

# Chronic Obstructive Pulmonary Disease (COPD)

*These Clinical Practice Guidelines are guidelines only. In no way should these be used as a substitute for clinical or medical judgment. For specialty patient populations such as elderly or post-partum patients, refer to evidenced based practice guidelines to best serve these populations' unique needs.*

## COPD Quick Facts

- COPD is the third leading cause of death in the U.S.
- COPD accounts for 20% of hospitalized patients over the age of 40.
- 30 day readmission rates are high (20.6%), second only to heart failure
- Frequently identified causes of COPD readmissions:
  - Inability to afford medications
  - Incorrect use of inhalers and nebulizers
  - Lack of transportation to post-discharge appointments



## Clinical Concern for COPD Diagnosis

In patients presenting with any of the following symptoms, consider the diagnosis of COPD and obtain spirometry:

- Patients with dyspnea that is persistent, worse with exercise, & progressive over time
- Recurrent wheezing
- Chronic cough: continuous or intermittent, dry or productive
- Recurrent lower respiratory infections
- History of risk factors: tobacco smoke, home or environmental smoke (cooking or heating fuels, occupational exposures)
- Host factors: prematurity, childhood respiratory infections, genetic factors, developmental abnormalities

## General questions regarding COPD management or whether a referral to Pulmonary Medicine is needed?

Email [COPDhelpline@uhhospitals.org](mailto:COPDhelpline@uhhospitals.org)

This account is monitored Monday – Friday by Pulmonary APPs to offer guidance in the management of COPD patients.

**It is NOT for URGENT or EMERGENT ISSUES.** Our goal is to send a response within 48 to 72 hours.





Start with evaluation using the Pulmonary Function Test (PFT) and 6 Minute Walk Test (6MWT). Order “Pre-post Bronchodilator Spirometry”.

**Pulmonary Function Test: Required for Diagnosis**

- Obstruction when the post bronchodilator is  $FEV_1/FVC < LLN$  or 0.7 (70%)
- $FEV_1\%$  predicted
  - >80% GOLD 1 (mild)
  - 50 - 79% GOLD 2 (moderate)
  - 30-49% GOLD 3 (severe)
  - < 30% GOLD 4 (very severe)

**6 Minute Walk Test:**

- Measures achieved walking distance, dyspnea, and vital signs to assess patient's cardiopulmonary and musculoskeletal response to exercise
- Can be used to evaluate exercise capacity and initiate or titrate oxygen if needed

PFTs can be repeated every 3 years if the patient is stable and not smoking. PFTs can be repeated yearly if needed for therapeutic decision making (medication management, identify or rule out new pulmonary diagnoses) or if there is a suspicion for significant disease progression.

**After the Diagnosis**

Determine the GRADE (severity) (1-4) and GROUP (staging) (A,B,E) to understand severity and guide medication selection. GOLD ABE assessment requires PFT results, the mMRC and CAT assessments and the number of exacerbations and/or hospitalizations within the last 12 months.

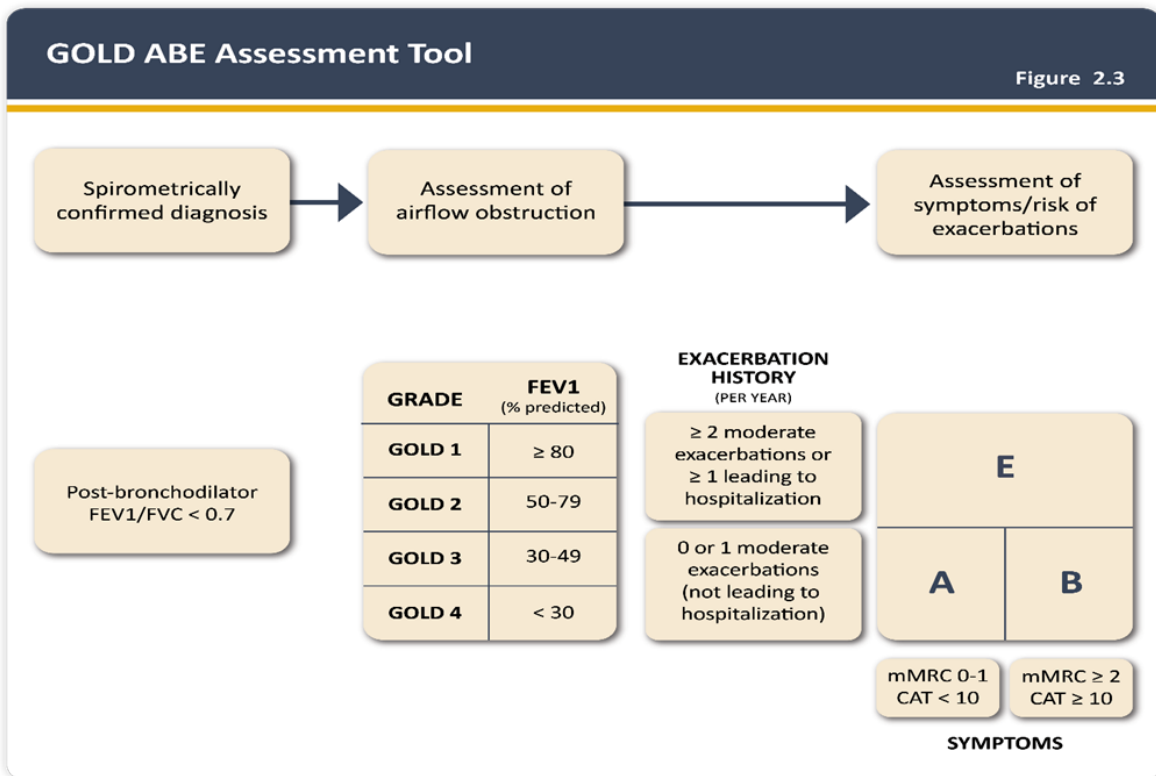


Figure from Reference #3 on page 16.

Approach to the Overall Management of COPD 

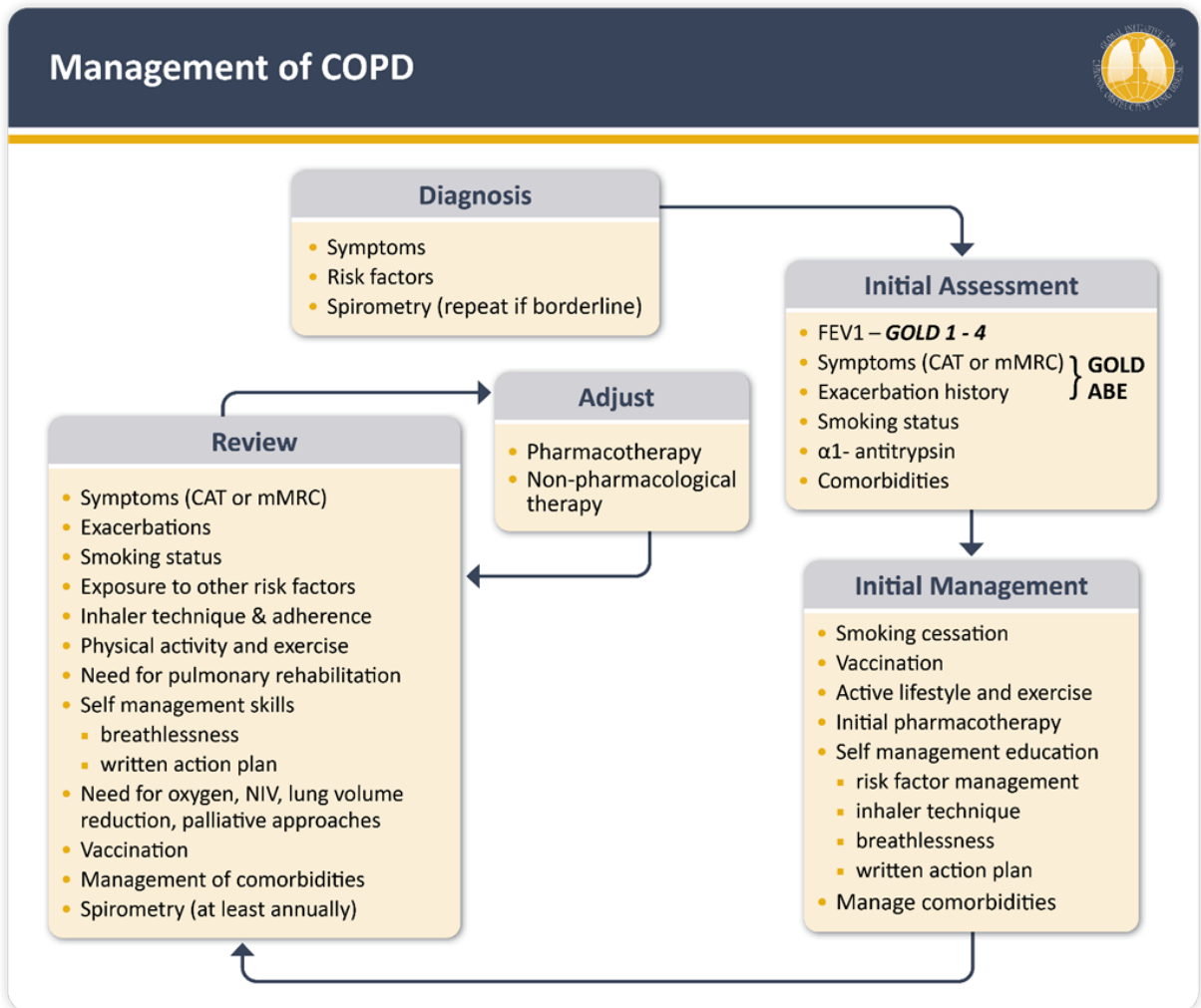


Figure from Reference #3 on page 16.

**Living Well With COPD Booklet**

Order #807987

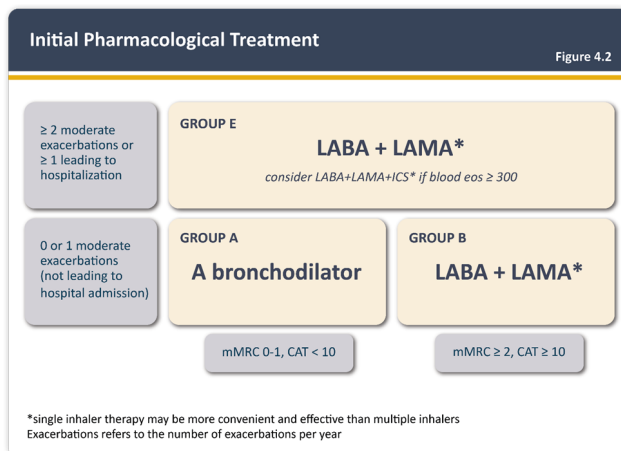
Ensure patient receives the booklet as soon as possible



## Pharmacological Treatment

### Consider ICS use:

- Favors Use:** History of ECOPD (COPD with exacerbations) with hospitalizations,  $\geq 2$  moderate ECOPD/year, blood eosinophils  $\geq 300$  cells/ $\mu$ L, concomitant asthma
- Against:** Repeated pneumonia events, blood eosinophils  $< 100$  cells/ $\mu$ L, history of mycobacterial infection



### Inhaler Classes: Initial Treatment

All groups (A, B, E) require a SABA PRN.

#### Group A

- Scheduled LAMA or LABA
- Short acting SABA or SAMA alone

#### Group B

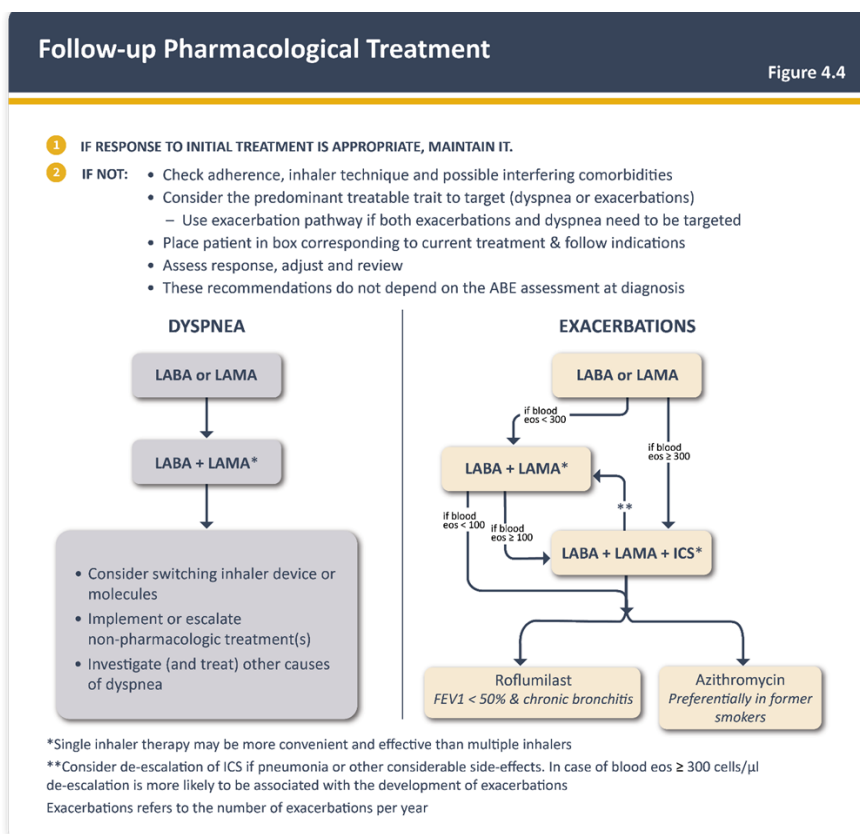
- LAMA + LABA (can be combination)

#### Group E

- LAMA + LABA
- LAMA + LABA + ICS

Drug Names	
<b>LABA</b>	Long-acting beta agonist
<b>LAMA</b>	Long-acting muscarinic antagonist
<b>SABA and SAMA</b>	Both are the same except “short-acting”
<b>ICS</b>	Inhaled corticosteroid

Both figures are from Reference #3 on page 16.



## Commonly Used Inhalers in the United States

Class	Medication in Class Generic (Brand, Inhaler type/name)	Frequency	t <sub>1/2</sub>	Duration
<b>Single Agents</b>				
Inhaled Corticosteroids (ICS)	Belomethasone (Qvar RediHaler, MDI) Budesonide (Pulmicort Flexhaler <sup>®</sup> , neb susp <sup>nd</sup> ) Ciclesonide (Alvesco MDI) Fluticasone (Arnuity Ellipta <sup>®</sup> , Flovent HFA, Diskus <sup>®</sup> ) Mometasone (Asmanex HFA)	QD BID BID QD-BID QD-BID		
Long-Acting Beta Agonists (LABA)	Arformoterol (Brovana neb soln) Formoterol (Foradil aerolizer <sup>DC</sup> /Perforomist neb soln <sup>nd</sup> ) Indacaterol (Arcapta Neohaler <sup>DC</sup> ) Olodaterol (Striverdi Respimat) Salmeterol (Serevent Diskus <sup>®</sup> )	BID BID - QD BID	26 h 7h <sup>neb</sup> - 7.5 h 5.5 h	? 12 h - 24 h 12 h
Long-Acting Muscarinic Antagonists (LAMA)	Aclidinium (Tudorza Pressair <sup>®</sup> ) Tiotropium (Spiriva Handihaler <sup>®</sup> , Respimat) Umeclidinium (Incruse Ellipta <sup>®</sup> )	BID QD QD	5-8 h 25-44h 11 h	? ? ?
Short-Acting Beta Agonists (SABA)	Albuterol (Ventolin HFA, Proventil HFA, ProAir HFA, Digihaler <sup>®</sup> , RespiClick <sup>®</sup> , neb soln) Levalbuterol (Xopenex HFA, neb soln) Pirbuterol (Maxair Autohaler <sup>DC</sup> )	q4-6h q4-6h <sup>mdi</sup> q6-8h <sup>neb</sup> -	3.8-5 h 3.3-4 h -	4-6h <sup>mdi</sup> 3-6h <sup>neb</sup> 3-4 h <sup>mdi</sup> 5-6h <sup>neb</sup> -
Short-Acting Muscarinic Antagonist (SAMA)	Ipratropium (Atrovent HFA) Ipratropium (Atrovent neb soln)	q4-6h <sup>mdi</sup> q6-8h <sup>neb</sup>	2 h	2-4h <sup>mdi</sup> 4-5h <sup>neb</sup>
<b>Combination Agents</b>				
ICS + LABA	Budesonide and Formoterol (Symbicort MDI) Fluticasone and Salmeterol (Advair HFA, Diskus <sup>®</sup> , AirDuo Digihaler <sup>®</sup> , AirDuo RespiClick <sup>®</sup> , Wixela Inhub <sup>®</sup> ) Fluticasone and Vilanterol (Breo Ellipta <sup>®</sup> ) Mometasone and Formoterol (Dulera MDI)	BID BID QD BID		
ICS + LAMA + LABA	Fluticasone, Umeclidinium, Vilanterol (Trelegy Ellipta <sup>®</sup> ) Budesonide, Glycopyrrolate, Formoterol (Breztri Aerosphere)	QD BID		
LAMA + LABA	Aclidinium and Formoterol (Duaklir Pressair <sup>®</sup> ) Tiotropium and Olodaterol (Stiolto Respimat) Umeclidinium and Vilanterol (Anoro Ellipta <sup>®</sup> )	BID QD QD		
SAMA + SABA	Ipratropium and Albuterol (Combivent Respimat) Ipratropium and Albuterol (Duoneb neb soln)	q4-6h		





# Respiratory Treatments



AllergyAsthmaNetwork.org  
800.878.4403

DRG = DOSE INDICATOR G = GENERIC AVAILABLE DISEASE STATES: A = ASTHMA C = COPD

Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.



## SHORT-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

<b>ProAir® Digihaler®</b> 90 mcg albuterol sulfate inhalation powder DRG A	<b>ProAir® RespiClick®</b> 90 mcg albuterol sulfate inhalation powder DRG A	<b>Proventil® HFA</b> 90 mcg albuterol sulfate DRG A, C	<b>Ventolin® HFA</b> 90 mcg albuterol sulfate DRG A, C	<b>Xopenex® HFA</b> 45 mcg levalbuterol tartrate DRG A, C
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## LONG-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

<b>Serevent® Diskus®</b> 50 mcg salmeterol xinafoate inhalation powder DRG A, C	<b>Striverdi® RespiMat®</b> 2.5 mcg olodaterol hydrochloride DRG C
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## INHALED CORTICOSTEROIDS

reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

<b>Alvesco® HFA</b> 80, 180 mcg ciclesonide DRG A	<b>ArmonAir® Digihaler®</b> 55, 113, 222 mcg fluticasone propionate inhalation powder DRG A	<b>Amuety® Ellipta®</b> 50, 100, 200 mcg fluticasone furoate inhalation powder DRG A	<b>Asmanex® HFA</b> 50, 100, 200 mcg mometasone furoate DRG A	<b>Asmanex® Twisthaler®</b> 110, 220 mcg mometasone furoate inhalation powder DRG A	<b>Flovent® Diskus®</b> 50, 100, 250 mcg fluticasone propionate inhalation powder DRG A	<b>Flovent® HFA</b> 44, 110, 220 mcg fluticasone propionate DRG A, C	<b>Pulmicort Flexhaler®</b> 90, 180 mcg budesonide inhalation powder DRG A	<b>QVAR® Redihaler®</b> 40, 80 mcg budesonide propionate DRG A
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## MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

<b>Atrovent® HFA</b> 17 mcg ipratropium bromide DRG C	<b>Increase® Ellipta®</b> 82.5 mcg umedidinium inhalation powder DRG C	<b>Spiriva® HandiHaler®</b> 18 mcg tiotropium bromide inhalation powder DRG C	<b>Spiriva® RespiMat®</b> 1.25, 2.5 mcg tiotropium bromide DRG A, C	<b>Tudorza® Pressair™</b> 400 mcg aclidinium bromide inhalation powder DRG C
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## COMBINATION MEDICATIONS

contain both short-acting beta<sub>2</sub>-agonist and short-acting muscarinic antagonist

<b>Combivent® RespiMat®</b> 20/100 mcg ipratropium bromide and albuterol DRG C
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## COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta<sub>2</sub>-agonist (LABA)

<b>Advair Diskus®</b> 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder DRG A, C, G	<b>Advair® HFA</b> 45/21, 115/21, 230/21 mcg fluticasone propionate and salmeterol inhalation powder DRG A, G	<b>AirDuo® Digihaler®</b> 50/14, 113/14, 222/14 mcg fluticasone propionate and salmeterol inhalation powder DRG A	<b>AirDuo® RespiClick®</b> 55/14, 113/14, 222/14 mcg fluticasone propionate and salmeterol inhalation powder DRG A, G	<b>Breo® Ellipta®</b> 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder DRG A, C	<b>Dulera®</b> 505, 1005, 2005 mcg mometasone furoate and formoterol fumarate dihydrate DRG A	<b>Symbicort®</b> 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate DRG A, C, G	<b>Wixela™ Inhub™</b> 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder DRG A, C
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## COMBINATION MEDICATIONS

contain both long-acting beta<sub>2</sub>-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

<b>Anoro® Ellipta®</b> 82.5/25 mcg umedidinium and vilanterol inhalation powder DRG C	<b>Bevespi Aerosphere®</b> 94.8 mcg glycopyrrolate and formoterol fumarate DRG C	<b>Duaklir® Pressair™</b> 400, 12 mcg aclidinium bromide and formoterol fumarate DRG C
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## COMBINATION MEDICATIONS

contain inhaled corticosteroid, long-acting beta<sub>2</sub>-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

<b>Trelegy® Ellipta®</b> 200/12.5/25 mcg fluticasone furoate, umedidinium and vilanterol inhalation powder DRG A, C	<b>Breztri Aerosphere™</b> 180/4.8 mcg budesonide, glycopyrrolate and formoterol fumarate DRG C
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## BIOLOGICS

target cells and pathways that cause airway inflammation, delivered by injection or IV

<b>Cinqair®</b> reslizumab A	<b>Dupixent®</b> dupilumab A	<b>Fasenra®</b> benralizumab A	<b>Nucala®</b> mepolizumab A	<b>Tezspire®</b> tezepelumab-ekko A	<b>Xolair®</b> omalizumab A
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## BRONCHIAL THERMOPLASTY

A minimally invasive procedure that uses radiofrequency energy to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities.  
www.biforasthma.com

## PDE4 INHIBITORS

ease lung inflammation and reduce exacerbations

<b>Daliresp®</b> 250, 500 mcg roflumilast C
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Reviewed by Dennis Williams, PharmD. Generic versions of brand name inhalers are not included on this poster. Generic inhalers may be a different color. ©2023 Allergy & Asthma Network

Figure from Reference #9 on page 16.

## Choosing the Appropriate Inhalation Device

- Patient dexterity, strength, coordination, and cognition must be evaluated
- Try to minimize the number and types of devices
- Dry powder inhalers (DPI) require patients to make a forceful and deep inhalation
- Metered-dose inhalers (MDI) require coordination between device triggering & inhalation (needs to be slow and deep)
- Adding a spacer (a holding chamber) to an MDI can help with delivery
- Soft mist inhalers (SMI) release the drug as a fine mist more slowly than an MDI to help with a slower inhalation
- Patients who have difficulty with DPI, MDI or SMI inhalers should be considered for nebulizer delivery
- Some patients can be sensitive to DPIs with side effects of sore throat or hoarse voice.

## Inhaler Teaching

- Assess for barriers to getting and using inhalers
- [COPD Foundation APP](#) has great inhaler and nebulizer educational videos



**Address with the Initial and Ongoing Assessment:****Smoking History**

1. Status: Current, Never, Former + Quit Date
2. Pack years:
  - a. 1 ppd x 20 yrs = 20 pack years
  - b. 0.5 ppd X 20 yrs = 10 pack years

**Smoking Cessation**

1. Education done documenting "> 5 minutes of smoking cessation counseling"
2. Give patient "How to be a Quitter" book
3. Referral to Tobacco Cessation Counselor, for questions email [Tobacco.Treatment@UHhospitals.org](mailto:Tobacco.Treatment@UHhospitals.org)

**Immunizations for Adults with COPD**

Follow the CDC Adult Immunization Schedule.

Specifically recommended for COPD:

- Influenza
- Pneumonia: **Pneumococcal**: 2 options CDC recommendation
  - 1 dose 20 valent (PCV20) **OR**
  - 1 dose 15 valent (PCV15) followed by 23-valent (PPSV23)
- Tdap (dTAP/dTPa)
- COVID
- Shingles

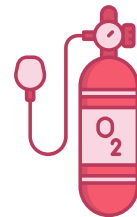
**Lung Cancer Screening**

- In order to qualify:
  - Age 50-77
  - 20 pack years +
  - Smoked within the last 15 years
  - Shared decision making discussion completed & documented
  - No previous CT chest in the last year (includes Ca scoring)
- Ordered as - CT chest low dose for lung screening w/o contrast
- If original screening CT is abnormal and requires sooner follow up based on Lung RADS score- need to order "CT Chest Lung CA Screen Follow Up LR3LR4 Diagnostic"
- Only cigarette smokers qualify for this program. It does not take into account other types of tobacco/ smoking products cigars, vape, or marijuana.
- Lung cancer screening navigators - [UHLungCancerScreeningProgram@UHhospitals.org](mailto:UHLungCancerScreeningProgram@UHhospitals.org)

**Oxygen: Current Requirements & Oxygen Evaluation****Goal Pulse Ox (88% - 92%)**

Long term oxygen therapy indicated for:

1. PaO<sub>2</sub> ≤ 55 mmHg or SaO<sub>2</sub> ≤ 88% with or without hypercapnia, confirmed twice over a 3 week period **OR** PaO<sub>2</sub> 55-60 mmHg or SaO<sub>2</sub> 88% if there is evidence of pulmonary hypertension, peripheral edema suggesting CHF or polycythemia (hematocrit > 55%)
2. Re-evaluate at 60-90 days with ABG or oxygen saturation measurements: room air AND on prescribed O<sub>2</sub> to assess for continued need and flow requirements
3. O<sub>2</sub> desaturation study and provider visit within 30 days required for oxygen initial certification and annually for recertification





## Exercise and Self-Management

Current level of physical activity? Understanding of breathlessness? Utilization of techniques to manage anxiety / SOB?

For self-management:

- Avoid infection
- Maintain good nutrition
- Aerobic exercise - can refer to Pulmonary Rehabilitation, if they qualify



## Pulmonary Rehabilitation

- Groups B or E (or restriction on PFTs or low DLCO)
- Patient is allotted 72 sessions (lifetime)

### ICD-10 Codes That Support Pulmonary Rehabilitation

- D86.9 Sarcoidosis
- E84.0 Cystic Fibrosis with pulmonary manifestations
- I27.0 Primary pulmonary hypertension
- J41.1 Simple chronic bronchitis
- J44.9 Obstructive chronic bronchitis without acute exacerbation
- J41.1 Other chronic bronchitis
- J43.9 Other Emphysema
- J44.9 Chronic Obstructive Asthma unspecified
- J45.991 Cough-variant asthma
- J47.9 Bronchiectasis without acute exacerbation
- J44.9 Chronic airway obstruction not elsewhere classified (COPD)
- J60 Coal workers' pneumoconiosis
- J61 Asbestosis
- J62.8 Pneumoconiosis due to other silica or silicates
- J63.6 Pneumoconiosis due to other inorganic dust
- J66.8 Pneumonopathy due to inhalation of other dust
- J64 Pneumoconiosis unspecified
- J68.4 Chronic respiratory conditions due to fumes and vapors
- J68.9 Unspecified respiratory conditions due to fumes and vapors
- J70.1 Chronic and other pulmonary manifestations due to radiation
- J84.10 Postinflammatory pulmonary fibrosis
- J84.01 Pulmonary alveolar proteinosis
- J84.02 Pulmonary alveolar microlithiasis
- J84.09 Other specified alveolar and parietoalveolar pneumonopathies
- J98.4 Other diseases of lung not elsewhere classified



### Additional tips/ helpful hints:

- In order for COPD to qualify patient needs to have a moderate obstruction (FEV<sub>1</sub> 50-80%).
- Non-COPD dx require FVC < 65% or FEV<sub>1</sub> < 65% or DLCO < 65%
- Pulmonary hypertension and long haul COVID qualifies
- Each pulmonary rehab referral is for 36 sessions. If they want to utilize the additional 36 sessions (72 lifetime sessions) they need to be referred again.
- Pulmonary rehabilitation can ONLY be ordered by a physician (APP [NP/PA] must put supervised by a collaborating physician in the order)

## Addressing Comorbidities and When to Refer to Pulmonary/Sleep Medicine

### Comorbidities

1. Identification & optimal management including referrals, as needed, is the goal
2. Common Comorbidities:
  - o Hypertension, Obstructive Sleep Apnea, Gastroesophageal Reflux
  - o Cardiovascular Disease, Heart Failure, Arrhythmias
  - o Pulmonary Embolism, Pulmonary Hypertension
  - o Osteoporosis, Anxiety, Depression

### Obstructive Sleep Apnea (OSA)

Patients with COPD and OSA have a worse prognosis and are more likely to develop daytime pulmonary hypertension than either condition alone. In patients with both COPD and OSA, there are clear indications for the use of CPAP: reduced all-cause hospitalizations, ED visits, moderate and severe exacerbations, and associated healthcare costs.

To screen for OSA using the STOP BANG instrument, see the below diagram as well as the [UHQCN Sleep CPG](#).

STOP		BANG		STOP BANG Scoring 0-2 Low 3-4 Intermediate 5-8 High
<ul style="list-style-type: none"> <li>• Do you SNORE loudly?</li> <li>• Do often feel TIRED?</li> <li>• Has anyone OBSERVED you stop breathing?</li> <li>• Do you have/are you treated for high blood PRESSURE?</li> </ul>		<ul style="list-style-type: none"> <li>• BMI &gt;35</li> <li>• AGE&gt;50</li> <li>• NECK circumference (&gt;17 in men, &gt;16 in women)</li> <li>• Gender= male</li> </ul>		
<p><b>Low Pretest Probability</b></p> <ul style="list-style-type: none"> <li>• STOP BANG &lt; 3</li> </ul> <p><b>Try conservative strategies for 3 months; then reassess need to test.</b></p>		<p><b>Moderate Pretest Probability</b></p> <ul style="list-style-type: none"> <li>• STOP BANG 3-4</li> <li>• Uncontrolled blood pressure ↑ test need</li> </ul> <p><b>Appropriate to test; Use clinical judgement.</b></p>		<p><b>High Pretest Probability</b></p> <ul style="list-style-type: none"> <li>• STOP BANG 5-8</li> </ul> <p><b>High priority to test</b></p>

### Pulmonary Medicine Referral

- **H** – Hospitalizations ≥ 1 exacerbation per year
- **E** – Exacerbations ≥2 requiring ED visits/steroids
- **L** - Low lung function. FEV1 < 50% ( GOLD 3 or 4)
- **P** - Problem sleeping or symptoms of sleep disorder breathing
- **O** - Oxygen needs
- **U** - Uncertain diagnosis
- **T** - Therapy options (need to up-titrate)



## Exacerbations in COPD

### COPD Exacerbation

Defined as an event characterized by dyspnea and/or cough and sputum that worsens in < 14 days

#### Cardinal Symptoms: dyspnea, sputum volume, sputum purulence\*

1. **Mild** – worsening of 1 of the cardinal symptoms
  - RR < 24, HR < 95, dyspnea < 5 on VAS
  - Resting sat ≥ 92% on room air/usual O<sub>2</sub> (or change ≤ 3% from baseline)
2. **Moderate** – worsening of 2 of the 3 cardinal symptoms
  - RR ≥ 24, HR ≥ 95
  - Resting sat < 92% on RA/usual O<sub>2</sub> (or change > 3% from baseline)
  - ABG may show hypoxemia &/or hypercapnia but NOT acidosis
3. **Severe** – worsening of all 3 cardinal symptoms
  - Parameters same as moderate
  - ABG shows hypercapnia & acidosis

\*Antibiotics should only be given if sputum purulence is one of the presenting symptoms

Make sure the patient has a rescue inhaler: SABA or SAMA/SABA.

<b>Exacerbation: Outpatient Treatment Plan</b>	
<b>Exacerbation Level</b>	<b>In all cases, re-evaluate in 48 hours for persistent or worsening symptoms and the need to escalate treatment.</b>
Mild	<ul style="list-style-type: none"> <li>• Increase use of PRN albuterol/nebulizers to every 4 hours</li> <li>• Continue long acting (maintenance) inhalers</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• Prednisone 40mg daily x 5 days</li> <li>• Antibiotics (if + sputum purulence) see the next page</li> <li>• Increase use of PRN albuterol/nebulizers to every 4 hours</li> <li>• Continue long acting (maintenance) inhalers</li> </ul>
Severe	<ul style="list-style-type: none"> <li>• Prednisone 40mg daily x 5 days</li> <li>• Antibiotics (see below)</li> <li>• Evaluate for referral to ED</li> <li>• Increase use of PRN albuterol/nebulizers to every 4 hours</li> <li>• Continue long acting (maintenance) inhalers</li> </ul>



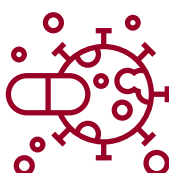
## A Guide to Antibiotics

<b>Clinical Indicators</b> (Exacerbation of COPD: ECOPD)	<b>Antibiotic Options</b> Recommended duration of treatment for outpatient ECOPD is ≤ 5 days
FEV <sup>1</sup> > 50% <b>AND</b> ≤ 2 ECOPD / year	<ul style="list-style-type: none"> <li>• Macrolide <b>OR</b></li> <li>• 2nd/3rd generation cephalosporin <b>OR</b></li> <li>• Trimethoprim / Sulfamethoxazole</li> </ul>
FEV <sup>1</sup> < 50% >2 ECOPD / year ECOPD with hospitalization in the last 12 months Home O <sub>2</sub> Comorbidities: heart failure, ischemic heart disease Chronic oral steroid use Antibiotic use in the last 3 months	<ul style="list-style-type: none"> <li>• Fluoroquinolone <b>OR</b></li> <li>• Amoxicillin / Clavulanate</li> </ul>
FEV <sup>1</sup> < 30% Bronchiectasis Known Pseudomonas Chronic oral steroids Multiple risk factors	<ul style="list-style-type: none"> <li>• Fluoroquinolone</li> </ul>

### Commons Antibiotics

This is not an exhaustive and please contact a Pharmacist with questions.

Macrolide	<ul style="list-style-type: none"> <li>• Azithromycin</li> <li>• Erythromycin</li> <li>• Clarithromycin</li> </ul>
2nd Generation Cephalosporin	<ul style="list-style-type: none"> <li>• Cefuroxime</li> <li>• Cefonicid</li> <li>• Ceforanide</li> </ul>
3rd Generation Cephalosporin	<ul style="list-style-type: none"> <li>• Cefixime</li> <li>• Ceftibuten</li> <li>• Cefdinir</li> </ul>
Fluoroquinolone	<ul style="list-style-type: none"> <li>• Ciprofloxacin</li> <li>• Levofloxacin</li> <li>• Gemifloxacin</li> </ul>



## Possible Hospitalization of Emergency Department Treatment

### SEND to the Emergency Department...

If any of the following:

- Marked increased intensity of symptoms
- New or worsening peripheral edema
- Worsening of hypoxemia from usual (if known)
- SpO<sub>2</sub> <92% if not on home oxygen
- Shortness of breath that is worsening and/or at rest and is not relieved or controlled with the use of rescue inhaler/nebulizer treatment
- High fever
- Altered mental state (confusion, slurred speech, drowsiness)
- Chest pain
- Worsening of co-morbidities (e.g. heart failure, ischemic heart disease, diabetes)
- Inability to perform daily activities and/or manage safely at home
- Increased anxiety (feeling scared/afraid)



## Advanced COPD Recommendations and Interventions

### 1. Additional COPD Medications

- Roflumilast (Daliresp) if FEV<sub>1</sub> < 50% predicted and chronic bronchitis
- Macrolide (Azithromycin)
  - Monitor QTc
  - Avoid in patients with cardiac disease/arrhythmias
  - Can cause hearing loss
- Withdraw ICS if recurrent pneumonia episodes

### 2. Advance Directives & Palliative Medicine Referral

- Advance directives include living will and durable power of attorney for healthcare
- End-of-life care should be discussed with patients and families to understand their thoughts and beliefs regarding what is an acceptable quality of life, desired level of resuscitation, place of death preferences and creating advanced directives.
- Palliative's role is to improve symptom management and assist the patient to achieve the best possible quality of life, including facilitating goals of care conversations and decisions.
- Even with optimal therapy many patients experience breathlessness, reduced exercise capacity, fatigue, anxiety, panic attacks and depression.
- Refer COPD patients to palliative medicine when they are O<sub>2</sub>-dependent PLUS one or more of the following:
  - Age > 85
  - Nutritional decline (>10% weight loss over past year)
  - 2+ hospitalizations or ICU admission in the past 6 months
  - Additional organ system failure — dementia, CHF with severely reduced EF, CKD IV or V, or cirrhosis with MELD > 15

### 3. Non-Invasive Ventilation (NIV)

NIV has several variations. NIV can provide single level pressure support (EPAP) or bi-level support (IPAP and EPAP). That support can also provide a back-up respiratory rate or none at all. Patients with severe COPD (Gold 3-4, FEV<sub>1</sub> < 50% predicted), daytime fatigue, dyspnea, suspicion of hypercapnia, and a history of hospitalization for acute respiratory failure should be evaluated for the use of NIV.

#### **Nocturnal noninvasive, ventilation, (CPAP, BIPAP)**

The first step is to get an ABG and confirm chronic hypercapnia PaCO<sub>2</sub> > 52 mmHg.

Patients with severe COPD and daytime fatigue without chronic hypercapnia should be referred to sleep medicine for a polysomnogram (sleep study) as there is a potential for OSA/COPD overlap that may require CPAP support.

Patients with severe COPD with confirmed hypercapnia:

1. Obtain an overnight oximetry study, looking for evidence of hypoxemia.
2. The study is completed either on the patient's prescribed home O<sub>2</sub> or 2 L per minute; whichever is greater.
3. If the patient (while on the oxygen) has a saturation < 88% for 5 minutes; (not continuous), the patient has demonstrated severe COPD with hypoxemia and is qualified to receive NIV without a backup rate.
4. Per the CMS guidelines this is known as a Respiratory Assist Device (RAD) without a backup rate. The goal is to use bi-level support with the IPAP titrated to reach > 18 cm H<sub>2</sub>O and an exhaled tidal volume of 8mL/kg IBW.





**Proportional Open Ventilation (POV)**

POV is noninvasive ventilation that is portable, multi modal, and can work with or without supplemental oxygen. It is designed for patients with chronic hypoxic respiratory failure who have a significant amount of symptoms throughout the day, negatively impacting their ability to function. POV delivers breaths in various modes and according to the type of activity, supporting overall ventilation, reducing work of breathing and improving quality of life.

The best example of this type of ventilation is the life 2000 ventilation system (manufactured by Hillrom). There is a stationary component in the home as well as a small, portable volume ventilator worn around the waist with a six hour battery that weighs approximately 1 pound. Delivery of breaths is accomplished through a nasal pillow. Candidates for Life 2000 have chronic respiratory failure as in COPD, restrictive lung disease, neuromuscular disorders, and lung transplant (pre and post). When using this device for COPD, the ultimate goal is reduce exacerbations and improve quality of life.

**4. Alpha1-Antitrypsin Deficiency (AATD)**

1. WHO recommends all COPD patients be screened for AATD
2. Additionally consider screening patients with liver disease of unknown cause, unexplained bronchiectasis, ANCA – positive vasculitis or first degree relatives of an affected individual
3. Obtain AAT level AND targeted genotype (see algorithm in UpToDate)
  - i. AAT blood level low if < 20 micromol/L or < 100 mg/dL
  - ii. Look for presence of deficient variant (F, I, S, Z)
  - iii. If no – gene sequence of SERPINA1 looking for null or rare variants

**6. Lung Volume Reduction Surgery/Endobronchial Valve (Zephyr Valve)**

COPD patients with emphysema and significant hyperinflation refractory to optimal medical care

Inclusion Criteria:

- Diagnosis of emphysema confirmed by CT
- BMI <35
- Stable with < 20mg prednisone (or equivalent) daily
- RV > 175% predicted (>200% if homogenous)
- FEV1 15-45% predicted
- TLC >100% predicted
- Not actively smoking (for at least 4 months)
- 6 minute walk distance 100-500m (150–500 if homogenous)

Exclusion Criteria:

- Currently smoking
- Prior lung transplant, lung volume reduction surgery, or lobectomy
- Prior surgery requiring median sternotomy (CABG etc.)
- CHF – EF <45%, unstable cardiac arrhythmia, MI or CVA
- Allergies to nitinol, nickel, titanium, or silicone
- Large bulla >30% of either lung
- Inability to complete preoperative/ postoperative pulmonary diagnostic and therapeutic program required for procedure
- Contraindications for bronchoscopy – patient characteristics that may carry a high risk of postoperative morbidity and/or mortality
- Severe hypercapnia (PaCO<sub>2</sub> >50 mmHg on RA) and or severe hypoxemia (PaO<sub>2</sub> <45 mmHg on RA)
- Uncontrolled pulmonary hypertension (sPAP > 45mmHg)

For any inquiries or referrals for endobronchial valves please contact Toby Schweinfurth RN, Bronchoscopy Coordinator - [Toby.Schweinfurth@UHhospitals.org](mailto:Toby.Schweinfurth@UHhospitals.org)

## 6. Clinical Trials for COPD

Pulmonology does participate in clinical trials for COPD. In order the information to be accurate, we ask that you search using the link below.

<https://www.uhhospitals.org/uh-research/find-clinical-trials-and-studies>

## 7. Lung Transplant Evaluation

- Transplant referral is managed by the patient's Pulmonologist
- Transplant for COPD is primarily for better quality of life and is an option for patients with progressive disease despite maximal therapy that includes medication, pulmonary rehabilitation and supplemental oxygen
- Patients who are appropriate for referral should meet all of the following criteria
  - A BODE index score  $\geq 7$ . The BODE score is an index of disease severity using **B**ody mass index, **O**airflow **O**bstruction, **D**yspnea & **E**xercise capacity.
  - Postbronchodilator forced expiratory volume in one second (FEV<sub>1</sub>) <15 percent of predicted
  - Evidence of hypercapnia defined as carbon dioxide tension (PaCO<sub>2</sub>) >50 mmHg (6.6 kPa)
  - Not candidate for lung volume reduction surgery
- COPD patients with moderate to severe Pulmonary Artery Hypertension should be considered for lung transplant sooner rather than later

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