Chronic Obstructive Pulmonary Disease Care Guide

June 2024

CALIFORNIA CORRECTIONAL HEALTH CARE SERVICES

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.

https://cchcs.ca.gov/clinical-resources/

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GOALS

- ✓ **Identify individuals who smoke and offer them help to quit**
- ✓ **Increase use of appropriate therapy for patients with chronic obstructive pulmonary disease (COPD)**
- ✓ **Reduce emergency department (ED) visits and hospitalizations**
- ✓ **Offer influenza, COVID, pneumococcal, RSV, and Tdap vaccinations as appropriate**
- ✓ **End-of-Life planning; encourage POLST/Advance Directive**

ALERTS

- **Chronic O_2 saturation <88%: Consider long-term oxygen**
- **Patients at high risk for poor outcomes if infected with viral respiratory pathogens, consider pre/post exposure Rx**
- **Symptoms of COPD exacerbation: ↑ sputum purulence, ↑ sputum volume, ↑ dyspnea**
- **Never use long-term oral steroids**

DIAGNOSTIC CRITERIA/EVALUATION

In the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2024 report, COPD is defined as a "heterogeneous lung condition characterized by **chronic respiratory symptoms** (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the **airways** (bronchitis, bronchiolitis) and/or **alveoli** (emphysema) that cause **persistent**, often **progressive, airflow obstruction**". It is influenced by both **environmental** and **host factors** (including abnormal lung development and accelerated lung aging). It is a common, preventable, and treatable disease, but is often under-diagnosed and misdiagnosed, resulting in patients not receiving appropriate treatment. Patients with COPD frequently possess other comorbidities which impact their 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 3 for further evaluation)
- Screening for Alpha 1-antitrypsin deficiency is recommended to be done once for patients diagnosed with COPD.

Note that patients with asthma and COPD can have similar manifestations and the diagnosis can be challenging. Some patients may have characteristics fitting both asthma and COPD. However, GOLD has indicated since 2021, that "we no longer refer to asthma-COPD overlap (ACO)" and instead emphasized that asthma and COPD are different disorders yet may share some common clinical features and treatable traits. See Asthma Care Guide for more details.

ASSESSMENT

Multidimensional Assessment of COPD

- Establish diagnosis by **post-bronchodilator FEV_1/FVC ratio < 0.70**
- Establish severity of airflow limitation (GOLD Stage below)
- Assess patient's symptom burden using the Modified Medical Research Council (mMRC) Dyspnea Scale (See Table 1, page 4) or the COPD Assessment Test (CAT)
- Determine number of exacerbations/hospitalizations in past year: 0-1 or >2
- Determine the patient's GOLD ABE Group (Table 2, page 4), (the C and D groups in the previous GOLD "ABCD" assessment tool merged into a single group termed "E" to highlight the clinical relevance of exacerbation.)
- Choose initial medication based on patient's GOLD ABE group (Table 3, page 5)

Abbreviations: CAT: COPD Assessment Test ; FEV_1: forced expiratory volume in one second; FVC: forced vital capacity; GOLD: Global Initiative for Chronic Obstructive Lung Disease; ICS: inhaled corticosteroids; LABA: long-acting beta2 agonist; LAMA: long-acting muscarinic antagonist; mMRC: Modified Medical Research Council; PaO2 = Arterial partial pressure of oxygen; PaCO2 = Arterial partial pressure of carbon dioxide; PDE4: phosphodiesterase-4; RSV: Respiratory Syncytial Virus; SABA: short acting beta2 agonist; SAMA: Short-acting muscarinic antagonists; SpO_2: pulse oxygen saturation; Tdap: Tetanus, Diphtheria, Pertussis.

Note that for the diagnosis of COPD, the spirometry needs to demonstrate that the post-bronchodilator FEV_1/FVC ratio <0.70. Spirometry is one of the most used PFTs (Pulmonary Function Tests) that is typically used to detect, confirm and monitor obstructive airway disease such as COPD and asthma. It allows the measurement of FEV_1, FEV, FEV_1/FVC and to see if there is airway obstruction and reversible airflow with bronchodilator, among other flow measures. Please see the Office spirometry for more details.

Stage	FEV_1% Predicted
GOLD 1: Mild	$FEV_1 \geq 80\%$
GOLD 2: Moderate	$50\% \leq FEV_1 < 80\%$
GOLD 3: Severe	$30\% \leq FEV_1 < 50\%$
GOLD 4: Very Severe	$FEV_1 < 30\%$ predicted

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 ABE assessment of symptoms and risk of exacerbation (Table 2, page 4 and Appendix A). Current level of symptoms was assessed by using either the CAT or mMRC scores.
- **Follow-up medication adjustments** based on lack of symptom control and/or recurrent exacerbations (Algorithm 2, page 7 and Appendix B).

Steroids: Normally, a 5-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 7 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. Consult pulmonologist when considering this medication, if clinically indicated.

Continuous O_2 Therapy: Improves survival if severe chronic resting hypoxemia ($PaO_2 \leq 55$ mm HG OR $SpO_2 \leq 88\%$); a generally accepted target is to keep SpO_2 between 90%-92%.

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

Dental Care: There is an association between COPD and poor oral health, such as periodontitis, missing teeth, and oral candidiasis associated with ICS use. Consider referral to dental for evaluation.

MONITORING

- Follow-up as clinically indicated. Close follow-up is indicated after hospital discharge as well as during and after any exacerbation. Consider including patient education, supervision and correction of inhaler technique, medication adjustment, assessment and optimal management of comorbidities, early rehabilitation during these follow up visits.
- Review symptoms, consider using CAT or mMRC (available in EBMcalc in EHRS under Calculator Category "Pulmonology") during each visit, at least annually; more often as clinically indicated.
- Assessing lung function regularly by spirometry, such as at least annually, is helpful in identifying rapid decline, monitoring the severity of airflow obstruction, and assisting making therapeutic decisions.
- Annual influenza, Pneumococcal, and COVID, RSV, Tdap and Zoster vaccines per current CDC recommendations. See more details at Adult Immunization Schedule by Age | CDC
- 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.
- Manage comorbidities, such as cardiovascular diseases, lung cancer, osteoporosis, depression/anxiety, gastroesophageal reflux, periodontitis, polycythemia, cognitive impairment, and frailty with an aim for simplicity of treatment and minimizing polypharmacy.
- Encourage completion of Advance Directive/POLST and establish and document patient's end of life goals. Providers are recommended to consider referral for palliative care, hospice service, compassionate release, expanded medical parole for appropriate patients.

Algorithm 1: COPD Evaluation and Management

Suspect COPD:
If patient has dyspnea, recurrent wheeze, chronic cough, recurrent lower respiratory infections and history of risk factors on page 4

Assessment

History: Risk factors (especially smoking history) and symptoms (such as 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 $FEV_1/FVC < 0.70$
- **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 patents with COPD be screened once for deficiency
- Assess for **Anemia with CBC** and **heart failure with BNP** or N-Terminal pro BNP if indicated (Heart Failure Care Guide)
- **Baseline e osinophil level:** Assessment may guide steroid treatment (reflected in Algorithm 2 "Exacerbation)

Establish Diagnosis/Severity of Airflow Limitation/Symptoms → Treatment Selection:

Step 1A: Establish diagnosis by spirometry- Post-bronchodilator ratio of $FEV_1/FVC < 0.7$
Step 1B: Establish severity of airflow limitation (GOLD Stages – See page 1)
Step 2A: Assess patient's symptom burden using Modified Medical Research Council (mMRC) Dyspnea scale (Table 1, page 4) (Other assessment tool options include the COPD Assessment Test [CAT]; both mMRC and CAT are available in **EBMcalc** in EHRS under Calculator Category "Pulmonology")
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 ABE Group (Table 2, page 4)
Step 3B: Choose initial medication based on patient's GOLD ABE Group (Table 3, page 5, and Appendix A)

Evaluate and Treat Associated Conditions:

- Cardiovascular disease (pulmonary HTN, cor pulmonale): Consider ECG, echocardiogram
- Sleep disorder: Consider screening of obstructive sleep apnea (OSA) if patient has obesity, snoring, especially with pulmonary HTN, ↑$PaCO_2$, and daytime somnolence, see Obstructive Sleep Apnea Care Guide

Non-Pharmacologic Management/Education/Prevention:

- Tobacco use/exposure and offer cessation support as needed
- Vaccinations: Annual influenza, Pneumococcal, and COVID, RSV, Tdap and Zoster vaccines per current recommendations Adult Immunization Schedule by Age | CDC
- Educate on proper inhaler technique (if Rx's) and check for appropriate usage, especially if not responding

Is patient stable on initial medication?

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 ABE Group)-See Algorithm 2, page 7, and Appendix B
- Consider "de-escalation" of medication once patient improves, with close medical supervision
- Additional guidance on managing exacerbations – See page 8
- Details on antibiotic selection (if indicated in exacerbation)- See Appendix C
- Refer to pulmonary specialist as indicated, see page 17
- Long-term oxygen in patients with chronic hypoxia increases survival: PaO_2 of < 55mm HG or O_2 sat ≤ 88%
- Establish Goals of Care/End-of-Life wishes (Advance Directive/POLST)
- Refer to palliative care, hospice, compassionate release, or expanded medical parole for appropriate patients

Yes

Follow-up Treatment of Stable COPD:

- If stable, continue current medications
- Ensure Goals of Care/End-of-Live wishes (Advance Directive/POLST)
- Follow Non-pharmacologic Management/Education/Prevention as above

RISK FACTORS FOR COPD

- Cigarette smoking is the most important risk factor for COPD
- Prematurity and genetic factors (including alpha-1 antitrypsin deficiency)
- Passive exposure to cigarette/tobacco smoke or air pollution
- Occupational dusts and chemicals (vapors, irritants, and fumes)
- History of asthma
- Severe respiratory infection in childhood, chronic bronchial infection in adulthood, tuberculosis, and HIV infection

SYMPTOMS OF COPD

- **Dyspnea**: Persistent, progressive over time, worse with exercise.
  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.
- **Chronic Cough:** May be intermittent and may be non-productive

Other clinical indicators for considering a diagnosis of COPD: recurrent wheeze, recurrent lower respiratory tract infections, history of risk factors (see above). If COPD is suspected, use spirometry to see if COPD can be established (see below).

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 $FEV_1 \geq 80\%$ predicted

GOLD 2: Moderate $50\% \leq FEV_1 < 80\%$ predicted

GOLD 3: Severe $30\% \leq FEV_1 < 50\%$ predicted

GOLD 4: Very Severe $FEV_1 < 30\%$ 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 and in **EBMcalc** in EHRS under Calculator Category "Pulmonology"

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 ABE Group (Table 2), group E being the combined groups of C and D

Step 3B: Choose initial medication based on patient's GOLD ABE Group (Table 3 on page 5 and Appendix A)
Note that GOLD also recommends the initial assessment include blood eosinophil count, presence, and type of comorbidities to guide therapy.

Table 1: MODIFIED MEDICAL RESEARCH COUNCIL (mMRC) DYSPNEA SCALE

Grade	Description of Breathlessness
0	I only get breathless with strenuous exercise
1	I get short of breath when hurrying on level ground or walking up a slight hill
2	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
3	I stop for breath after walking about 100 yards or after a few minutes on level ground
4	I am too breathless to leave the house, or I am breathless when dressing

TABLE 2: GOLD "ABE" GROUPS: ASSESSMENT OF SYMPTOMS/RISK OF EXACERBATIONS FOR INITIATION OF COPD THERAPY

Assess Exacerbation Risk: Exacerbations/Hospitalizations	Assess Symptoms	
	mMRC 0 to 1; CAT* < 10	mMRC ≥ 2; CAT ≥ 10
0 or 1 moderate exacerbations without hospitalization	A	B
≥ 2 moderate exacerbations or ≥ 1 hospitalization	E (previous groups of C and D)	

*CAT = COPD Assessment Test (online symptom assessment tool: https://www.catestonline.org/)
A moderate exacerbation requires treatment with antibiotics, systemic glucocorticoids, or both.

Assessment/Diagnosis, Cont'd

BODE Index[2]

- The BODE index used four factors: the body-mass index (B), the degree of airway obstruction (O, by FEV_1), dyspnea (D, by modified Medical Research Council dyspnea score), and exercise capacity (E, by six-minute walk distance), to assess an individual's risk of death from COPD. The BODE index is superior to FEV_1 value alone for prediction of mortality and hospitalization needs. If not already done, providers need to complete Advance Directive/POLST and establish and document patient's end of life goals. Refer to palliative care, hospice, compassionate release, or expanded medical parole for appropriate patients. (link to Palliative Care CG.)

TABLE 3. BODE INDEX TO ESTIMATE PROGNOSIS OF COPD				
Variable	Points on BODE index			
	0	1	2	3
FEV_1 (% of predicted)	≥65	50-64	36-49	≤35
Distance walked in 6 min (m)	≥350	250-349	150-249	≤149
mMRC dyspnea scale	0-1	2	3	4
Body-mass index	>21	≤21		

Approximate 4-year survival: 0-2 points: 80%; 3-4 points: 67%; 5-6 points: 57%; 7-10 points: 18%

See BODE Index for COPD Survival for more instructions on when to use and its calculations. It is also available in EBMcalc in EHRS under Calculator Category "Pulmonology".

MEDICATIONS TO INITIATE IN STABLE COPD

Per GOLD[1] there is lack of high-quality evidence supporting initial pharmacological treatment strategies in newly diagnosed COPD patients. Table 4 below is their attempt to provide clinical guidance using the best available evidence.

TABLE 4: INITIAL PHARMACOLOGICAL THERAPY BASED ON THE GOLD ABE ASSESSMENT IN STABLE COPD [1]		
Exacerbation History (per year)	**Symptoms: mMRC 0-1, CAT < 10**	**Symptoms: mMRC ≥ 2, CAT ≥ 10**
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	**Group E** LAMA + LABA* Consider LABA+LAMA+ICS* if blood eos ≥ 300	
0 or 1 moderate exacerbations (not leading to hospitalization)	**Group A** Short-acting bronchodilator or Long-acting bronchodilator	**Group B** LABA + LAMA*
SAMA: Short-acting muscarinic antagonists; **SABA**: Short-acting beta-agonist **LAMA**: Long-acting muscarinic antagonists; **LABA**: Long-acting beta-agonist **ICS**: Inhaled corticosteroid; eos: blood eosinophil count in cells per µL *Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment. mMRC: modified Medical Research Council dyspnea questionnaire CAT™: COPD Assessment Test™ A moderate exacerbation requires treatment with antibiotics, systemic glucocorticoids, or both. **For more detailed recommendations, please see Appendix A.**		

RECOMMENDATIONS FOR A, B and E GROUPS BASED ON GOLD 2024[1]

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, the patient's ability to use it correctly due to **age, cognitive capacity, inspiratory profile, and preference**. Please note that correct use of pressurized metered dose inhaler (pMDI) needs coordination between hand movement and inhalation which can be mitigated by the use of holding chambers; dry powder inhalers, although relatively simple to use, are breath-actuated and thus require the user to generate a rapid, forceful inhalation. Consider various factors before prescribing inhalers (See Table 1, 2 and 4 in Reference 3).
- Try to avoid prescribing devices requiring different inhalation techniques[3].
- 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.

Medications to Initiate in Stable COPD, Cont'd

Key points for use of bronchodilators:

Group A

- All Group A patients should be offered bronchodilator treatment based on its effect on breathlessness. This can be either a short- or a long-acting bronchodilator. If a long-acting bronchodilator is available, it is preferred, except in patients with very occasional breathlessness.

Group B

- Treatment should be initiated with a LABA+LAMA combination.
- If it is not appropriate to use a LABA+LAMA combination, either LABA or LAMA can be used. An individual patient's choice should be led by the patient's perception of symptom relief.

Group E

- Treatment should be initiated with a LABA+LAMA combination, provided there are no issues regarding availability, cost, and side effects.
- Use of LABA+ICS in COPD is not encouraged. If an ICS is indicated, LABA+LAMA+ICS is superior to LABA+ICS and preferred.
- Consider LABA+LAMA+ICS in group E if eos ≥ 300 cells/ µL. (Note this action is also reflected in the "exacerbation" pathway for patients with blood eos ≥ 100/µL in Algorithm 2)
- If patients with COPD have concomitant asthma, they should be treated like patients with asthma and use of an ICS is mandatory. Please note that GOLD has indicated since 2021, that "we no longer refer to asthma-COPD overlap (ACO)" and instead emphasized that asthma and COPD are different disorders yet may share some common clinical features and treatable traits. See Asthma Care Guide for more details.

PATIENTS UNDER TREATMENT WITH LABA+ICS

- If a patient with COPD and **no features of asthma** has been treated, for whatever reason, with LABA+ICS and is well controlled for symptoms and exacerbations, continuation with LABA+ICS is an option. In patients with no exacerbation and no dyspnea or low COPD impact, **tapering or discontinuing ICS** could be considered to reduce adverse effects of ICS.
- However, if the patient develops **further exacerbations**, treatment should be escalated to LABA+LAMA+ICS if the eos ≥ 100 cells/µL or switch to LABA+LAMA if it is < 100/ µL. (Note this action is also reflected in the "exacerbation" pathway for patients with blood eos < 100/µL in Algorithm 2) If the patient has major symptoms, switching to LABA+LAMA should be considered.

For all patients, rescue short-acting bronchodilators should be prescribed for immediate symptom relief.

Key points for the use of anti-inflammatory agents:

- Long-term monotherapy with ICS alone has not been shown to provide conclusive benefit on mortality in patients with COPD.
- For patients on appropriate long-acting bronchodilators, yet still has any of the following scenarios: history of hospitalization(s) for exacerbations of COPD, ≥ 2 moderate exacerbations per year, blood eosinophils ≥ 300 cells/µL, or history of or concomitant asthma, adding ICS to the long-acting bronchodilators is recommended.
- If patients have **repeated pneumonia** events, blood eosinophils < 100 cells/µL, or history of mycobacterial infection, it is **NOT recommended** to add the ICS to the long-acting bronchodilators. Note that quoted blood eosinophil count represents approximate cut-points and are likely to fluctuate.
- Long-term therapy with oral corticosteroids is not recommended.
- In patients with severe to very severe airflow limitation, chronic bronchitis, and exacerbations the addition of a PDE 4 inhibitor (roflumilast) to a treatment with long-acting bronchodilators can be considered.
- Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, macrolides, in particular azithromycin, can be considered for patients prone to exacerbations. However, azithromycin use can be associated with an increased incidence of prolongation of QTc interval, bacterial resistance, and impaired hearing tests.

NON-PHARMACOLOGIC MANAGEMENT OF STABLE COPD

For all patients, counsel on:

- Avoidance of risk factor(s), such as smoking
- Importance of regular physical activity
- Annual influenza, COVID-19 and pneumococcal, RSV, Tdap, and Zoster vaccinations as current CDC recommendations
- Regular review/correction of inhaler technique
- Long-term oxygen therapy if severe chronic resting hypoxemia (PaO_2 < 55 or % SpO_2 < 88%; PO2 55-60. Goal is baseline PaO_2 to ≥ 60 mm Hg or SpO_2 ≥ 90%) improves survival (See page 9)
- Pulmonary rehabilitation is indicated for all patients with relevant symptoms and/or a high risk for exacerbation, especially those recently hospitalized after an exacerbation

FOLLOW-UP TREATMENT OF COPD AND EXACERBATION MANAGEMENT

Following initiation of therapy, patients should be reassessed periodically as clinically indicated:

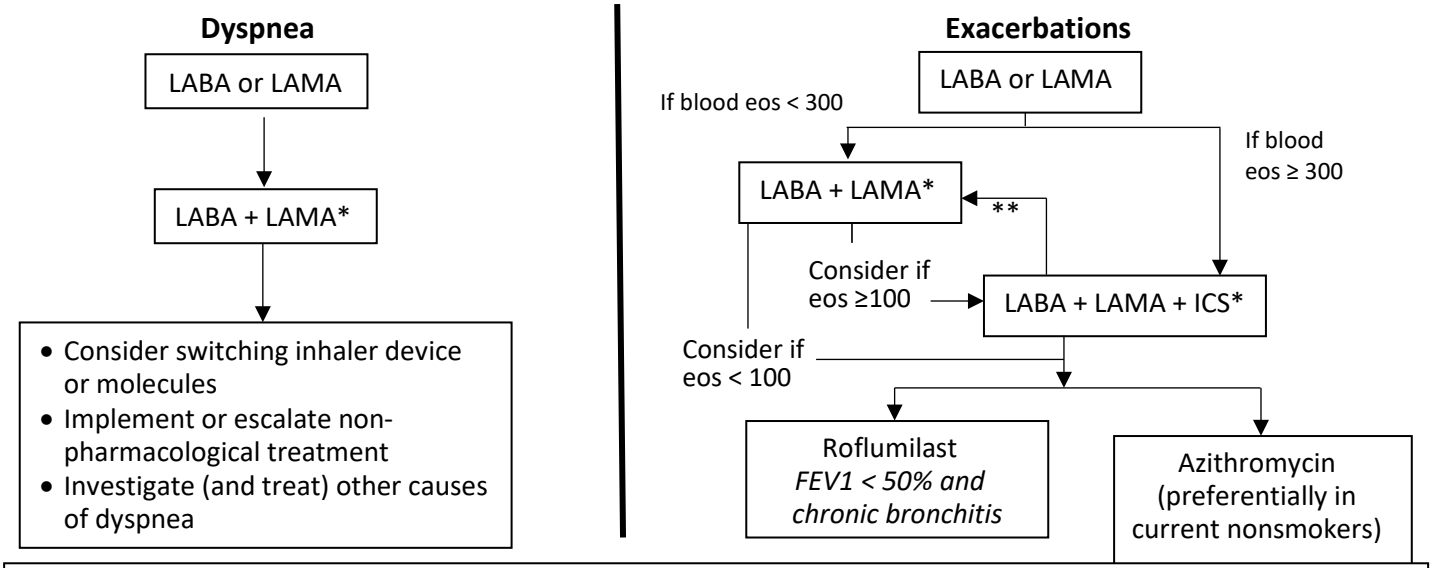
- **Review** symptoms (dyspnea) and exacerbation risk.
- **Assess** inhaler technique and adherence, and the role of non-pharmacological approaches.
- **Adjust** pharmacological treatment, including escalation or de-escalation. Switching inhaler device or molecules within the same class (e.g., using 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 2024 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 [1,4]

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 predominant treatable trait (See below)
    i. GOLD ABE Assessment NOT used to adjust treatment
    ii. If BOTH Dyspnea and Exacerbations need to be targeted use Exacerbation pathway
    iii. Follow medication adjustment recommendations, assess response, adjust again as needed until stable



eos: blood eosinophil count (cells/µL)
*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment
**Consider de-escalation of ICS if pneumonia or other considerable side effects. In case of blood eos ≥ 300 cells/µL de-escalation is more likely to be associated with the development of exacerbations
For patients with persistent exacerbations on bronchodilator monotherapy, escalation to LABA+LAMA is recommended. In patients who develop further exacerbations on LABA+LAMA therapy we suggest escalation to LABA+LAMA+ICS.

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.

Follow-Up Treatment of COPD and Exacerbation Management, Cont'd

OTHER MEDICATIONS

PDE4-Inhibitors: The principal action of phosphodiesterase–4 inhibitors are 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 could improve lung function and reduce moderate to severe exacerbations.

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 (250 mg bid) for 1 year may be considered in patients prone to exacerbations and NOT current smokers.

MANAGEMENT OF EXACERBATIONS

Exacerbation of COPD is defined as an event characterized by dyspnea and/or cough and sputum that worsen in <14 days which may be accompanied by tachypnea and/or tachycardia and is often associated with increased local and systemic inflammation caused by infection, pollution, or other insult to the airways[1].

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.

Keep in mind that patients with COPD are at higher risk of other acute events, particularly decompensated heart failure, pneumonia, and pulmonary embolism that may mimic or aggravate a COPD exacerbation[1]. It is important to conduct prompt careful consideration and investigation of other potential confounders or contributors if clinically indicated.

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)

Pharmacological Therapy for Exacerbations [1,5]**:** (See Algorithm 2 on page 7)

- Short acting inhaled beta-2 agonists, with or without short acting-antimuscarinics (note SAMAs are generally not recommended to be used routinely in conjunction with LAMA), are recommended as the initial bronchodilators to treat an acute exacerbation.
- Adjust existing inhaled medication when patient becomes stable: if on LABA or LAMA alone, add the other. If elevated eosinophils, consider adding ICS.
- Systemic corticosteroids can improve lung function (FEV_1), oxygenation, and shorten recovery time and hospitalization duration. Duration of therapy should not normally be more than 5 days.
- Antibiotics, when indicated, can shorten recovery time, and reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should normally be 5 days. (For antibiotic selection, see Appendix C).
- To prevent future exacerbation, consider PDE4-Inhibitors (Roflumilast) in patients with FEV_1 < 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**:**

- $PaO_2 \leq 55$ mmHg (7.3K Pa) or $SpO_2 < 88\%$ **OR** PaO_2 between 55 and 60 mmHg (> 7.3K Pa but < 8K Pa) with right heart failure or erythrocytosis (hematocrit > 55%).
- Prescribing oxygen therapy to COPD patients includes the following steps:
  - Prescribe supplemental oxygen and titrate to keep the $SpO_2 \geq 90\%$. It is generally accepted to keep the target SpO_2 between 90-92%.
  - Recheck in 60 to 90 days to assess if supplemental oxygen is still indicated and effective.

Health Equity Note
Pulse Oximeters
Quality Management – Pulse Oximeters and Skin Pigmentation HE Alert.pdf – All Documents (sharepoint.com))

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. Clinicians should be aware that some pulse oximeters may perform less accurately on dark-skinned patients. Clinical correlation is recommended.

Nutritional support

Weight loss and malnutrition develop in patients with COPD as their disease severity progresses and indicates poor prognosis. It has been reported that 30-60% of patients hospitalized with COPD has malnutrition and up to 50% of people with COPD weigh less than 90% of their ideal body weight. Malnutrition in COPD is associated with impaired lung function, poor exercise tolerance, worsened quality of life, increased hospitalization, and increased mortality. For applicable patients, nutritional repletion in people with COPD should be coupled with regular exercise, optimization of lung function, and improvement of tissue oxygenation[1].

SPECIALTY REFERRAL GUIDELINES[6]

Generally, refer to pulmonologist if the patient has:

1. COPD with complications or comorbidity (e.g., chronic O2 dependence, $FEV_1 \leq 60\%$ predicted at baseline, pregnancy, features suggesting Cor pulmonale, asthma, pregnancy, history of ICU admission or mechanical ventilation)
2. Frequent exacerbations (≥ 2 exacerbations per year or ≥ 1 exacerbation per year requiring hospitalization)
3. Chronic oral corticosteroid use
4. Continued symptoms after appropriate treatment
5. Alpha-1-antitrypsin deficiency
6. Uncertain diagnosis of COPD

Detailed and complete criteria can be found on Inter-Qual Review Manager website.

Combination Inhalers

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/Name	Strength/Dose	Special Notes*
SABA/SAMA Albuterol/Ipratropium (Combivent® Respimat) **$$$$$$**	Ipratropium bromide 20 mcg/albuterol 100 mcg/spray (4g) 1 puff via oral inhalation 4 times daily MAX: 6 puffs per 24 hours	Many studies show that the combination of ipratropium and albuterol provides greater bronchodilator effect compared to each alone; however, the same effect could probably be achieved by doubling the dose of either agent.
LABA/LAMA Formoterol/Glycopyrrolate (Bevespi® Aerosphere) Vilanterol/Umeclidinium (Anoro® Ellipta) Olodaterol/Tiotropium (Stiolto® Respimat) **$$$$**	Glycopyrrolate 9 mcg/formoterol fumarate 4.8 mcg (120 inhalations) Recommended and MAX dose: 2 puffs via oral inhalation twice daily (morning and evening) 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. 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	LAMA/LABA fixed dose combinations have been shown to improve lung function, quality of life and exacerbation frequency, thus slowing disease progression in COPD.

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.

Combination Inhalers, Cont'd

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/Name	Strength/Dose	Special Notes*
LABA/ICS Formoterol/Budesonide (Symbicort®) Salmeterol/Fluticasone (Advair® Diskus) Vilanterol/Fluticasone furoate (Breo® Ellipta) **Formoterol/Mometasone (Dulera®)** Off Label Use for COPD **$-$$$**	Budesonide 160 mcg/formoterol 4.5 mcg (10.2g) Symbicort® 160/4.5mcg (10.2g) Recommended and MAX dose: 2 puffs via oral inhalation twice daily approximately 12 hours apart Advair® Diskus 250/50 mcg (60 blisters) Wixela Inhub 250/50 mcg (60 blisters) Fluticasone propionate 250 mcg/salmeterol 50 mcg (60 blisters) Recommended and MAX dose: 1 actuation via oral inhalation twice daily (morning and night) approximately 12 hours apart Fluticasone furoate 100 mcg and vilanterol 25mcg (30 doses) Recommended and MAX dose: 1 puff via oral inhalation once daily at the same time every day **Mometasone 100 mcg/formoterol 5 mcg (8.8g, 60 sprays)** **Mometasone 100 mcg/formoterol 5 mcg (13g, 120 sprays)** **Mometasone 200 mcg/formoterol 5 mcg (8.8g, 60 sprays)** **Mometasone 200 mcg/formoterol 5 mcg (13gm, 120 sprays)** 2 puffs via oral inhalation twice daily (morning and evening) approximately 12 hours apart	Although LABA+ICS is more effective than either component alone in improving lung function, health status, exacerbations in patients with moderate to very severe COPD and exacerbations, clinical trials failed to demonstrate a statistically significant effect of combination therapy on survival. In GOLD 2024 report, it was stated that "Use of LABA+ICS in COPD is not encouraged". If there is an indication for ICS, then LAMA+LABA+ICS was shown to be superior to LABA+ICS and preferred. In severe COPD, regular treatment with ICS increases pneumonia risk. See page 6 for more on "Patients under treatment with LABA+ICS"
LABA/LAMA/ICS Budesonide/Glycopyrrolate/ Formoterol (Breztri® Aerosphere) Fluticasone/Umeclidinium/ Vilanterol (Trelegy® Ellipta) **$$$$$**	Budesonide 160 mcg/Glycopyrrolate 9 mcg/ Formoterol fumarate 4.8 mcg (5.9 gm and 10.7 gm) Recommended and MAX dose: 2 actuations via oral inhalation twice daily (morning and evening) Fluticasone 100 mcg/Umeclidinium 62.5 mcg/Vilanterol 2.5 mcg (28 blisters) Additional strength 200mcg/62.5mcg/2.5mcg (30 doses) Recommended and MAX dose: 1 puff via oral inhalation once daily at the same time every day	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, in patients with moderate-to-very-severe COPD and at least one exacerbation in the past year.

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.

Single Agent Inhaled Medications for COPD

MEDICATION CLASS/NAME	STRENGTH/DOSE	SPECIAL NOTES*
SHORT ACTING BETA-AGONIST (SABA) **Levalbuterol (Xopenex®)** *Albuterol (ProAir®, Ventolin®)* **$**	**Xopenex®: 45 mcg/spray (15g)** 2 puffs via oral inhalation every 4 to 6 hours as needed for symptoms MAX: 12 puffs per day *ProAir® HFA: 90 mcg/spray (8.5g)* *Albuterol HFA: 90 mcg/spray (18g)* *Ventolin® HFA: 90 mcg/spray (18g)* *2 puffs via oral inhalation every 4 to 6 hours as needed for symptoms* *MAX: 12 puffs per day*	Onset of bronchodilator effect 5-10 minutes Duration of action 4-6 hours Levalbuterol (SABA) and ipratropium (SAMA) are equipotent as bronchodilators, improving dyspnea and exercise tolerance equally well. **SABAs are recommended as the first-line treatment for patients with mild COPD because of their prompt onset of action.** **Levalbuterol, use contraindicated with phenothiazines**.
LONG ACTING BETA-AGONIST (LABA) **Salmeterol (Serevent® Diskus)** *Olodaterol (Striverdi® Respimat)* **$$-$$$**	**Diskus 50 mcg/blister (60 blisters)** Recommended and MAX dose: 50 mcg (one blister) via oral inhalation twice daily (am/pm) approximately 12 hours apart *2.5 mcg/spray (60 sprays)* *Recommended and MAX dose: 2 puffs via oral inhalation once daily at the same time every day*	Duration of action 12 hours **CAN** use as single agent in COPD (i.e., not Black Box as it is in asthma) Significantly improves FEV_1 and lung volumes, dyspnea, health status, exacerbation rate and number of hospitalizations, but no effect on mortality or rate of decline of lung function
SHORT ACTING MUSCARINIC-ANTAGONIST (SAMA) **Ipratropium bromide (Atrovent® HFA)** **$$$$$**	**17 mcg/spray (200 sprays; 12.9g)** 2 puffs via oral inhalation 3 or 4 times per day (no more frequent than every 4 hours) MAX: 12 puffs per day	Onset of bronchodilator effect is 15 to 30 minutes; duration of action 4-5 hours Long-acting bronchodilators are preferred over short-acting bronchodilators except for persons with occasional dyspnea and for quick relief of symptoms in persons already on long-acting bronchodilators as maintenance therapy.
LONG ACTING MUSCARINIC-ANTAGONIST (LAMA) **Tiotropium (Spiriva® Handihaler)** *Aclidinium bromide (Tudorza® Pressair)* *Umeclidinium (Incruse® Ellipta)* **$$$**	**Handihaler: 18 mcg/capsule (30 capsules)** Handihaler usual and MAX dose: 2 puffs via oral inhalation once daily at the same time each day *400 mcg/spray (30 sprays)* *400 mcg/spray (60 sprays)* *Recommended and MAX dose: 1 puff via oral inhalation twice daily, approximately 12 hours apart* *62.5 mcg/blister (30 doses)* *Recommended and MAX dose: 1 puff via oral inhalation once daily, at the same time every day*	Duration of action 24 hours Has greater effect on exacerbation reduction compared with LABAs and decreases hospitalizations. Has additive effects to LABA.

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.

Single Agent Inhaled Medications for COPD, Cont'd

MEDICATION CLASS/NAME	STRENGTH/DOSE	SPECIAL NOTES*
INHALED CORTICO-STEROID (ICS) **Mometasone (Asmanex®HFA)** **Off Label Use** *Beclomethasone (QVAR®* *RediHaler)* *Off Label Use* *Budesonide (Pulmicort® FLX)* *Off Label Use* *Fluticasone (Flovent® Diskus)* *Off Label Use* **$-$$**	**100 mcg/spray (120 sprays)** **200 mcg/spray (120 sprays)** **2 puffs via oral inhalation twice /day (about q12 hrs)** **MAX: 800 mcg per day** *40 mcg/spray (120 sprays) and 80 mcg/spray (120 sprays)* *40 to 320 mcg vial oral inhalation twice daily* *MAX: 320 mcg twice daily* *90 mcg/spray (60 sprays) and 180 mcg/spray (60 sprays)* *180 to 360 mcg via oral inhalation twice daily* *100 mcg/blister (60 blisters) and250 mcg/blister* *(60 blisters)* *100 to 250 mcg via oral inhalation twice daily* *MAX: 2,000 mcg per day*	In severe COPD, regular treatment with ICS increases pneumonia risk 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. Most studies have found that regular treatment with ICS ALONE does not modify the long-term decline in FEV_1 or mortality in patients with COPD.

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.

Notable Side Effects and Caution of Medication by Class

Anticholinergics such as SAMA and LAMA

- URI symptoms
- Bronchitis
- Sinusitis
- Myalgia
- Headache
- Vomiting
- Dysphonia
- Xerostomia
- Oral ulceration
- Caution in patients with narrow-angle glaucoma or urinary retention

Beta2-agnosists such as SABA and LABA

- URI symptoms
- Nausea/vomiting
- Nervousness
- Tremor
- Tachycardia
- Palpitations
- Headache
- Rhinitis
- Dizziness
- Throat irritation
- Increased blood pressure
- Xerostomia
- Caution in patient with CAD, arrythmias, or HTN

ICS

- URI symptoms
- Throat irritation
- Oral candidiasis
- Esophageal candidiasis
- Hoarseness
- Dysphonia
- Headache
- Cough
- Nausea/vomiting
- Rash
- Arthralgia/Myalgia
- Pruritis
- Contraindicated in status asthmaticus

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APPENDIX A

MANAGEMENT OF STABLE COPD: INITIATION OF THERAPY BASED ON THE GOLD ABE ASSESSMENT OF SYMPTOMS AND RISK OF EXACERBATION* (REFERENCE 7,8)			
Groups	**Symptoms**	**Risk**	**Suggested Treatment**
A	**Less symptomatic** Mild or infrequent symptoms (i.e., breathless with strenuous exercise or when hurrying on level ground or walking up a slight hill)† or CAT < 10‡	**Low risk** 0 or 1 moderate exacerbation in the past year without associated hospitalization	• LAMA plus as-needed SABA (preferred) **OR** • LABA plus SAMA-SABA or SABA **OR** • As needed SAMA-SABA or SABA
B	**More symptomatic** 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‡	**Low risk** 0 or 1 moderate exacerbation in the past year without associated hospitalization	• LAMA-LABA dual bronchodilator therapy **AND** • SABA as needed for acute dyspnea
E	**High risk** ≥ 2 moderate exacerbations per year or ≥ 1 leading to hospitalization		• For patients with high peripheral eosinophil (≥300/µL) or hospitalization for COPD exacerbation: LAMA+LABA+ICS AND SABA as needed for acute dyspnea
			• For patients **without** high peripheral eosinophil (≥300/µL) or hospitalization for COPD exacerbation: LAMA+LABA dual bronchodilator therapy **AND** SABA as needed for acute dyspnea

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 FEV_1/FVC ratio that is <0.70%. The severity of airflow limitation is determined by the FEV_1.
† Symptom severity based on: Modified Medical Research Council (mMRC) Dyspnea scale.
‡ COPD Assessment Test (CAT): http://www.catestonline.org (Accessed January, 2024).

APPENDIX B

FOLLOW-UP MANAGEMENT OF COPD* (REFERENCE 9)	
The GOLD 2024 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 "ABE" system used for initial therapy (Table 4: **INITIATION OF THERAPY BASED ON THE GOLD ABE ASSESSMENT IN STABLE COPD** page 5). The following are detailed recommendations.	
NO EXACERBATIONS AND NO DYSPNEA/LOW COPD IMPACT (I.E., MMRC 0 TO 1 OR CAT < 10)†	
Current therapy	**Actions**
SABA or SABA-SAMA as needed	• Continue current therapy
LAMA, LABA, or LAMA-LABA	• Continue current therapy
LABA-ICS or **LABA-LAMA-ICS**	• Taper or discontinue ICS dose to reduce adverse effects of ICS‡
PERSISTENT DYSPNEA OR HIGH COPD IMPACT (I.E., MMRC ≥ 2 OR CAT ≥ 10)† WITH NO EXACERBATIONS	
Current therapy	**Actions**
SABA or **SABA-SAMA** as needed	• Add LAMA or LABA
LAMA or **LABA monotherapy**	• Change to LAMA-LABA
LABA-ICS	• LAMA-LABA-ICS • LAMA-LABA if lack of response to ICS or adverse effects from ICS
LAMA-LABA	• Substitute alternate delivery system or different LAMA-LABA agents • Trial of LAMA-LABA-ICS, in patients with blood eosinophil ≥100 cells/µL • Additional interventions may include low dose theophylline, repeat pulmonary rehabilitation, and nonpharmacologic therapies§
LAMA-LABA-ICS	• Continue LAMA-LABA-ICS • Additional interventions may include low dose theophylline, repeat pulmonary rehabilitation, and nonpharmacologic therapies for COPD§ • Stop ICS if initial indication unclear, lack of response, or adverse effect to ICS‡
1 OR MORE EXACERBATIONS IN PAST YEAR +/– PERSISTENT DYSPNEA OR HIGH COPD IMPACT (I.E., MMRC ≥ 2 OR CAT ≥ 10)†	
Current therapy‖	**Actions**
SABA or **SABA-SAMA** as needed	• Add LAMA
LAMA or **LABA monotherapy**	• LAMA-LABA, if blood eosinophils <300/µL **Or** • LAMA-LABA-ICS, if blood eosinophils ≥300/µL or hospitalization for COPD exacerbation **Or** • LABA-ICS if blood eosinophils ≥100/µL **and** LAMA contraindicated
LAMA-LABA	• LAMA-LABA-ICS, if blood eosinophil count ≥100/µL **Or** • Continue LAMA-LABA, if blood eosinophils <100/µL Add roflumilast¶ **Or** Add azithromycin**
LABA-ICS	• LAMA-LABA-ICS **Or** • LAMA-LABA if lack of response to ICS or adverse effects from ICS‡
LAMA-LABA-ICS	• Continue LAMA-LABA-ICS Add roflumilast¶ **Or** Add azithromycin** • Stop ICS if initial indication unclear, lack of response, or adverse effect to ICS‡

See next page for additional information and footnote details

Appendix B (Continued)

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; **SpO_2**: pulse oxygen saturation; **FEV_1**: 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 $SpO_2 \leq 88\%$, 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.

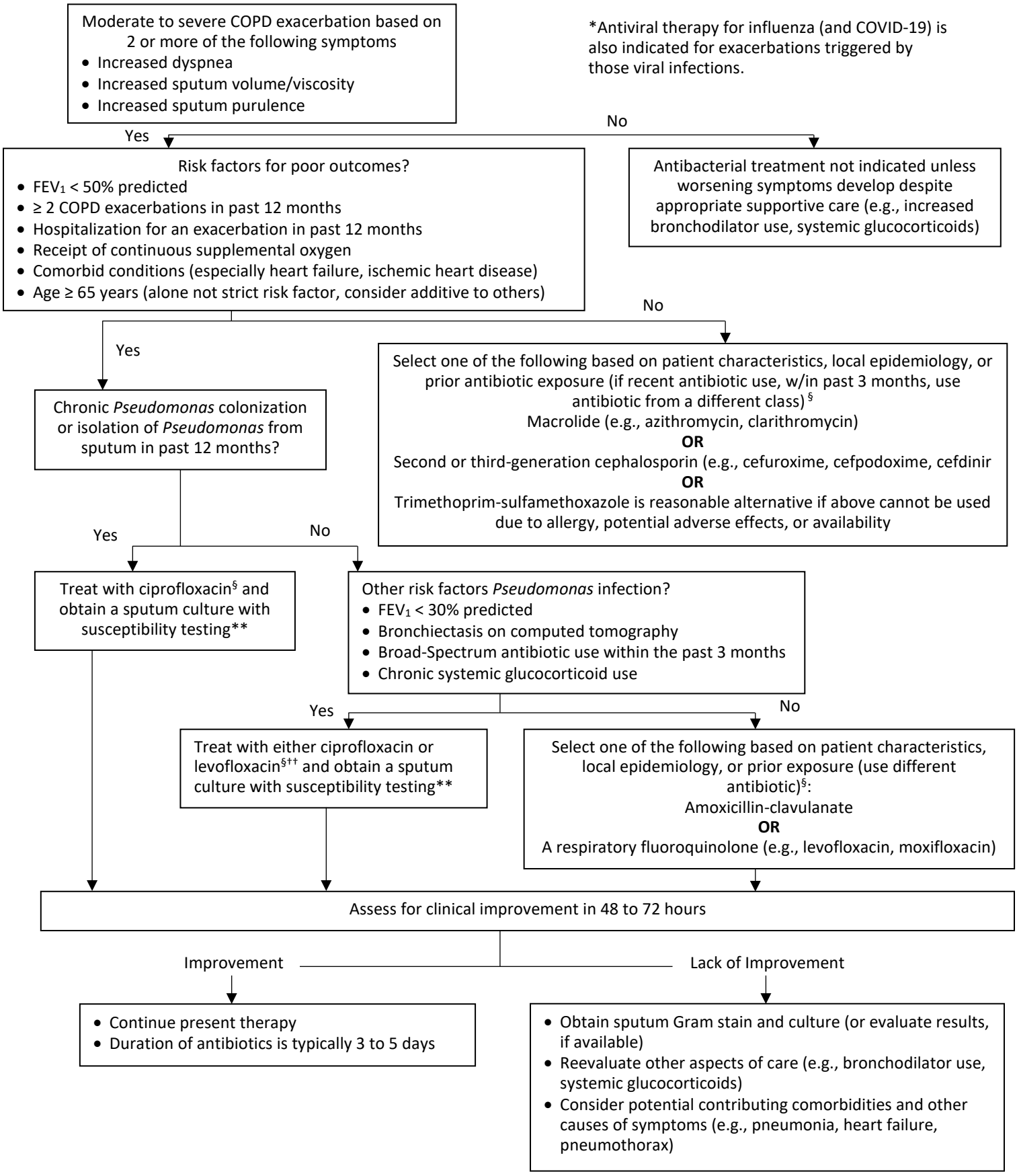
‖ Combination of LAMA-ICS is unstudied. For patients on this regimen who have persistent exacerbations and/or dyspnea, a change to LAMA-LABA-ICS would be a reasonable next step.

¶ Roflumilast is used for patients with chronic bronchitis and $FEV_1 < 50\%$ 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 10)



APPENDIX C, Cont'd

- 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*, non-typeable 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.

[§] Selection among antibiotic choices is based on local microbial sensitivity patterns, patient comorbidities, prior infecting organisms, potential adverse events, and drug interactions, and provider and patient preferences. In particular, 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.

[**] 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.

[††] 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.

PATIENT EDUCATION

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 most often caused by smoking, however, other factors such as previous serious lung infections and air pollution can also cause it.

- 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.

PATIENT EDUCATION

COPD: What You Should Know, Cont'd

How is COPD Treated?

There is no cure for COPD. To slow COPD progression you must 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. It is very common for people to not use it correctly and thus not get the treatment they need. It is best to check your technique at every visit and use it correctly. 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 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. There are also other vaccines you may need to protect you from getting 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.

COPD: 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

- Always keep your rescue inhaler with you.
- 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 if I Get COVID-19?

- 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 COVID-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.

ENFERMEDAD PULMONAR OBSTRUCTIVA CRÓNICA: LO QUE DEBE SABER

¿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 los 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.

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.
Cuídese: 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.

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.

CONSECO'S 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.