation of clinical methods for rating dyspnea. <i>Chest</i> . 1988 Mar;93(3):580-586.	
Grade of Dyspnea	Description
0	No dyspnea. No breathlessness except with strenuous exercise
1	Mild dyspnea. Shortness of breath when hurrying or walking up a slight hill
2	Moderate dyspnea. Walks more slowly than people of the same age due to breathlessness or has to stop for breath when walking at own pace on a level surface
3	Severe dyspnea. Stops for breath after walking approximately 100 meters or after a few minutes on a level surface
4	Very severe dyspnea. Too breathless to leave the house, or breathless when dressing or undressing.

Additional tests

Table 2. Additional tests to consider		
Test	Population	Reason
EKG	All patients	Assess for heart disease
CBC	All patients	Assess for anemia or polycythemia
Oximetry, at rest and after exercise	Patients with severe or very severe COPD (FEV ₁ lower than 50% of predicted)	Determine the degree of hypoxemia and the potential need for long-term oxygen therapy
Arterial blood gases	Patients with: <ul style="list-style-type: none"> ▪ Very severe COPD (FEV₁ lower than 30% of predicted) ▪ Signs of heart failure ▪ Signs of polycythemia (Hct > 55%) 	Assess for hypercapnia (respiratory failure)
Cardiopulmonary exercise testing	Patients with disproportionate degree of dyspnea for FEV ₁	Quantify impairment and/or disability and help select patients able to safely undergo lung volume reduction surgery
Alpha ₁ -antitrypsin	Patients with: <ul style="list-style-type: none"> ▪ Early onset COPD ▪ Little or no history of smoking ▪ Family history of COPD ▪ Predominance of basilar emphysema 	Assess for alpha ₁ -antitrypsin deficiency
Pulmonary function tests	Patients with suspected emphysema	Assess for emphysema by monitoring for reduced carbon monoxide diffusion capacity
Echocardiogram	Patients with dyspnea	Assess for cardiac dysfunction or disease, or pulmonary hypertension
Chest X-ray	Patients with dyspnea	Rule out other diagnoses (e.g., TB, lung cancer, congestive heart failure)
Sputum culture and TB smear and culture	Patients with persistently purulent sputum or during recurrent infectious exacerbations	Rule out TB or other infections

Treatment Goals

The goals of managing COPD are to prevent disease progression, reduce the frequency and severity of exacerbations, and improve health status, exercise tolerance, daily activities, and quality of life.

Non-Pharmacologic Treatment Options

Lifestyle modifications

Counsel all patients with COPD to quit smoking and to avoid secondhand smoke. Smoking cessation is the most important factor in slowing the progression of the disease.

Patients should also be encouraged to reduce exposure to dusts, fumes, gases, and to indoor and outdoor air pollutants.

In patients with weight loss or malnutrition, consider dietary supplementation with exercise and nutritional consultation.

Pulmonary rehabilitation

Many patients with COPD may benefit from pulmonary rehabilitation. Pulmonary rehabilitation (PR) is a multidisciplinary program designed to improve both the physical and psychological impacts of chronic respiratory disease. Studies show that PR helps to improve dyspnea, health status and exercise tolerance—especially in patients with moderate to severe COPD—and reduces the risk of re-hospitalization after an exacerbation. Program components include exercise training, disease education, nutritional support, and behavior change strategies that promote long-term adherence to healthy habits. The optimal benefits are obtained from programs lasting for 6–8 weeks with supervised exercise training at least twice per week.

Consider PR for:

- Symptomatic patients with FEV1 < 50% predicted
- Patients recently hospitalized for an acute exacerbation
- Patients with stable COPD who have exercise limitation despite optimal pharmacologic treatment

Note: PR is not suitable for patients who are unable to walk, have unstable angina, or have recently had an MI.

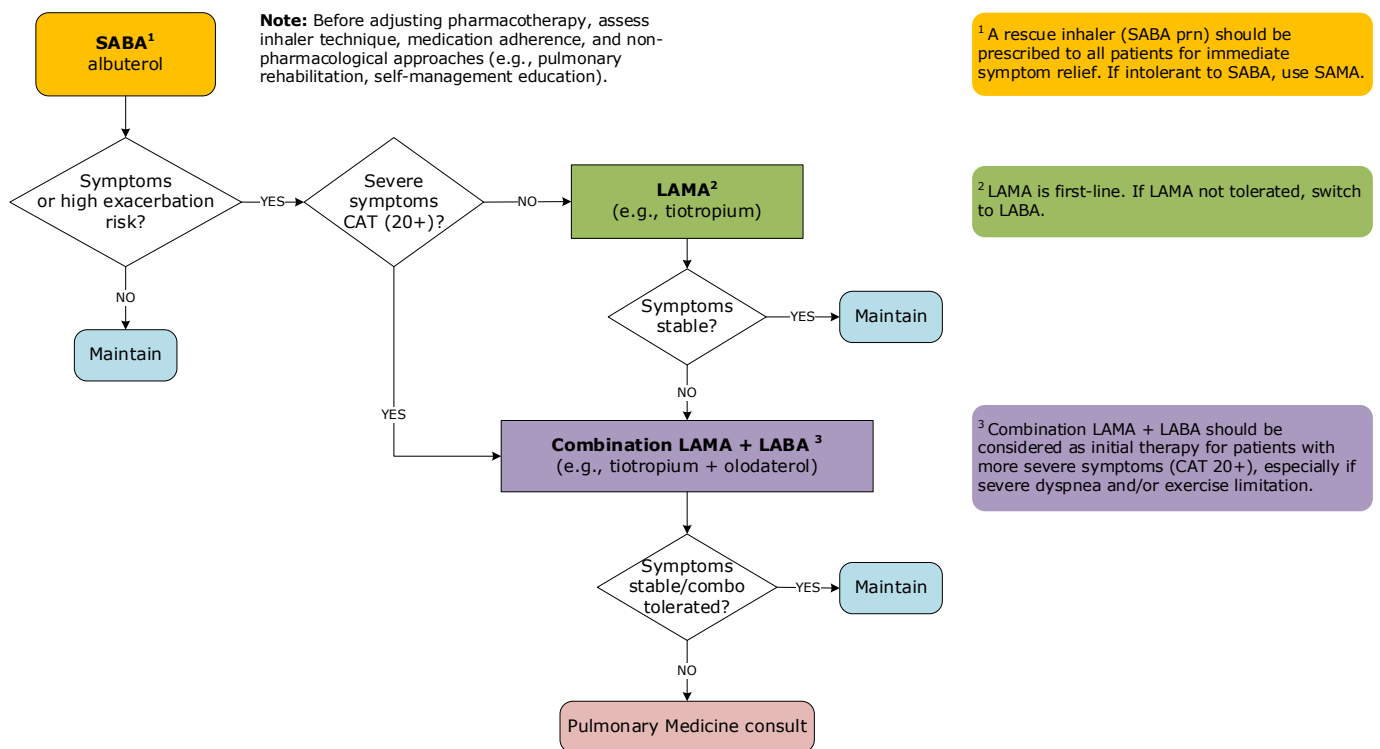
Pharmacologic Treatment Options

Pharmacologic management of COPD should be **individualized** according to presence of symptoms and exacerbation * risk:

- **No symptoms:** mMRC ≤ 1 or CAT < 10
- **Symptoms present:** mMRC > 2 or CAT ≥ 10
- **Low exacerbation risk:** 0 or 1 moderate exacerbations (not leading to hospital admission) in the past year
- **High exacerbation risk:** ≥ 2 moderate exacerbations or ≥ 1 exacerbations leading to hospital admission in the past year

* See COPD Exacerbations, p. 9.

Bronchodilator therapy for patients with confirmed, stable COPD



Prescribing notes

About inhaled corticosteroids (ICS)

Most people with COPD do not benefit from ICS. Regular treatment with ICS increases the risk of pneumonia (*high-quality evidence*).

For patients who are currently on ICS therapy: If patient also has asthma, do not discontinue ICS therapy, and consider referral to Pulmonology. Otherwise, consider de-escalation of ICS if presented with any of the following conditions:

- Recent pneumonia or history of pneumonia while on ICS therapy
- Adverse effects (oral candidiasis, hoarse voice, or skin bruising)
- Lack of response to ICS treatment
- Original indication for ICS was inappropriate (ICS initially used to treat symptoms in the absence of a history of exacerbations)

About beta-blockers

In patients with confirmed COPD who have a cardiovascular indication for beta-blockers, consider continuing cardio-selective beta-blockers (e.g., metoprolol and atenolol).

Table 3: Recommended bronchodilator therapy dosing		
Use . AVSINHALERINSTRUCTIONS to share inhaler information and video links with patients.		
Category	Medications	COPD dosing
SABA	Albuterol	2 puffs every 4–6 hours as needed
If patient is intolerant to SABA, use:		
SAMA	Ipratropium <i>Atrovent</i>	2 puffs 4 times daily
LAMA	Tiotropium <i>Spiriva Respimat 2.5 mcg</i>	2 puffs (5 mcg) once daily
LABA	Olodaterol <i>Striverdi Respimat</i>	2 puffs once daily
LAMA/LABA	Tiotropium/olodaterol <i>Stiolto Respimat</i>	2 puffs once daily
SABA: Short-acting beta-2 agonist; SAMA: short-acting muscarinic antagonist; LAMA: long-acting muscarinic antagonist; LABA: long-acting beta-2 agonist		

Oxygen therapy

Oxygen therapy is considered a pharmacologic treatment with risks and benefits.

Use of supplemental oxygen therapy for a minimum of 15 hours per day increases survival and improves the quality of life of patients with COPD who are severely hypoxic at rest. However, oxygen does not provide any benefit for patients with stable COPD and mild or no hypoxemia at rest. Due to the risk of potentially life-threatening facial and upper airway burns, patients who continue to smoke should not be prescribed oxygen.

Severe hypoxia is defined as:

- SaO₂ 88% or lower and/or PaO₂ 55 mm Hg or lower while patient is *clinically stable*.
- SaO₂ 89% or lower and/or PaO₂ 56–59 mm Hg and signs of tissue hypoxia (hematocrit higher than 55%, pulmonary hypertension, or cor pulmonale), angina or dependent edema suggestive of heart failure.
- SaO₂ 88% or lower or PaO₂ 55 mg Hg *upon exertion*.

Before prescribing supplemental oxygen therapy, the following items must be documented:

- An oxygen assessment was done within 30 days prior to initial home oxygen order.
- COPD symptoms have progressed over time and persist despite maximum medication therapy.
- O₂ saturation must improve while the patient is on oxygen—at rest and/or upon exertion.

Use the **Home Oxygen SmartSet** to ensure that all [coverage criteria](#) have been met, and to specify O₂ delivery method (cannula, mask, portable O₂) and flow rate during exertion, at rest, and during sleep. Use of the Home Oxygen SmartSet also ensures that oxygen is added to the medication list. Patient information can be added to the After Visit Summary using **.avsoxygentherapy**.

Follow-up visits are needed:

- Within 30 days of oxygen initiation to assess the continued need for home oxygen and adjust O₂ flow as needed.
- 3 months after oxygen initiation.
- Annually thereafter.

COPD Exacerbations

COPD exacerbation

A sustained acute-onset worsening of the person's symptoms from their usual stable state, which goes beyond their normal day-to-day variations, and leads to a change in medication. Diagnosis relies exclusively on clinical presentation of **three cardinal symptoms**:

- Increased dyspnea
- Increased sputum volume
- Increased sputum purulence

Note: If increased purulence of sputum is one of the symptoms, then only one other cardinal symptom (increased dyspnea or increased sputum volume) is required for an exacerbation diagnosis.

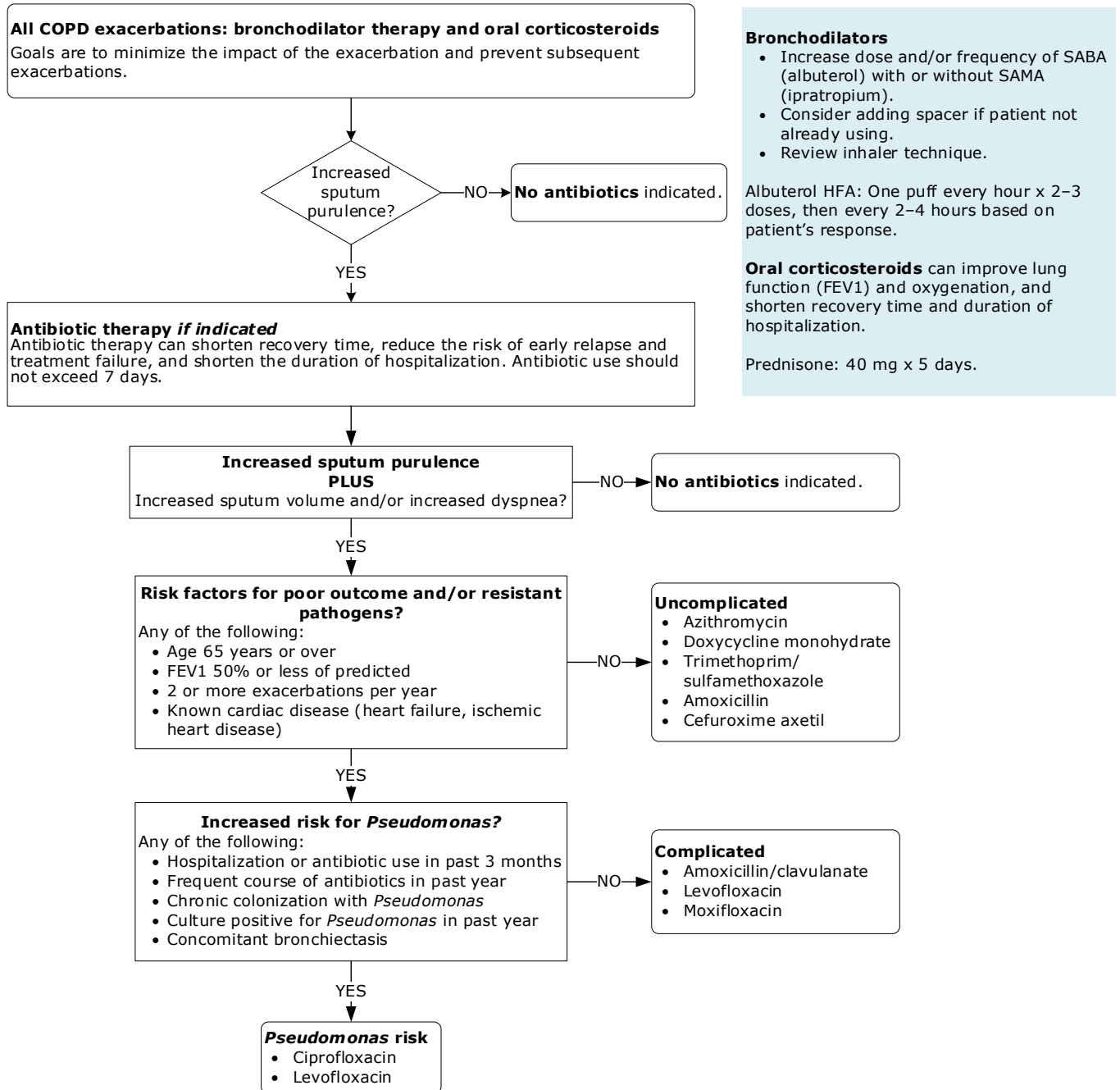
A chest X-ray is recommended for all patients with a suspected COPD exacerbation.

Severity of exacerbation

- Mild exacerbation: the person has an increased need for short acting bronchodilators, which they can manage in their own normal environment.
- Moderate exacerbation: the person has a sustained worsening of respiratory status that requires treatment with systemic corticosteroids and/or antibiotics.
- Severe exacerbation: the person experiences a rapid deterioration in respiratory status that requires hospitalization.

If hypoxia is a new symptom for your patient, consider the exacerbation as severe and triage as above.

Treatment of COPD exacerbations



For antibiotic dosing, see Table 4 on the following page.

Table 4. Antibiotic dosing for treatment of COPD exacerbations			
Antibiotic	Dosing	Duration	Risk Pathway
Amoxicillin	500 mg TID	5–7 days	Uncomplicated
Amoxicillin/clavulanate	875/125 mg BID	5–7 days	Complicated
Azithromycin	500 mg x 1 dose, then 250 mg daily x 4 days	5 days	Uncomplicated
Cefuroxime axetil	500 mg BID	5–7 days	Uncomplicated
Ciprofloxacin	500 mg BID	5–7 days	<i>Pseudomonas</i> risk
Doxycycline	100 mg BID	5–7 days	Uncomplicated
Levofloxacin	750 mg daily	5–7 days	Complicated <i>Pseudomonas</i> risk
Moxifloxacin	400 mg daily	5–7 days	Complicated
Trimethoprim/sulfamethoxazole (TMP/SMX)	800/160 mg BID	5–7 days	Uncomplicated

Prophylactic antibiotics to prevent COPD exacerbations

Prophylactic antibiotic use should be considered for patients with COPD who meet the following criteria:

- Do not smoke, **and**
- Have optimized non-pharmacologic management and inhaled therapies, relevant vaccinations and (if appropriate) have been referred for pulmonary rehabilitation, **and**
- Continue to have 1 or more of the following, particularly if they have significant daily sputum production:
 - Frequent (typically 4 or more per year) exacerbations with sputum production
 - Prolonged exacerbations with sputum production
 - Exacerbations resulting in hospitalization

Before referral to or E-Consult with Pulmonology for prophylactic antibiotics, ensure the person has had:

- Sputum culture and sensitivity (including tuberculosis culture), to identify other possible causes of persistent or recurrent infection that may need specific treatment (for example, antibiotic-resistant organisms, atypical mycobacteria, or *Pseudomonas aeruginosa*)
- Training in airway clearance techniques to optimize sputum clearance
- A CT scan of the thorax to rule out bronchiectasis and other lung pathologies

Follow-up and Monitoring

To optimize treatment and prevent complications, periodic monitoring is advised.

For patients on medications, monitor symptoms at every visit. Repeat spirometry is recommended for those patients with a persistent change in symptoms or to assess response to a new treatment.

Medication monitoring

Table 5. Recommended monitoring for medication side effects	
Eligible population	Tests
Patients being treated with SABA	<ul style="list-style-type: none">• Blood pressure• Heart rate• Tremor
Patients being treated with LABA	<ul style="list-style-type: none">• Blood pressure• Heart rate• Tremor
Patients being treated with SAMA	<ul style="list-style-type: none">• Heart rate
Patients being treated with LAMA	<ul style="list-style-type: none">• Heart rate
Patients being treated with long-term prednisone	<ul style="list-style-type: none">• Assess lipids 1 month after initiation, then every 6–12 months• Blood sugar every 3 to 6 months for first year, then annually after• Eye exam annually (due to increased risk of cataracts and glaucoma)• Assess bone density (due to risk of osteoporosis)

Risk of osteoporosis is increased by long-term oral or inhaled steroid use

- Patients with COPD are at elevated risk for osteoporosis. Patients with COPD prescribed steroids are at even higher risk.
- Fracture risk is best estimated using the FRAX calculator because there is an increased risk of fracture even before bone mineral density decreases.
- COPD patients taking **oral** steroids at doses above 5 mg/day of prednisolone or equivalent for 3–6 months (or a lifetime cumulative oral steroid dose of 1,000 mg or more) have a greater risk of fracture than patients without COPD taking the same oral steroids. Patients on high-dose steroids should be screened for osteoporosis at least once (outside of standard screening recommendations) and given prophylactic calcium and vitamin D.
- **Intermittent use** of oral steroids is not associated with an increased risk of fractures.
- Patients continuously taking **inhaled** steroids for a duration of 3–4 years are at increased risk of bone demineralization and/or fracture and should be screened for osteoporosis at least once (outside of standard screening recommendations).

Recommended immunizations

Ensure immunizations are current per [CDC recommendations](#), including:

- Annual influenza vaccination
- Pneumococcal vaccination
- Covid vaccination

Referral

Consider a referral to **Pulmonology** for patients who:

- Are at COPD Stage 3 or 4 (FEV1 < 50%)
- Have two or more exacerbations per year
- Have hypercapnia or ICU admission for COPD
- Have hypoxic COPD
- Have pulmonary hypertension

Consider a transfer to **Urgent Care/Emergency Room** for patients with:

- Failure to respond to home care
- Worsening hypoxemia or hypercapnia
- Onset of cyanosis, altered mental status or other new signs
- History of frequent exacerbations or recent hospitalization
- Hypoxic COPD

In addition, consider a referral to **Palliative Care** in patients with severe disease or refractory symptoms to discuss advance care planning and complete documentation of Health Care DPOA and POLST. See the Palliative Care home page for more information about the available options, including home-based palliative care.

Evidence Summary

The COPD Diagnosis and Treatment Guideline was developed using an evidence-based process, including systematic literature search, critical appraisal, and evidence synthesis.

As part of our improvement process, the Kaiser Permanente Washington guideline team is working towards developing new clinical guidelines and updating the current guidelines every 2–3 years. To achieve this goal, we are adapting evidence-based recommendations from high-quality national and international external guidelines, if available and appropriate. The external guidelines should meet several quality standards to be considered for adaptation. They must: be developed by a multidisciplinary team with no or minimal conflicts of interest; be evidence-based; address a population that is reasonably similar to our population; and be transparent about the frequency of updates and the date the current version was completed.

In addition to identifying the recently published guidelines that meet the above standards, a literature search was conducted to identify studies relevant to the key questions that are not addressed by the external guidelines.

External guidelines eligible for adapting

- [2022 Update of Global Initiative for Chronic Obstructive Lung Disease \(GOLD\): Global strategy for the diagnosis, management and prevention of COPD](#)
- 2022 KP National Clinical Practice Guideline: Chronic Obstructive Pulmonary Disease
- [2022 U.S. Preventive Services Task Force. Screening for Chronic Obstructive Pulmonary Disease.](#)
- [2021 Department of Veterans Affairs and Department of Defense. VA/DoD Clinical Practice Guideline: Management of Outpatient Chronic Obstructive Pulmonary Disease](#)

The KPWA guideline team reviewed and adopted the following conclusions, excerpted from the 2022 KP National Clinical Practice Guideline for Chronic Obstructive Pulmonary Disease (see pages 25–26):

Long-acting bronchodilators (LAMAs and LABAs)

The confidence in the available evidence is high that the benefits of offering long-acting bronchodilators to patients with confirmed, stable COPD who continue to have respiratory symptoms likely outweigh the harms of not offering therapy and the adverse effects of the medications. In patients with confirmed, stable COPD who continue to have respiratory symptoms, both LAMAs and LABAs are beneficial in the chronic management of this condition, in addition to the use of as-needed short-acting bronchodilators. LAMAs (specifically tiotropium) improve FEV1 and QoL. Additionally, LAMAs reduce the rate of COPD exacerbations and exacerbations requiring hospitalization. LABAs (specifically formoterol and salmeterol) also improve FEV1 and QoL. However, rates of COPD exacerbations, mortality, and non-fatal serious adverse events do not vary between patients using LABAs and those using placebo, so evidence suggests LABAs may be less effective. Indacaterol, a once daily LABA, was also demonstrated to improve FEV1 compared to placebo. There is no difference among different types of LABAs for the outcome of COPD exacerbations.

In the 2021 update, the VA/DoD guideline work group issued a strong recommendation to offer inhaled LAMAs as first-line therapy in all patients with symptomatic COPD, as well as a strong recommendation against offering inhaled LABAs as first-line therapy (unless a LAMA is not tolerated or contraindicated). A literature search updating the evidence base for these recommendations identified 9 new systematic reviews published since the 2014 version of the guideline. The evidence from these new publications, as well as the Cochrane review and 1 RCT identified in the 2014 guideline, was judged to be of moderate quality. This evidence suggests that, relative to placebo, LAMAs and LABAs are associated with decreased dyspnea, less frequent exacerbations, and improved quality of life, and no increased risk of adverse events. Additionally, two SRs published in 2017 found that patients treated with LAMAs had significantly fewer exacerbations, hospitalizations, and adverse events relative to patients treated with LABAs. The work group noted that some patients (e.g., those with glaucoma or urinary retention) may not tolerate a LAMA, or may be reluctant to start a LAMA given the risk of adverse events; in such patients, the choice of LABA as first-line treatment

may be appropriate. Nevertheless, the work group concluded that the benefits of first-line LAMA therapy clearly outweighed the harms.

KP adopted the 2021 VA/DoD update to recommendations on the use of LAMAs as first-line therapy, which strengthened language to promote the use of LAMAs and discouraged LABA. The recommendation language is the same, but we consider the language on LABAs to be more appropriately interpreted as a clinical consideration, rather than a strong negative recommendation. In KP guideline development, strong negative recommendations are generally reserved for treatments where the risks clearly outweigh benefits, and the evidence does not support this conclusion.

Guideline Development Process and Team

Development process

The COPD Guideline was developed using an evidence-based process, including systematic literature search, critical appraisal, and evidence synthesis. For details, see Evidence Summary and References.

This edition of the guideline was approved for publication by the Guideline Oversight Group in April 2023.

Team

The COPD Guideline development team included representatives from the following specialties: family medicine, gerontology, internal medicine, nursing, residency, respiratory therapy, pharmacy, pulmonology, and urgent care.

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