**CCHCS Care Guide: COPD**

### SUMMARY

**GOALS**
- Identify individuals who smoke and offer them help to quit.
- Increase use of appropriate therapy for COPD patients
- Reduce emergency department (ED) visits and hospitalizations
- Offer influenza, COVID and pneumococcal vaccinations
- Educate COPD patients to increase their self-management skills
- End-of-Life planning; encourage POLST/Advanced Directive

**DIAGNOSTIC CRITERIA/EVALUATION**

COPD is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. Significant comorbidities may have an impact on morbidity and mortality.\(^1\)

**Diagnosis:** Suspected based on the patient’s symptoms and physical examination and confirmed when a patient who has symptoms of COPD is found by post-bronchodilator spirometry to have FEV\(_1\)/FVC ratio < 0.70.
- Chest X-Ray is not sensitive for the diagnosis of COPD; it may be done to rule out other diagnoses and as a baseline (See page 2 for further evaluation)
- Screening for Alpha 1-antitrypsin deficiency is recommended to be done once for patients diagnosed with COPD

### ASSESSMENT

**MULTIDIMENSIONAL ASSESSMENT OF COPD**

- Establish diagnosis by post-bronchodilator FEV\(_1\)/FVC ratio < 0.70
- Establish severity of airflow limitation (GOLD* Stage at right)
- Assess patient’s symptom burden using the Modified Medical Research Council (mMRC) Dyspnea Scale (See Table 1 page 3)
- Determine number of exacerbations/hospitalizations in past year: 0-1 or > 2
- Determine the patient’s GOLD ABCD Group (Table 2 page 3)
- Choose initial medication based on patient’s GOLD ABCD group (Table 3 page 4)

**FEV\(_1\) = Forced expiratory volume in 1 sec; FVC = Forced vital capacity; PaO\(_2\) = Arterial partial pressure of oxygen; PaCO\(_2\) = Arterial pressure of carbon dioxide
**GOLD:** Global Initiative for Chronic Obstructive Lung Disease

### TREATMENT

**Inhaled Medications:** (Provide education on proper inhaler/device technique and review frequently, especially if not responding to treatment)
- **Initiation of therapy** based on the GOLD* ABCD assessment of symptoms and risk of exacerbation (Table 3 page 4 and Appendix A).
- **Follow-up medication adjustments** based on lack of symptom control and/or recurrent exacerbations (Algorithm 1 page 2 and Appendix B).

* **SABA:** Short-acting beta-agonist (all patients as needed for acute symptoms);
* **LABA:** Long-acting beta-agonist;
* **SAMA:** Short-acting muscarinic antagonists;
* **LAMA:** Long-acting muscarinic antagonists;
* **ICS:** Inhaled corticosteroid

**Steroids:** 5-7 day course of oral corticosteroid indicated for treatment of COPD exacerbation. NO role for chronic use of oral corticosteroids.

**Antibiotics:** In outpatients with moderate to severe exacerbation, antibiotics improved clinical outcomes (See Algorithm 2 page 5 and Appendix C).

**PDE4-Inhibitors:** Reduce inflammation. Roflumilast is a once-daily oral medication indicated only in patients with chronic bronchitis, severe to very severe COPD, and a history of exacerbations.

**Continuous O\(_2\) Therapy:** Improves survival if severe chronic resting hypoxemia (PaO\(_2\) < 55 mm HG OR SaO\(_2\) < 88%); goal is baseline SaO\(_2\) > 90%.

**Pulmonary Rehabilitation:** Self-directed pulmonary rehab strategies including exercise program/conditioning to help quality of life and decrease symptoms.

### MONITORING

- Follow-up as clinically indicated. Close follow-up is indicated after hospital discharge as well as during and after any exacerbation.
- Pneumococcal (1 dose of PCV20 or 1 dose of PCV15 followed by a dose of PPSV23 ≥1 years later*), COVID, and annual influenza vaccines. Ask about tobacco use at every visit; offer help with smoking cessation.
- Review medication adherence and inhaler technique, especially if patient is not responding to therapy.

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**Information contained in the Care Guide is not a substitute for a health care professional's clinical judgment. Evaluation and treatment should be tailored to the individual patient and the clinical circumstances. Furthermore, using this information will not guarantee a specific outcome for each patient. Refer to "Disclaimer Regarding Care Guides" for further clarification.**

[http://www.cchcs.ca.gov/careguides.aspx](http://www.cchcs.ca.gov/careguides.aspx)

*Latest ACIP guidelines*
Algorithm 1: COPD Evaluation and Management

**Suspect COPD:**
If patient is a past or current smoker and has chronic cough and/or chronic sputum production and/or dyspnea with exertion or at rest

**Assessment:**
- **History:** Risk factors (especially smoking history) and symptoms (cough, dyspnea)
- **Exam:** Findings are generally present only with severe disease:
  - Evidence of hyperinflation (e.g., increased resonance to percussion) barrel chest
  - Decreased breath sounds/wheezes/pursed lip breathing/use of accessory muscles of respiration

Labs/Diagnostic Studies:
- **Spirometry** (required for diagnosis): Diagnosis established if post-bronchodilator FEV₁/FVC < 0.70
- **CXR:** Not sensitive for diagnosis of COPD but can be done to rule out other diagnosis and for later use as baseline
- **Alpha-1-antitrypsin:** WHO recommends all patients with COPD be screened once for deficiency
- **Assess for Anemia with CBC and heart failure with BNP** if indicated
- **Baseline eosinophil level:** Assessment may guide steroid treatment

**Establish Diagnosis/Severity of Airflow Limitation/Symptoms → Treatment Selection:**
- **Step 1A:** Establish diagnosis by spirometry. Post-bronchodilator ratio of FEV₁/FVC < 0.7
- **Step 1B:** Establish severity of airflow limitation (GOLD Stage - See page 3)
- **Step 2A:** Assess patient’s symptom burden using Modified Medical Research Council (mMRC) Dyspnea scale (Table 1 page 3)
- **Step 2B:** Determine number of exacerbations/hospitalizations the patient has experienced in the past year: 0-1 or ≥ 2
- **Step 3A:** Determine the patient’s GOLD ABCD Group (Table 2 page 3)
- **Step 3B:** Choose initial medication based on patient’s GOLD ABCD Group (Table 3 on page 4 and Appendix A)

**Evaluate and Treat Associated Conditions:**
Cardiovascular disease (pulmonary HTN, cor pulmonale): Consider ECG, echocardiogram
Sleep disorder: Consider screen for obstructive sleep apnea (OSA) if patient has pulmonary HTN, ↑PaCO₂, daytime somnolence

**Non-Pharmacologic Management/Education/Prevention:**
- Tobacco use/exposure and offer cessation support as needed
- Vaccinations: Annual influenza, Pneumococcal, and COVID vaccines per current recommendations
- Educate on proper inhaler technique (if Rx’s) and check for appropriate usage, especially if not responding
- Encourage self-directed pulmonary rehabilitation strategies including exercise program conditioning/endurance

**Is patient stable on initial medication?**
**Yes**
- **Follow-up Treatment of Stable COPD:**
  - If stable, continue current medications
  - Ensure Goals of Care/End-of-Life wishes (Advanced Directive/POLST)
  - Follow Non-pharmacologic Management/Education/Prevention as above

**No**
- **Follow-up Treatment of COPD and Exacerbation Management:**
  - If continued dyspnea or exacerbations, adjust medication based on GOLD recommendations (Does NOT depend on GOLD ABCD Group)- See Algorithm 2 page 5 and Appendix B
  - Consider “de-escalation” of medication once patient improves
  - Additional guidance on managing exacerbations- See page 5
  - Details on antibiotic selection (if indicated in exacerbation)- See Appendix C
  - Refer to pulmonary specialist as indicated
  - Long-term oxygen in patients with chronic hypoxia increases survival: PaO₂ of < 55mm Hg or O₂ sat ≤ 88%
  - Establish Goals of Care/End-of-Life wishes (Advanced Directive/POLST)
Assessment/Diagnosis

Risk Factors for COPD:
- Cigarette smoking causes 80%-90% of all cases of COPD
- Prematurity and genetic factors (including alpha-1 antitrypsin deficiency)
- Passive exposure to cigarette smoke or environmental tobacco smoke
- Occupational hazards, eg, dusts and chemicals (vapors, irritants, and fumes)
- History of asthma

Symptoms of COPD:
- Dyspnea: Ask about the amount of effort required to induce uncomfortable breathing. Many individuals will deny symptoms of dyspnea, but will have reduced their activity levels substantially.
- Cough: Cough with or without sputum production should be an indication for spirometric testing. The presence of chronic cough and sputum has been used to define chronic bronchitis.

Diagnosis and assessment of severity of COPD and initial treatment choice:

Step 1A: Establish diagnosis by spirometry: Post-bronchodilator ratio of FEV1/FVC < 0.7

Step 1B: Establish severity of airflow limitation (GOLD Stage)
- GOLD 1: Mild FEV1 ≥ 80% predicted
- GOLD 2: Moderate 50% ≤ FEV1 < 80% predicted
- GOLD 3: Severe 30% ≤ FEV1 < 50% predicted
- GOLD 4: Very Severe FEV1 < 30% predicted

Step 2A: Assess patient’s symptom burden using the Modified Medical Research Council (mMRC) Dyspnea scale (Table 1)

Other assessment tool options include the CAT (COPD Assessment Test) which is available online

Step 2B: Determine number of exacerbations/hospitalizations the patient has experienced in the past year: 0 or 1 or ≥ 2

Step 3A: Determine the patient’s GOLD ABCD Group (Table 2)

Step 3B: Choose initial medication based on patient’s GOLD ABCD Group (Table 3 on page 4 and Appendix A)

Table 1: Modified Medical Research Council (mMRC) Dyspnea Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description of Breathlessness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I only get breathless with strenuous exercise</td>
</tr>
<tr>
<td>1</td>
<td>I get short of breath when hurrying on level ground or walking up a slight hill</td>
</tr>
<tr>
<td>2</td>
<td>On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace</td>
</tr>
<tr>
<td>3</td>
<td>I stop for breath after walking about 100 yards or after a few minutes on level ground</td>
</tr>
<tr>
<td>4</td>
<td>I am too breathless to leave the house or I am breathless when dressing</td>
</tr>
</tbody>
</table>

Table 2: GOLD "ABCD" Groups: Assessment of Symptoms/Risk of Exacerbations for Initiation of COPD Therapy

<table>
<thead>
<tr>
<th>Assess Exacerbation Risk: Exacerbations/Hospitalizations</th>
<th>Assess Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mMRC 0 to 1; CAT* &lt; 10</td>
</tr>
<tr>
<td>0 or 1 exacerbations without hospitalization</td>
<td>A</td>
</tr>
<tr>
<td>≥ 2 exacerbations or ≥ 1 hospitalization</td>
<td>C</td>
</tr>
</tbody>
</table>

*CAT = COPD Assessment Test (online symptom assessment tool: [https://www.catestonline.org/](https://www.catestonline.org/))
Per GOLD there is lack of high quality evidence supporting initial pharmacological treatment strategies in newly diagnosed COPD patients. Table 3 below is their attempt to provide clinical guidance using the best available evidence.

**TABLE 3: INITIATION OF THERAPY BASED ON THE GOLD ABCD ASSESSMENT IN STABLE COPD**

<table>
<thead>
<tr>
<th>Number of Exacerbations</th>
<th>Symptoms: mMRC 0-1</th>
<th>Symptoms: mMRC ≥ 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 2 exacerbations per year with one or more leading to hospitalization</td>
<td><strong>Group C</strong> LAMA</td>
<td><strong>Group D</strong> LAMA or LAMA + LABA* or ICS + LABA**</td>
</tr>
<tr>
<td>0 or 1 exacerbations in the past year without associated hospitalization</td>
<td><strong>Group A</strong> Short-acting bronchodilator (SABA, SAMA, or combination of SABA-SAMA), as needed.</td>
<td><strong>Group B</strong> A long-acting bronchodilator (LABA or LAMA)</td>
</tr>
</tbody>
</table>

SAMA: Short-acting muscarinic antagonists; LAMA: Long-acting muscarinic antagonists; SABA: Short-acting beta-agonist; LABA: Long-acting beta-agonists; ICS: Inhaled corticosteroid
*Consider if highly symptomatic **Consider if eosinophils ≥300 cell/microliter
For more detailed recommendations, please see Appendix A.

**RECOMMENDATIONS AND EVIDENCE STRENGTH FOR MEDICATION CLASSES BASED ON GOLD 2020**

Key Points for Inhalation of drugs:
- The **choice of inhaler device** has to be individually tailored and will depend on access, cost, and most importantly, patient's ability and preference.
- It is essential to provide instructions and to demonstrate the **proper inhalation technique** when prescribing a device, to ensure the inhaler technique is adequate. Recheck this at each visit to ensure patients continue to use their inhaler correctly.
- Assess inhaler technique (and adherence to therapy) before concluding that the current therapy requires modification.

Key points for use of bronchodilators:
- LABAs and LAMAs are preferred over short-acting agents except for patients with only occasional dyspnea (Evidence A), and for immediate relief of symptoms in patients already on long-acting bronchodilators for maintenance therapy.
- Patients may be started on single long-acting bronchodilator therapy or dual long-acting bronchodilator therapy. In patients with persistent dyspnea on one bronchodilator treatment should be escalated to two (Evidence A).
- Inhaled bronchodilators are recommended over oral bronchodilators (Evidence A).
- Theophylline is not recommended unless other long term bronchodilators are unavailable or unaffordable (Evidence B).

Key points for the use of anti-inflammatory agents:
- Long-term monotherapy with ICS is not recommended (Evidence A).
- Long-term treatment with ICS may be considered in association with LABAs for patients with a history of exacerbations despite appropriate treatment with long-acting bronchodilators (Evidence A).
- Long-term therapy with oral corticosteroids is not recommended (Evidence A).
- In patients with severe to very severe airflow limitation, chronic bronchitis and exacerbations the addition of a PDE 4 inhibitor to a treatment with long-acting bronchodilators with/without ICS can be considered (Evidence B).
- Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, macrolides, in particular azithromycin, can be considered (Evidence B).
- Antioxidant mucolytics are recommended only in selected patients (Evidence A).

**NON-PHARMACOLOGIC MANAGEMENT OF STABLE COPD**

For all patients, counsel on:
- Avoidance of risk factor(s), such as smoking
- Importance of regular physical activity
- Influenza (annually) COVID-19 and pneumococcal vaccinations (PCV13 and PCV23 in patients > 65 years old, and in younger patients with significant comorbid conditions)
- Regular review/correction of inhaler technique
- Long-term oxygen therapy if severe chronic resting hypoxemia (\(\text{PaO}_2 < 55 \text{ or } \% \text{SaO}_2 < 88\% ; \text{PO2} 55-60\). Goal is baseline \(\text{PaO}_2 \text{ to } \geq 60 \text{ mm Hg or SaO}_2 \geq 90\%\)) improves survival (See page 6)
- Pulmonary rehabilitation
Follow-up Treatment of COPD and Exacerbation Management

Following initiation of therapy, patients should be reassessed periodically as clinically indicated:
- **Review** symptoms (dyspnea) and exacerbation risk.
- **Assess** inhaler technique and adherence, and the role of non-pharmacological approaches.
- **Adjust** pharmacological treatment, including escalation or de-escalation. Switching inhaler device or molecules within the same class (e.g., using a different long-acting bronchodilator) may be considered as appropriate. Any change in treatment requires a subsequent review of the clinical response, including side effects.

The GOLD 2020 algorithm below is provided to guide follow-up treatment/medication adjustment.
- Management still based on symptoms/exacerbations, but does not depend on the patient’s GOLD Group at diagnosis.
- These follow-up recommendations can be used whether early after initial treatment or after years of follow-up.
- These recommendations incorporate recent evidence from clinical trials and the use of peripheral blood eosinophil counts of the biomarker to guide the use of ICS therapy for exacerbation prevention.

**Algorithm 2: Follow-up Pharmacological Treatment**

1. If response to initial treatment is working and appropriate, maintain it.
2. If not, medication adjustment can be determined based on whether Dyspnea or Exacerbations are the main issue (See below)
   - i. GOLD ABCD Assessment NOT used to adjust treatment
   - ii. If BOTH Dyspnea and Exacerbations are a problem use Exacerbation pathway
   - iii. Follow medication adjustment recommendations, assess response, adjust again as needed until stable

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**IMPORTANCE OF DE-ESCALATION AS WELL AS ESCALATION**

- The algorithm above suggests escalation and de-escalation strategies based on available efficacy as well as safety data.
- The response to treatment escalation should always be reviewed, and de-escalation should be considered if there is a lack of clinical benefit and/or side effects occur.
- De-escalation may also be considered in COPD patients receiving treatment who return with resolution of some symptoms that subsequently may require less therapy. Patients in whom treatment modification is considered, in particular de-escalation, should be undertaken under close medical supervision. Treatment escalation and de-escalation have limited systematic evidence.

**OTHER MEDICATIONS**

**PDE4-Inhibitors**: The principal action of phosphodiesterase-4 inhibitors is to reduce inflammation by inhibiting breakdown of intracellular cAMP. **Roflumilast** is a once daily oral medication with no direct bronchodilator activity. It is indicated in patients with chronic bronchitis, severe to very severe COPD and a history of exacerbations. It is felt to improve lung function and reduce moderate to severe exacerbations (Evidence A).

**Antibiotics**: Older studies of prophylactic, continuous use of antibiotics showed no effect on the frequency of exacerbations. More recent studies have shown that regular use of some antibiotics may reduce exacerbation rate. Gold 2020 states azithromycin (250 mg/day or 500 mg 3X/week) or erythromycin (500 mg bid) for 1 year may be considered in patients prone to exacerbations and NOT current smokers.
Exacerbation of COPD is defined as an acute worsening of respiratory symptoms that results in additional therapy.

Exacerbations are classified as:
- Mild (treated with short-acting bronchodilators only)
- Moderate (treated with short-acting bronchodilators plus antibiotics and/or oral corticosteroids) or
- Severe (patient requires hospitalization or visits the emergency room). May also be associated with acute respiratory failure.

Triggers: Exacerbations are mainly triggered by respiratory viral infections although bacterial infections and environmental factors such as pollution in ambient temperature may also initiate and/or amplify these events. Short-term exposure to fine particulate matter is associated with increased hospitalizations for acute exacerbations and increased mortality of COPD.

Duration: Symptoms usually last between 7 to 10 days but some events may last longer.

Morbidity: It is well-established that COPD exacerbations contribute to disease progression. Disease progression is even more likely if recovery from exacerbations is slow.

Recurrence: The strongest predictor of the patient's future exacerbation frequency remains the number of exacerbations they have had in the prior year.

Treatment setting: More than 80% of exacerbations are managed on an outpatient basis with pharmacological therapies including bronchodilators, corticosteroids, and antibiotics.

Potential indications for hospitalization assessment:
- Severe symptoms such as worsening of resting dyspnea, high respiratory rate, decreased oxygen saturation, confusion, and drowsiness.
- Acute respiratory failure.
- Onset of new physical signs (e.g., cyanosis, peripheral edema).
- Failure of an exacerbation to respond to initial medical management.
- Presence of serious comorbidities (e.g., heart failure, newly occurring arrhythmias).

Treatment of Exacerbations: (See Algorithm 2 page 5)
- Short acting inhaled beta-2 agonists, with or without short acting-antimuscarinics, are recommended as the initial bronchodilators to treat an acute exacerbations (Evidence C).
- Adjust existing inhaled medication: if on LABA or LAMA alone, add the other. If elevated eosinophils, consider LABA + ICS.
- Systemic corticosteroids can improve lung function (FEV₁), oxygenation, and shorten recovery time and hospitalization duration. Duration of therapy should not be more than 5 to 7 days (Evidence A).
- Antibiotics, when indicated, can shorten recovery time and reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should be 5 to 7 days (Evidence B). (For antibiotic selection, see Appendix C).
- Can consider PDE4-Inhibitors (Roflumilast) in patients with FEV₁ < 50% predicted and chronic bronchitis, especially if they have had a least one hospitalization for exacerbation in the past year.

LONG-TERM OXYGEN THERAPY

In patients with severe resting hypoxemia, long-term oxygen therapy is indicated (Evidence A).
- Arterial hypoxemia defined as: PaO₂ < 55 mmHg (7.3K PA) or SaO₂ < 88% OR PaO₂ > 55 < 60 mmHg (> 7.3K PA but < 8K PA) with right heart failure or erythrocytosis.
- Prescribing oxygen therapy to COPD patients includes the following steps:
  - Prescribe supplemental oxygen and titrate to keep the SaO₂ ≥ 90%.
  - Recheck in 60 to 90 days to assess if supplemental oxygen is still indicated and effective.

In patients with stable COPD and resting or exercise-induced moderate desaturation, long-term oxygen treatment should not be routinely prescribed. However, individual patient factors may be considered when evaluating the patient’s need for supplemental oxygen (Evidence A).

PaO₂ = Partial pressure of arterial O₂; SaO₂ = Arterial O₂ saturation.
The following is a list of combination inhalers that can be used in COPD. All of these are currently nonformulary (except Formoterol/Mometasone), and are typically significantly over $200 per inhaler. 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. If combination inhaled medications are indicated, consider the specific clinical indications, the options available (two or more single medications vs. a combination device) and the patient’s ability to comply with inhaler use. Work with your local pharmacist to determine if multiple single inhalers or a combination inhaler should be prescribed.

### Medication Class

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>Medication</th>
<th>Strength/Dose</th>
<th>Special Notes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>SABA/SAMA</td>
<td>Albuterol/Ipratropium (Combivent® Respimat)</td>
<td>Ipratropium bromide 20 mcg/albuterol 100 mcg/spray (4g) 1 puff via oral inhalation 4 times daily MAX: 6 puffs per 24 hours</td>
<td>Many studies show that the combination of ipratropium and albuterol provides greater bronchodilator effect compared to each alone; however, the same effect could probably be achieved by doubling the dose of either agent.</td>
</tr>
<tr>
<td>LABA/LAMA</td>
<td>Formoterol/Glycopyrrolate (Bevespi® Aerosphere)</td>
<td>Glycopyrrolate 9 mcg/formoterol fumerate 4.8 mcg (28 inhalations) Recommended and MAX dose: 2 puffs via oral inhalation twice daily (morning and evening)</td>
<td>LAMA/LABA fixed dose combinations have been shown to improve lung function, lung hyperinflation, exercise capacity, quality of life and exacerbation frequency thereby slowing disease progression in COPD.</td>
</tr>
<tr>
<td></td>
<td>Vilanterol/Umeclidinium (Anoro® Ellipta)</td>
<td>Umeclidinium 62.5 mcg/vilanterol 25 mcg (30 doses) Recommended and MAX dose: 1 puff via oral inhalation once daily at the same time every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Olodaterol/Tiotropium (Stiolto® Respimat)</td>
<td>Tiotropium 2.5 mcg/olodaterol 2.5 mcg (60 sprays) Recommended and MAX dose: 2 puffs via oral inhalation once daily at the same time every day</td>
<td></td>
</tr>
<tr>
<td>LABA/ICS</td>
<td>Formoterol/Budesonide (Symbicort®)</td>
<td>Budesonide 160 mcg/formoterol 4.5 mcg (10.2g) Symbicort® 160/4.5mcg (10.2g) Recommended and MAX dose: 2 puffs via oral inhalation twice daily approximately 12 hours apart</td>
<td>ICS/LABA is more effective than either component alone in improving lung function, health status, and reducing exacerbations in patients with moderate to very severe COPD and exacerbations.</td>
</tr>
<tr>
<td></td>
<td>Salmeterol/Fluticasone (Advair® Diskus)</td>
<td>Advair® Diskus 250/50 mcg (60 blisters) Wixela Inhub 250/50 mcg (60 blisters) Fluticasone propionate 250 mcg/salmeterol 50 mcg (60 blisters) Recommended and MAX dose: 1 actuation via oral inhalation twice daily (morning and night) approximately 12 hours apart</td>
<td>In severe COPD, regular treatment with ICS increases pneumonia risk.</td>
</tr>
<tr>
<td></td>
<td>Vilanterol/Fluticasone furoate (Breo® Ellipta)</td>
<td>Fluticasone furoate 100 mcg and vilanterol 25mcg (30 doses) Recommended and MAX dose: 1 puff via oral inhalation once daily at the same time every day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formoterol/Mometasone (Dulera®) Off Label Use for COPD</td>
<td>Mometasone 100 mcg/formoterol 5 mcg (8.8g, 60 sprays) Mometasone 100 mcg/formoterol 5 mcg (13g, 120 sprays) Mometasone 200 mcg/formoterol 5 mcg (8.8g, 60 sprays) Mometasone 200mcg/formoterol 5 mcg (13gm, 120 sprays) 2 puffs via oral inhalation twice daily (morning and evening) approximately 12 hours apart MAX: 800 mcg mometasone with 20 mcg formoterol per day</td>
<td>Triple therapy has been shown to improve lung function, patient reported outcomes and reduce exacerbations when compared to LAMA alone, LABA/LAMA and LABA/ICS.</td>
</tr>
<tr>
<td>LABA/LAMA/ICS</td>
<td>Budesonide/Glycopyrrolate/ Formoterol (Breztri® Aerosphere)</td>
<td>Budesonide 160 mcg/Glycopyrrolate 9 mcg/ Formoterol fumerate 4.8 mcg (5.9 gm and 10.7 gm) Recommended and MAX dose: 2 actuations via oral inhalation twice daily (morning and evening)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluticasone/Umeclidinium/ Vilanterol (Trelegy® Ellipta)</td>
<td>Fluticasone 100 mcg/Umeclidinium 62.5 mcg/Vilanterol 2.5 mcg (28 blisters) Recommended and MAX dose: 1 puff via oral inhalation once daily at the same time every day</td>
<td></td>
</tr>
</tbody>
</table>

**Bold=Formulary**

*See prescribing information for complete description of dosing, adverse effects, drug interactions, precautions, and contraindications (https://www.clinicalkey.com/pharmacology/).

Note: Most medications listed are $200 or more per canister. Cost range in this care guide is different from other care guides to stratify costs appropriately.
## Summary

### Single Agent Inhaled Medications for COPD

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>Medication</th>
<th>Strength/Dose</th>
<th>Special Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHORT ACTING</strong></td>
<td>Levalbuterol (Xopenex&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>Xopenex&lt;sup&gt;®&lt;/sup&gt;: 45 mcg/spray (15g)</td>
<td>Onset of bronchodilator effect 15 min</td>
</tr>
<tr>
<td><strong>BETA-AGONIST (SABA)</strong></td>
<td>Albuterol (ProAir&lt;sup&gt;®&lt;/sup&gt;, Ventolin&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>ProAir&lt;sup&gt;®&lt;/sup&gt; HFA: 90 mcg/spray (8.5g)</td>
<td>Duration of action 4-6 hours</td>
</tr>
<tr>
<td><strong>LONG ACTING</strong></td>
<td>Salmeterol (Serevent Diskus)</td>
<td>50 mcg/blister for Diskus (60 blisters)</td>
<td>Duration of action 12 hours</td>
</tr>
<tr>
<td><strong>BETA-AGONIST (LABA)</strong></td>
<td>Olopatadine (Striverdi® Respimat)</td>
<td>2.5 mcg/spray (60 sprays)</td>
<td>Can use as single agent in COPD (i.e. not Black Box as it is in asthma)</td>
</tr>
<tr>
<td><strong>MUSCARINIC-ANTAGONIST (SAMA)</strong></td>
<td>Ipratropium bromide (Atrovent® HFA)</td>
<td>17 mcg/spray (200 sprays; 12.9g)</td>
<td>Onset of bronchodilator effect is 30-90 min</td>
</tr>
<tr>
<td><strong>LONG ACTING</strong></td>
<td>Tiotropium (Spiriva® Handihaler)</td>
<td>Handihaler: 18 mcg/capsule (30 capsules)</td>
<td>Duration of action 24 hours</td>
</tr>
<tr>
<td><strong>MUSCARINIC-ANTAGONIST (LAMA)</strong></td>
<td>Umeclidinium (Incruse® Ellipta)</td>
<td>62.5 mcg/blister (30 doses)</td>
<td>Has greater effect on exacerbation reduction compared with LABAs and decreases hospitalizations.</td>
</tr>
<tr>
<td><strong>INHALED</strong></td>
<td>Momentasone (Asmanex®HFA)</td>
<td>100 mcg/spray (120 sprays)</td>
<td>Has additive effects to LABA.</td>
</tr>
<tr>
<td><strong>CORTICO-STEROID (ICS)</strong></td>
<td>Off Label Use</td>
<td>200 mcg/spray (120 sprays)</td>
<td></td>
</tr>
<tr>
<td><strong>$</strong></td>
<td>Beclomethasone (QVAR® RediHaler)</td>
<td>2 puffs via oral inhalation twice /day (about q12 hrs)</td>
<td>In severe COPD, regular treatment with ICS increases pneumonia risk</td>
</tr>
<tr>
<td><strong>$-$</strong></td>
<td>Budesonide (Pulmicort® FLX)</td>
<td>MAX: 800 mcg per day</td>
<td>The only inhaled corticosteroids currently with specific indication for COPD by the FDA are fixed combination products with LABAs or as triple therapy with LABA/LAMAs. GOLD recommendations and other guidelines outline off label use.</td>
</tr>
<tr>
<td><strong>$-$</strong></td>
<td>Fluticasone (Flovent® Diskus)</td>
<td>40 mcg/spray (120 sprays) and 80 mcg/spray (120 sprays)</td>
<td>Most studies have found that regular treatment with ICS ALONE does not modify the long-term decline in FEV1 or mortality in patients with COPD.</td>
</tr>
</tbody>
</table>

*Bold=Formulary | *Note: Most medications listed are $200 or more per canister. Cost range in this care guide is different from other care guides to stratify costs appropriately.*

*See prescribing information for complete description of dosing, adverse effects, drug interactions, precautions and contraindications ([https://www.clinicalkey.com/pharmacology/](https://www.clinicalkey.com/pharmacology/)).
REFERENCES

Primary Reference:

Supporting References:
**CHRONIC OBSTRUCTIVE PULMONARY DISEASE: WHAT YOU SHOULD KNOW**

### WHAT IS COPD?

Chronic Obstructive Pulmonary Disease (COPD) is a lung disease usually caused by smoking. It makes it hard to breathe.

- **“Chronic”** means long lasting
- **"Obstructive"** means blockage of air flow
- **“Pulmonary”** means lungs

### ARE THERE DIFFERENT KINDS OF COPD?

YES, COPD is often a mix of two problems: EMPHYSEMA & CHRONIC BRONCHITIS

- In a healthy person, the tiny air sacs in the lungs are like balloons. As you breathe in and out, they get bigger and smaller to move air through your lungs.
- With emphysema, these air sacs are damaged and lose their stretch. Less air gets in and out of the lungs, which makes you feel short of breath.
- In chronic bronchitis, the airways that carry air to the lungs (bronchial tubes) get inflamed and make a lot of mucus. This can narrow or block the airways, making it hard for you to breathe.

### WHAT CAUSES COPD?

COPD is almost always caused by smoking.

- Over time, breathing tobacco smoke irritates the airways and destroys the stretchy fibers in the lungs.
- It usually takes many years for the lung damage to start causing symptoms, so COPD is most common as people get older.
- Other things that may put you at risk for COPD include breathing chemical fumes, dust, air pollution, and secondhand smoke.

### WHAT ARE THE SYMPTOMS OF COPD?

The main symptoms of COPD are:

- A long-lasting (chronic) cough.
- Mucus that comes up when you cough.
- Shortness of breath that gets worse when you exercise.
- As COPD gets worse, you may be short of breath even when you do simple things such as getting dressed or walking a short way. It gets harder to eat or exercise, and breathing takes much more energy. People often lose weight and they often get weaker.
- At times, your symptoms may suddenly flare up and get much worse. This is called a COPD exacerbation (say "egg-ZASS-er-BAY-shun"). These flare ups can be caused by infections.
- An exacerbation can range from mild to life-threatening. The longer you have COPD, the more severe flare-ups can be.

### HOW IS COPD DIAGNOSED?

To find out if you have COPD, your doctor will:

- Examine you and listen to your lungs.
- Ask you questions about your past health and whether you smoke or have smoked in the past or have been exposed to other things that can irritate your lungs.
- Have you do breathing tests, including spirometry, to find out how well your lungs work.
COPD: WHAT YOU SHOULD KNOW (CONTINUED)

HOW IS COPD TREATED?
There is no cure for COPD. The only way to slow COPD progression is to quit smoking. This is the most important thing you can do. It is never too late to quit. No matter how long you have smoked or how serious your COPD is, quitting smoking can help stop the damage to your lungs.

- Medicines can often be used to help you breathe easier and feel better.
- Most of the medicines used to treat COPD are inhaled so they go straight to your lungs.
- If you get an inhaler, it is very important to use it just the way your care team shows you. (Ask how to use it if you are not sure). There are different types of inhalers so be sure to get help if you get one you have never used before.

WILL I NEED TO USE OXYGEN?
If your COPD is severe, you may need oxygen some or most of the time.

WHAT ELSE SHOULD I DO TO TAKE CARE OF MY LUNGS?

Vaccines: People who have COPD are more likely to get lung infections, so you will need to get an influenza “flu” vaccine every year and follow the latest recommendations to be sure you are fully vaccinated and “boosted” for COVID. You should also get vaccinated against pneumococcal bacteria “pneumonia vaccine”. This may be require 2 or 3 injections over a year or more. These vaccines may not be enough to keep you from getting a lung infection, but likely if you do get pneumonia, you will not be as sick.

Take Care of Yourself: Stay as healthy as you can by:
- Avoiding things that can irritate your lungs, such as smoke, fumes, or pollution. Wear a mask when needed.
- Get regular exercise to stay as strong as you can.
- Eat as well as possible so you can keep up your strength. If you are losing weight talk to your care team.

Lung Cancer Screening: Ask your primary care team about lung cancer screening. People over age 50 who have smoked heavily might need to be checked for lung cancer. This is done with a quick “Cat Scan” test. This screening can sometimes catch lung cancer when it is small enough to treat.

WHEN SHOULD I CONTACT MY PRIMARY CARE TEAM?
Contact your care team if:
- Your medicine is not working as well as it had been.
- Your symptoms are slowly getting worse and you have not seen your Primary Care Provider recently.
- You have a cold and:
  - Your fever lasts longer than 2 to 3 days.
  - Breathlessness occurs or becomes noticeably worse.
  - Your cough gets worse or lasts longer than 7 to 10 days.
- You cough up any amount of blood.

WILL COPD SHORTEN MY LIFE?
Treatment for COPD is helping people live longer. But COPD is a disease that keeps getting worse, and it can be fatal. Because COPD can be fatal it is important to talk with your care team about end of life issues such as:
- What is your idea of the “ideal death”? Do you want to be kept alive at all costs? Do you want a calm, peaceful death?
- If you have sudden, life-threatening breathing problems, do you want mechanical ventilation, which means being put on a machine that helps you breathe?
- What other kinds of medical treatment do you want, or not want, when you are near the end of life?

You should complete an Advance Directive (CDCR Form 7421) where you can list who you want to speak for you if you can no longer speak for yourself. If you also fill out a POLST Form (CDCR 7465) you can tell your healthcare team if you want to be put on machines, have a feeding tube if needed, or if you simply want comfort care if you are near death.
CHRONIC OBSTRUCTIVE PULMONARY DISEASE: WHAT YOU SHOULD DO

WHAT TO DO IF YOU HAVE A FLARE OF COPD

- Take your “rescue” inhaler right away.
- Sit down and loosen any tight fitting clothing. Do not lie down.
- If you do not feel better right away continue to take one puff of your “rescue” inhaler every minute for five minutes or until you feel better.
- If you are not better in five minutes tell the primary care team right away.

TO KEEP YOUR INHALER CLEAN

Cleaning:
- Once a day clean the “Mist” type MDI inhaler and cap by rinsing them in warm running water. Let the inhaler dry before you use it again.
- Follow instructions from your health care team for the care of other types of inhalers you may use such as the “Diskus” or “HandiHaler”. When you use these correctly the medication goes deep into your lungs and you want to be sure the inhaler is kept as clean as possible so it works correctly.

HELPFUL HINTS

- Keep your rescue inhaler with you at all times.
- If you are going into an area where custody may not let you carry your rescue inhaler, leave it with the custody staff in charge of that area. Tell them you may need your medication right away if a flare should occur.
- Plan ahead and refill medications before they run out.
- Being depressed or worried can make your COPD worse. Talk with your provider if you are having trouble.
- Remember, a big part of your COPD care is up to you. The medical staff is available to help you but you must do your part to help them.

HOW SHOULD I MANAGE MY COPD DURING THE COVID-19 PANDEMIC?

- COVID-19 stands for "coronavirus disease 2019." It is caused by a virus called SARS-CoV-2.
- People with COVID-19 can have fever, cough, and other symptoms.
- In severe cases, it can cause pneumonia and trouble breathing. **Some people with COPD are more likely to have serious symptoms, or even die, if they get COVID-19.**
- If you have COPD, it's especially important to take measures to avoid getting sick—wash hands, stay away from sick people whenever possible, wear a well-fitting mask when around other people, especially indoors.
- Get all COVID-19 vaccinations and boosters that are recommended. This is the best protection you have from getting really sick, needing hospitalization, or even dying from COVOD-19.
- If you take medications for your COPD, it's important to **keep taking them** as usual.

*If you have symptoms of COVID-19, or think you might have been exposed to the virus, talk to your health care team immediately.*
¿Qué es la EPOC?

La Enfermedad Pulmonar Obstructiva Crónica (EPOC) es una enfermedad de los pulmones, generalmente causada por fumar, que hace que sea difícil respirar.

- “Crónica” significa que es prolongada.
- “Obstructiva” significa que se bloquea el flujo de aire.
- “Pulmonar” significa que es de los pulmones.

¿EXISTEN DIFERENTES TIPOS DE EPOC?

Sí. A menudo, la EPOC es una combinación de dos problemas: ENFISEMA Y BRONQUITIS CRÓNICA

- En una persona sana, los diminutos sacos de aire de los pulmones son como globos. A medida que se inhala y exhala el aire, se hacen más grandes y más pequeños para mover el aire a través de sus pulmones.
- Con el enfisema, estos sacos de aire se dañan y pierden su elasticidad. Entra y sale menos aire de los pulmones, lo que le hace sentir que le falta el aire.
- Con la bronquitis crónica, las vías respiratorias que llevan aire a los pulmones (tubos bronquiales) se inflaman y producen mucha mucosidad. Esto puede estrechar u obstruir las vías respiratorias, haciéndole difícil respirar.

¿QUÉ CAUSA LA EPOC?

Casi siempre, la EPOC es causada por fumar.

- Con el tiempo, respirar el humo del tabaco irrita las vías respiratorias y destruye las fibras elásticas de los pulmones.
- Por lo general, el daño pulmonar tarda muchos años en comenzar a causar síntomas, por lo que la EPOC es más común a medida que las personas envejecen.
- Otras cosas que pueden ponerlo en riesgo de sufrir EPOC incluyen respirar vapores químicos, polvo, contaminación del aire y humo de segunda mano.

¿CUÁLES SON LOS SÍNTOMAS DE LA EPOC?

Los principales síntomas de la EPOC son:

- Tos prolongada (crónica).
- Mucosidad que sale al toser.
- Dificultad para respirar, que empeora cuando hace ejercicio.
- A medida que la EPOC empeora, es posible que le falte el aire incluso cuando hace cosas sencillas, como vestirse o caminar un trecho corto. Se vuelve más difícil comer o hacer ejercicio, y respirar requiere mucha más energía. A menudo, las personas pierden peso y se debilitan.
- A veces, sus síntomas pueden brotar repentinamente y empeorar mucho. Esto se denomina exacerbación de la EPOC (“e-xa- cer-ba-CIÓN”), y puede deberse a infecciones.
- Una exacerbación puede variar de leve a potencialmente mortal. Cuanto más tiempo tenga EPOC, más graves pueden ser los brotes.

¿CÓMO SE DIAGNOSTICA LA EPOC?

Para saber si tiene EPOC, su médico hará lo siguiente:

- Examinar y escuchar sus pulmones.
- Preguntarle por su salud en el pasado, y si fuma o ha fumado en el pasado o ha estado expuesto a otras cosas que puedan irritar sus pulmones.
- Pruebas de respiración, como espirometría, para averiguar qué tan bien funcionan sus pulmones.
## EPOC: LO QUE DEBE SABER (CONTINUACIÓN)

### ¿CÓMO SE TRATA LA EPOC?

La EPOC no tiene cura. La única forma de retrasar su progreso es dejar de fumar. Esto es lo más importante que puede hacer. Nunca es demasiado tarde para dejar de fumar. No importa cuánto tiempo haya fumado o qué tan grave sea su EPOC, dejar de fumar puede ayudar a detener el daño a sus pulmones.

- Los medicamentos a menudo se pueden usar para ayudarle a respirar más fácilmente y sentirse mejor.
- La mayoría de los medicamentos que se usan para tratar la EPOC se inhalan, por lo que van directo a sus pulmones.
- Si le entregan un inhalador, es muy importante que lo use tal y como le muestra su equipo de atención (pregunte cómo se usa si no sabe). Hay de diferentes tipos, así que asegúrese de pedir ayuda si recibe uno que nunca ha usado antes.

### ¿TENDRÉ QUE UTILIZAR OXÍGENO?

Si su EPOC es grave, es posible que necesite oxígeno parte o la mayor parte del tiempo.

### ¿QUÉ MÁS DEBO HACER PARA CUIDAR MIS PULMONES?

**Vacunas:** es más probable que las personas que tienen EPOC contraigan infecciones pulmonares, por lo que deberá vacunarse contra la influenza (“gripe”) todos los años y seguir las recomendaciones más recientes para asegurarse de tener las vacunas y refuerzos completos contra la COVID. También debe vacunarse contra la bacteria neumocócica (vacuna contra la neumonía). Esto puede implicar 2 o 3 inyecciones durante un año o más. Es posible que estas vacunas no sean suficientes para evitar que contraiga una infección pulmonar, pero es probable que, si contrae neumonía, no se enferme tanto.

**Cuidese:** manténgase tan saludable como pueda al:
- Evitar cosas que pueden irritar los pulmones, como humo, vapores o contaminación. Use mascarilla cuando se deba.
- Haga ejercicio regularmente para mantenerse lo más fuerte posible.
- Coma lo mejor posible para que pueda mantener su fuerza. Si está perdiendo peso, hable con su equipo de atención.

**Detección de cáncer de pulmón:** pregunte a su equipo de atención primaria sobre estas pruebas. Es posible que las personas mayores de 50 años que hayan fumado mucho deban realizárselas. Se hace con una prueba rápida por “tomografía computarizada”. A veces, esta prueba de detección, puede detectar el cáncer de pulmón cuando es lo suficientemente pequeño como para tratarlo.

### ¿CUÁNDO DEBO CONTACTAR A MI EQUIPO DE ATENCIÓN PRIMARIA?

Comuníquese con su equipo de atención si:
- Su medicamento no está funcionando tan bien como antes.
- Sus síntomas están empeorando poco a poco y no ha visto a su proveedor de atención primaria recientemente.
- Está resfriado y:
  - Su fiebre dura más de 2 a 3 días.
  - La dificultad para respirar ocurre o empeora notablemente.
  - Su tos empeora o dura más de 7 a 10 días.
- Tose y le sale alguna cantidad de sangre.

### ¿LA EPOC REDUCIRÁ MI ESPERANZA DE VIDA?

El tratamiento de la EPOC ayuda a las personas a vivir más tiempo, pero es una enfermedad que sigue empeorando y puede ser fatal. Por ello, es importante que hable con su equipo de atención sobre asuntos del final de la vida, como:
- ¿Cómo sería la "muerte ideal"? ¿Desea que lo mantengan vivo a toda costa? ¿Desea morir tranquila y pacíficamente?
- Si tiene problemas respiratorios repentinos que ponen en riesgo su vida, ¿desea ventilación mecánica, es decir, que le coloquen una máquina que lo ayude a respirar?
- ¿Qué otros tipos de tratamiento médico desea o no desea cuando esté cerca del final de su vida?

Debe preparar una directiva anticipada (formulario del Departamento de Correcciones y Rehabilitación de California [California Department of Corrections and Rehabilitation, CDCR 7421]) para indicar quién quiere que hable por usted si ya no puede hablar por sí mismo. Si también llena una orden médica para el tratamiento de mantenimiento de la vida ((CDCR 7465), puede decirle a su equipo de atención médica si desea que le coloquen máquinas, una sonda de alimentación, si es necesario, o si simplemente desea atención reconfortante si es posible que muera.
Guía de los CCHCS para el cuidado: EPOC

Abril de 2022

**RESUMEN**

**APOYO EN DECISIONES**

**EDUCACIÓN AL PACIENTE/AUTOCONTROL**

**ENFERMEDAD PULMONAR OBSTRUCTIVA CRÓNICA : LO QUE DEBE HACER**

**QUÉ HACER SI TIENE UN BROTE DE EPOC**

- Tome su inhalador de “rescate” de inmediato.
- Siéntese y afloje la ropa ajustada. No se acueste.
- Si no se siente mejor de inmediato, siga tomando una bocanada de su inhalador de “rescate” cada minuto durante cinco minutos o hasta que se sienta mejor.
- Si no mejora en cinco minutos, informe al equipo de atención primaria de inmediato.

**PARA MANTENER SU INHALADOR LIMPIO**

Limpieza:
- Una vez al día, limpie el inhalador con dosificador (Metered-dose Inhaler, MDI) de tipo “niebla” y la tapa enjuagándolos con agua corriente tibia. Deje que el inhalador se seque antes de volver a usarlo.
- Siga las instrucciones de su equipo de atención médica para el cuidado de otros tipos de inhaladores que pueda usar, como el "Diskus" o el "HandiHaler". Cuando los usa de manera correcta, el medicamento penetra profundamente en sus pulmones, y debe asegurarse de que el inhalador se mantenga lo más limpio posible para que funcione correctamente.

**CONSEJOS ÚTILES**

- Mantenga su inhalador de rescate consigo en todo momento.
- Si va a un área donde vigilancia no le permite llevar su inhalador de rescate, déjelo con el personal a cargo de esa área. Dígales que es posible que necesite su medicamento de inmediato si ocurre un brote.
- Planifique y reabastezca sus medicamentos antes de que se agoten.
- Estar deprimido o preocupado puede empeorar su EPOC. Hable con su proveedor si tiene problemas.
- Recuerde que gran parte de la atención de su EPOC depende de usted. El personal médico está disponible para ayudarlo, pero debe hacer su parte para ayudarlos a ellos.

**¿CÓMO DEBO CONTROLAR MI EPOC DURANTE LA PANDEMIA DE LA COVID-19?**

- COVID-19 significa "enfermedad por coronavirus de 2019". Es causada por un virus llamado SARS-CoV-2.
- Las personas con COVID-19 pueden tener fiebre, tos y otros síntomas.
- En casos graves, puede causar neumonía y dificultad para respirar. **Algunas personas con EPOC tienen más probabilidades de presentar síntomas graves, o incluso morir, si contraen la COVID-19.**
- Si tiene EPOC, es especialmente importante que tome medidas para evitar enfermarse: lávese las manos, manténgase alejado de las personas enfermas siempre que sea posible, use una mascarilla que le quede bien cuando esté cerca de otras personas, en particular en espacios interiores.
- Colóquese todas las vacunas y refuerzos contra la COVID-19 que se recomiendan. Esta es su mejor protección para no enfermarse gravemente, necesitar hospitalización o incluso morir de COVID-19.
- Si toma medicamentos para la EPOC, es importante que **siga tomándolos** como de costumbre.

**Si presenta síntomas de la COVID-19 o cree que podría haber estado expuesto al virus, hable con su equipo de atención médica de inmediato.**
Management of Stable COPD: Initiation of Therapy Based on the GOLD ABCD Assessment of Symptoms and Risk of Exacerbation* (Reference 2)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Symptoms</th>
<th>Risk</th>
<th>Suggested Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Less symptomatic</td>
<td>Low risk</td>
<td>Short-acting bronchodilator (SABA, SAMA, or combination of SABA-SAMA), as needed.</td>
</tr>
<tr>
<td></td>
<td>Mild or infrequent symptoms (i.e., breathless with strenuous exercise or when hurrying on level ground or walking up a slight hill)† or CAT &lt; 10‡</td>
<td>0 or 1 exacerbations in the past year without associated hospitalization</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>More symptomatic</td>
<td>Low risk</td>
<td>Regular treatment with a long-acting bronchodilator, either LAMA or LABA, based on patient preference.</td>
</tr>
<tr>
<td></td>
<td>Moderate to severe symptoms (i.e., patient has to walk more slowly than others of same age due to breathlessness, has to stop to catch breath when walking on level ground at own pace, or has more severe breathlessness)† or CAT ≥ 10‡</td>
<td>0 or 1 exacerbations in the past year without associated hospitalization</td>
<td>Short-acting bronchodilator (usually SABA) for symptom relief as needed.</td>
</tr>
<tr>
<td>C</td>
<td>Less symptomatic</td>
<td>High risk</td>
<td>Regular treatment with a LAMA; SABA available for symptom relief as needed.</td>
</tr>
<tr>
<td></td>
<td>Mild or infrequent symptoms (i.e., breathless with strenuous exercise or when hurrying on level ground or walking up a slight hill)† or CAT &lt; 10‡</td>
<td>≥ 2 exacerbations per year with one or more leading to hospitalization</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>More symptomatic</td>
<td>High risk</td>
<td>Regular treatment with LAMA or, if severe breathlessness (e.g., CAT &gt; 20), combination LABA plus LAMA.</td>
</tr>
<tr>
<td></td>
<td>Moderate to severe symptoms (i.e., patient has to walk slower than others of same age due to breathlessness, has to stop to catch breath when walking on level ground at own pace, or has more severe breathlessness)† or CAT ≥ 10‡</td>
<td>≥ 2 exacerbations per year with one or more leading to hospitalization</td>
<td>Combination glucocorticoid-LABA inhaler may be preferred, if features of asthma/COPD overlap.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SABA available for symptom relief as needed.</td>
</tr>
</tbody>
</table>

Patients must be taught how and when to use their treatments, and treatment choices are adjusted based on patient responses. Medications being prescribed for other conditions should be reviewed. Refer to UpToDate topic on the diagnosis of COPD for further information about mMRC and CAT.

**COPD**: chronic obstructive pulmonary disease; **GOLD**: Global Initiative for Chronic Obstructive Lung Disease; **CAT**: COPD Assessment Test; **SABA**: short-acting beta agonist; **SAMA**: short-acting muscarinic antagonist; **LAMA**: long-acting muscarinic antagonist (anticholinergic); **LABA**: long-acting beta agonist; **mMRC**: Modified Medical Research Council; **FEV**₁: forced expiratory volume in one second; **FVC**: forced vital capacity.

* All patients with COPD have a reduced FEV₁/FVC ratio that is <0.70% predicted or <5th percentile lower limit of normal. The severity of airflow limitation is determined by the FEV₁.
† Symptom severity based on: Modified Medical Research Council (mMRC) Dyspnea scale.


Additional data from:
**FOLLOW-UP MANAGEMENT OF COPD* (REFERENCE 5)**

The GOLD 2020 Report suggests that follow-up/adjustment of medications should be based on the severity of symptoms and occurrence of exacerbations on current therapy, rather than the “ABCD” system used for initial therapy (Table 3: INITIATION OF THERAPY BASED ON THE GOLD ABCD ASSESSMENT IN STABLE COPD page 4). The following are detailed recommendations.

### No Exacerbations and No Dyspnea/Low COPD Impact (i.e., mMRC 0 to 1 or CAT < 10)†

<table>
<thead>
<tr>
<th>Current therapy</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SABA or SABA-SAMA as needed</strong></td>
<td>• Continue current therapy</td>
</tr>
<tr>
<td><strong>LAMA, LABA, or LAMA-LABA</strong></td>
<td>• Continue current therapy</td>
</tr>
<tr>
<td><strong>LABA-ICS or LABA-LAMA-ICS</strong></td>
<td>• Taper or discontinue ICS dose to reduce adverse effects of ICS‡</td>
</tr>
</tbody>
</table>

### Persistent Dyspnea or High COPD Impact (i.e., mMRC ≥ 2 or CAT ≥ 10)† with No Exacerbations

<table>
<thead>
<tr>
<th>Current therapy</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SABA or SABA-SAMA as needed</strong></td>
<td>• Add LAMA or LABA</td>
</tr>
<tr>
<td><strong>LAMA or LABA monotherapy</strong></td>
<td>• Change to LAMA-LABA</td>
</tr>
<tr>
<td><strong>LABA-ICS</strong></td>
<td>• LAMA-LABA-ICS</td>
</tr>
<tr>
<td></td>
<td>• LAMA-LABA if lack of response to ICS or adverse effects from ICS</td>
</tr>
<tr>
<td><strong>LAMA-LABA</strong></td>
<td>• Substitute alternate delivery system or different LAMA-LABA agents</td>
</tr>
<tr>
<td></td>
<td>• Additional interventions may include LAMA-LABA-ICS, low dose theophylline, repeat pulmonary rehabilitation, and nonpharmacologic therapies§</td>
</tr>
<tr>
<td><strong>LAMA-LABA-ICS</strong></td>
<td>• Continue LAMA-LABA-ICS</td>
</tr>
<tr>
<td></td>
<td>• Additional interventions may include low dose theophylline, repeat pulmonary rehabilitation, and nonpharmacologic therapies for COPD§</td>
</tr>
<tr>
<td></td>
<td>• Stop ICS, if initial indication unclear, lack of response, or adverse effect to ICS‡</td>
</tr>
</tbody>
</table>

### 1 or More Exacerbations in Past Year +/- Persistent Dyspnea or High COPD Impact (i.e., mMRC ≥ 2 or CAT ≥ 10)†

<table>
<thead>
<tr>
<th>Current therapy‡</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SABA or SABA-SAMA as needed</strong></td>
<td>• Add LAMA</td>
</tr>
<tr>
<td><strong>LAMA or LABA monotherapy</strong></td>
<td>• LAMA-LABA-ICS (blood eosinophil count ≥100/μL increases likelihood of ICS benefit) OR</td>
</tr>
<tr>
<td></td>
<td>• LABA-ICS: If LAMA contraindicated and 1 exacerbation in past year with blood eosinophils ≥300/μL or ≥2 exacerbations or 1 hospitalization in past year with blood eosinophils ≥100/μL</td>
</tr>
<tr>
<td><strong>LAMA-LABA</strong></td>
<td>• LAMA-LABA-ICS (blood eosinophil count ≥100/μL increases likelihood of ICS benefit) OR</td>
</tr>
<tr>
<td></td>
<td>• LABA-ICS: If LAMA contraindicated and 1 exacerbation in past year with blood eosinophils ≥300/μL or ≥2 exacerbations or 1 hospitalization in past year with blood eosinophils ≥100/μL</td>
</tr>
<tr>
<td></td>
<td>• Continue LAMA-LABA, if blood eosinophils &lt;100 (indicates lesser likelihood that addition of ICS will be beneficial)</td>
</tr>
<tr>
<td></td>
<td>• Add roflumilast§ OR</td>
</tr>
<tr>
<td></td>
<td>• Add azithromycin**</td>
</tr>
<tr>
<td><strong>LABA-ICS</strong></td>
<td>• LAMA-LABA-ICS if prior indication for ICS (eg, 1 exacerbation in past year and blood eosinophils ≥300/μL or ≥2 exacerbations or 1 hospitalization in past year and blood eosinophils ≥100/μL)</td>
</tr>
<tr>
<td></td>
<td>• LAMA-LABA if lack of response to ICS or adverse effects from ICS‡</td>
</tr>
<tr>
<td><strong>LAMA-LABA-ICS</strong></td>
<td>• Continue LAMA-LABA-ICS</td>
</tr>
<tr>
<td></td>
<td>• Add roflumilast§ OR</td>
</tr>
<tr>
<td></td>
<td>• Add azithromycin**</td>
</tr>
<tr>
<td></td>
<td>• Stop ICS, if initial indication unclear, lack of response, or adverse effect to ICS‡</td>
</tr>
</tbody>
</table>

See next page for additional information and footnote details.
Follow-up Management of COPD* (Continued)

COPD: chronic obstructive pulmonary disease; mMRC: modified Medical Research Council; CAT: COPD Assessment Test; SABA: short-acting beta agonist; SAMA: short-acting muscarinic antagonist; LAMA: long-acting muscarinic antagonist; LABA: long-acting beta agonist; ICS: inhaled corticosteroids (glucocorticoids); BMI: body mass index; SpO₂: pulse oxygen saturation; FEV₁: forced expiratory volume in one second.

* Adjustments to pharmacologic therapy for COPD are based on an assessment of dyspnea/exercise limitation (mMRC or CAT) and frequency of exacerbations. Follow-up visits are also an opportunity to assess and reinforce nonpharmacologic interventions for COPD, including: smoking cessation; inhaler technique and adherence to medications; administration of pneumococcal and seasonal influenza vaccinations; pulmonary rehabilitation; and nutrition counselling regarding healthy diet and normal BMI. All patients with COPD should have a rapid relief inhaler available, either a SABA or a SABA-SAMA (SABA preferred for patients using a LAMA). Refer to UpToDate content for information on nonpharmacologic therapy.

† mMRC dyspnea scale: Refer to UpToDate content; CAT evaluates health impact of COPD: https://www.catestonline.org.

‡ If blood eosinophil count ≥ 300 cells/microL, patient is more likely to experience exacerbations after ICS withdrawal. Close patient monitoring is required, if ICS are withdrawn.

§ Nonpharmacologic measures (e.g., oxygen therapy if SpO₂ ≤ 88%, pulmonary rehabilitation, bronchoscopic or surgical lung volume reduction, lung transplantation) can help reduce dyspnea and exacerbations. Contributing comorbidities should be evaluated and treated. Not all patients achieve control of dyspnea or exacerbations despite optimal available pharmacotherapy.

‖ Combination of LAMA-ICS is unstudied. For patients on this regimen who have persistent exacerbations and/or dyspnea, a change to LAMA-LABA-ICS would be a reasonable next step.

¶ Roflumilast is used for patients with chronic bronchitis and FEV₁ < 50% predicted, particularly if at least 1 hospitalization for an exacerbation in the past year. Potential adverse effects may limit use.

** Azithromycin preventive therapy is more effective in patients who are not current smokers. May lead to development of resistant organisms.

### APPENDIX C

## ANTIBIOTIC* SELECTION IN OUTPATIENTS WITH COPD EXACERBATIONS (MODIFIED FROM REFERENCE 7)

| Moderate to severe COPD exacerbation based on 2 or more of the following symptoms |
|---------------------------------|----------------------------------|
| • Increased dyspnea             |
| • Increased sputum volume/viscosity |
| • Increased sputum purulence    |

*Antiviral therapy for influenza (and COVID-19) is also indicated for exacerbations triggered by those viral infections.

| Risk factors for poor outcomes? |
|---------------------------------|---------------------|
| • FEV₁ < 50% predicted          |
| • ≥2 COPD exacerbations in past 12 months |
| • Hospitalization for an exacerbation in past 12 months |
| • Receipt of continuous supplemental oxygen |
| • Comorbid conditions (especially heart failure, ischemic heart disease) |
| • Age ≥ 65 years (alone not strict risk factor, consider additive to others) |

Antibacterial treatment not indicated unless worsening symptoms develop despite appropriate supportive care (e.g., increased bronchodilator use, systemic glucocorticoids).

<table>
<thead>
<tr>
<th>Chronic <em>Pseudomonas</em> colonization or isolation of <em>Pseudomonas</em> from sputum in past 12 months?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
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</tbody>
</table>

Select one of the following based on patient characteristics, local epidemiology, or prior antibiotic exposure (use different antibiotic)⁶:  
- Amoxicillin-clavulanate  
- A respiratory fluoroquinolone (e.g., levofloxacin, moxifloxacin)

<table>
<thead>
<tr>
<th>Other risk factors <em>Pseudomonas</em> infection?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Treat with either ciprofloxacin or levofloxacin⁹¹ and obtain a sputum culture with susceptibility testing***</th>
</tr>
</thead>
</table>

Select one of the following based on patient characteristics, local epidemiology, or prior antibiotic exposure (use different antibiotic)⁶:  
- Amoxicillin-clavulanate  
- A respiratory fluoroquinolone (e.g., levofloxacin, moxifloxacin)

<table>
<thead>
<tr>
<th>Assess for clinical improvement in 48 to 72 hours</th>
</tr>
</thead>
</table>

- Improvement  
- Lack of Improvement

- Continue present therapy  
  - Duration of antibiotics is typically 3 to 5 days

- Obtain sputum Gram stain and culture (or evaluate results, if available)  
  - Reevaluate other aspects of care (e.g., bronchodilator use, systemic glucocorticoids)  
  - Consider potential contributing comorbidities and other causes of symptoms (e.g., pneumonia, heart failure, pneumothorax)

### prompts
- Prompt and appropriate antibiotic use has been associated with improved clinical outcomes in patients with moderate to severe COPD exacerbations. Empiric regimens designed to target the most likely pathogens (*Haemophilus influenzae*, *Moraxella catarrhalis*, *Streptococcus pneumoniae*) and broadened to target drug-resistant pathogens & difficult-to-eradicate pathogens (e.g., macrolide-resistant *S. pneumoniae*, nontypeable strains of *H. influenzae*) in those at risk for poor outcomes.
- All patients should be evaluated for clinical response in approximately 72 hours, and sputum Gram stain and culture should be considered for those who fail to respond to empiric treatment.

⁶ Selection among antibiotic choices is based on local microbial sensitivity patterns, patient comorbidities, prior infecting organisms, potential adverse events and drug interactions, and also provider and patient preferences. In particularly, modifications to this regimen may be needed for patients with a history of drug-resistant *Pseudomonas* based on severity of illness, degree of suspicion for *Pseudomonas*, and prior susceptibility profiles of pseudomonal isolates.

⁷ Because fluoroquinolone resistance is prevalent among *Pseudomonas aeruginosa* strains, we obtain a sputum Gram stain and culture with susceptibility testing for these patients to help guide subsequent management decisions. For most other outpatients, obtaining a sputum culture is not needed unless the patient fails to respond to empiric treatment.

⁹ Levofloxacin has lesser activity against *Pseudomonas* than ciprofloxacin but has greater activity against *S. pneumoniae* and *M. catarrhalis* is thus a reasonable alternative to ciprofloxacin for patients who are at increased risk of *Pseudomonas* infection but lack microbiologic evidence of *Pseudomonas* infection or colonization.