Chronic Obstructive Pulmonary Disease Clinical Guideline

MOUNT CARMEL Health Partners

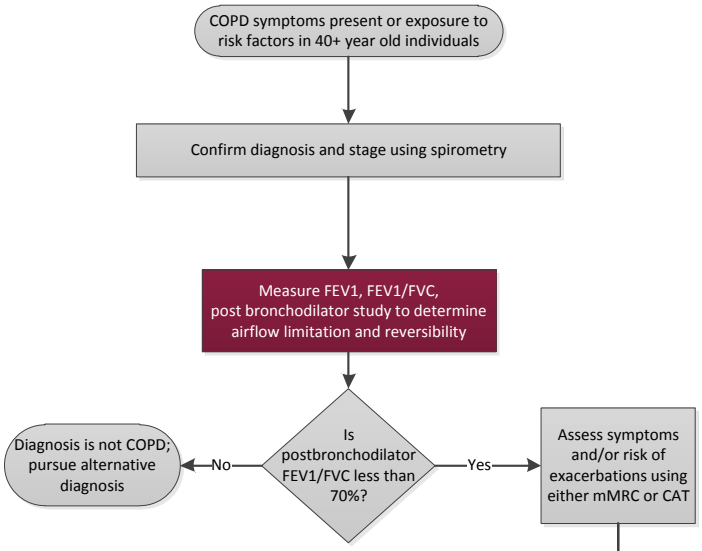
Definition: Chronic Obstructive Pulmonary Disease (COPD) is a common and treatable disease that is characterized by airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lungs to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients.

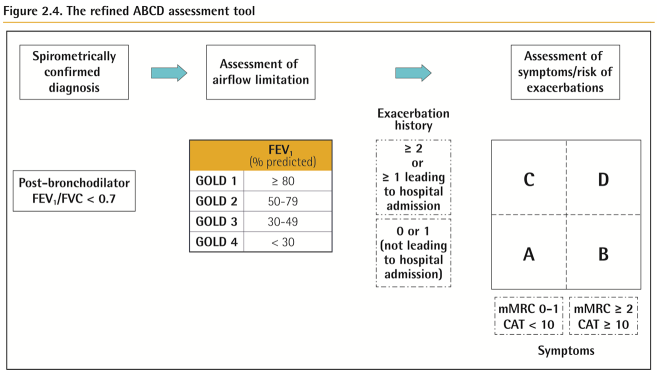
Causes: Chronic bronchitis, emphysema, and bronchospasm infection are common causes. It is made worse by tobacco smoking, air pollution, and recurrent infections.

Quick Guide to Chronic Obstructive Pulmonary Disease Care

COPD exacerbations account for a significant number of ED visits. The goal of this guideline is to provide a consolidation of best practice recommendations in order to decrease the number of exacerbations and therefore improve ER utilizations. A brief synopsis of recommendations follows.

- Make the diagnosis and stage the patient with spirometry. This is recommended by most, if not all, pulmonary expert panels.
- See patients in the Global Initiative for Chronic Obstructive Lung Disease (GOLD) severe and very severe categories at least twice a year.
- Address tobacco cessation early and often. This is by far the most effective and cost-effective intervention.
- Treat early with long-acting bronchodilators and/or combination steroid/beta-2 agonist inhaled products based on GOLD guidelines staging.
- Avoid regular use of antitussives.
- Use antibiotics for infectious exacerbations.
- Vaccinate for **influenza** annually and administer **pneumococcal vaccine** at diagnosis and again at least once after age 65 (per current recommendation).
- Treat with chronic oxygen if, and when, SaO_2 drops below 88% resting.
- Enroll patients who are symptomatic and/or have decreased daily life activities due to COPD into a pulmonary rehabilitation program.
- For acute exacerbations, add short-acting bronchodilators, a short (5 day burst) tapering course of prednisone, and antibiotics for patients with signs of infectious exacerbation.
- 30% of hospital admissions for exacerbation have no identifiable cause.
- See patients following an ED visit or within 2 weeks of hospitalization.





Evaluation

Treatment

Group A – Low Risk
(less symptoms)
0 to 1 exacerbation per year and no hospitalization for exacerbation; and mMRC 0-1 or CAT <10

Short-acting bronchodilator when needed; anticholinergic alone or with beta-agonist

Group B – Low Risk
(more symptoms)
0 to 1 exacerbation per year and no hospitalization for exacerbation; and mMRC grade ≥ 2 or CAT ≥10

1 when needed and 2
OR
Initial treatment: **3 or 4**
Step-up treatment: **3 and 4**
(stat if severe breathlessness)

Group C – High Risk
(less symptoms)
≥ 2 exacerbation per year or ≥ 1 hospitalization for exacerbation: and mMRC 0-1 or CAT <10

1 when needed and 2
OR
Initial treatment: **3**
Step-up treatment: **3 and 4**
Alternative step-up treatment: **4 and 5**

Group D High Risk
(more symptoms)
≥ 2 exacerbation per year or ≥ 1 hospitalization for exacerbation: mMRC grade ≥ 2 or CAT ≥10

1 when needed and 2
OR
Initial treatment:**3 and 4 OR 4 and 5 (if asthma and COPD overlap)**
Step-up treatment:
• Triple therapy with **3 , 4, 5**
Alternative step-up treatment:
• add **6**
• **add macrolide**
• **stop 5**

Treatment Key:
1 Short-acting bronchodilator
2 Pulmonary rehabilitation
3 Long-acting anticholinergic
4 Long-acting beta-agonist
5 Inhaled glucocorticoid
6 Phosphodiesterase-4 inhibitor

*Adapted from Global Initiative for Chronic Obstructive Lung Disease 2018 Report. Modified British Research Council Questionnaire (mMRC), COPD Assessment Test (CAT).

Modified British Medical Research Council Questionnaire (mMRC)

Please "X" in the box that applies to you (only one box) (Grades 1-4)		
mMRC 0	I only get breathless with strenuous exercise.	
mMRC 1	I get short of breath when hurrying on the level or walking up a slight hill.	
mMRC 2	I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level.	
mMRC 3	I stop for breath after walking about 100 meters or after a few minutes on the level.	
mMRC 4	I am too breathless to leave the house or I am breathless when dressing or undressing .	

*Flecher CM. BMJ 1960, 2: 1662

COPD Assessment Test (CAT)

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select on response for each question.

Example: I am very happy	0	X	2	3	4	5	I am very sad	Score
I never cough	0	1	2	3	4	5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0	1	2	3	4	5	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0	1	2	3	4	5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0	1	2	3	4	5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0	1	2	3	4	5	I am very limited doing activities at home	
I sleep soundly	0	1	2	3	4	5	I don't sleep soundly because of my lung condition	
I have lots of energy	0	1	2	3	4	5	I have no energy at all	
							Total Score	

*The COPD Assessment Test was developed by a multi-disciplinary group of international experts in COPD supported by GSK.
Reference: Jones et al. ERJ 2009; 34 (3); 648-54

Initial Visit

1.Obtain and perform detailed medical history and physical with a focus on the following:

- Pattern of symptom development
- History of exacerbations
- Patient's quality of life
- Patient's support system
- Exposure to risk factors (i.e.tobacco use, environmental/occupational risk factors)
- Neck vein distension, accessory muscle use
- Abdominal examination for hepatomegaly
- Peripheral edema
- Digital clubbing is not typical in COPD and suggests other diagnoses (lung cancer, bronchiectasis, pulmonary fibrosis)
- Cyanosis
- Gallop rhythm (S3 or S4)
- Displaced PMI (point of maximum impulse)

Diagnosis of COPD

The diagnosis of COPD should be confirmed by spirometry. When performing spirometry, measure:

- Forced vital capacity (FVC)
- Forced expiratory volume in one second (FEV1)
- Calculate the FEV1/FVC ratio: postbronchodilator FEV1 is recommended for the diagnosis and assessment of the severity of COPD. FEV1/FVC ratio should be confirmed by repeat spirometry on a separate occasion if ratio is between 0.6 and 0.8. A FEV1/FVC ratio less than 0.7 con firm the presence of airflow limitation that is not fully reversible

Other diagnostic tests that may be performed prior to establishing the diagnosis of COPD:

- Bronchodilator reversibility to exclude asthma and establish a lung function baseline
- Chest x-ray to rule out other causes for lung diseases
- Arterial blood gas or pulse oximetry
- Alpha-1 antitrypsin (AAT) deficiency screening; this deficiency is caused by an inherited deficiency of the hepatically-produced protein alpha-1 antitrypsin, a known lung protector. This test should be performed on patients with COPD of Caucasian descent under the age of 45 or in patients who have a strong family history of COPD
- CBC to assess for anemia
- BNP or NT-proBNP to assess and/or evaluate for heart failure

Goals of COPD Management

1. Improve health status
2. Relieve symptoms
3. Prevent disease progression
4. Prevent and treat exacerbations
5. Prevent and treat complications
6. Improve exercise tolerance
7. Prevent or minimize side effects from treatment
8. Reduce mortality

Differential Diagnosis of COPD

Diagnosis	Suggestive Features
COPD	Onset mid-life (onset early adulthood–suspicion for alpha-1 antitrypsin deficiency)
	Symptoms progress slowly
	Long smoking history, although can occur in nonsmokers.
	Largely irreversible airflow limitation
	Dyspnea during exercise
Asthma	Onset early in life, often childhood
	Symptoms vary from day to day
	Symptoms at night/early morning
	Allergy, rhinitis and/or eczema
	Family history of asthma
	Largely reversible airflow limitation
	Obesity coexistence
Heart Failure	Fine basilar crackles on auscultation
	Chest radiograph shows dilated heart, pulmonary edema
	Pulmonary function tests typically indicate volume restriction, not airflow limitation
Bronchiectasis	Large volumes of purulent sputum
	Commonly associated with recurrent or persistent bacterial infection
	Coarse crackles on auscultation, clubbing of digits
	Chest radiograph/High-resolution computed tomography (HRCT) shows bronchial dilation, bronchial wall thickening
Tuberculosis	Onset all ages
	Chest x-ray shows lung infiltrate
	Microbiological confirmation
	High local prevelence of tuberculosis
Obliterative bronchiolitis	Onset younger age, nonsmokers
	May have history or rheumatoid arthritis or acute fume exposure
	Seen after lung or bone marrow transplant
	CT on expiration shows hypodense areas
Diffuse Panbronchiolitis	Predominantly seen in patients of Asian descent
	Most patients are male and nonsmokers
	Almost all have chronic sinusitis
	Chest x-ray and HRCT show diffuse small centrilobular nodular opacities and hyperinflation

Management of Stable COPD

Patients with severe COPD should have a visit with their PCP at least once every six months.
Reduce risk factors by:

- Influenza and pneumococcal vaccines
- Reducing and/or eliminating occupational exposures and other pollutants
- Smoking cessation, which is the most effective and co-effective intervention to reduce the risk of developing COPD and slow its progression
- Treatment of anxiety and depression, as both are major comorbidities.
- Assessing inhaler techniques
- Establish Advanced Directives

Management of Exacerbations

The American Thoracic Society defines an exacerbation of COPD as an acute change in a patient's baseline dyspnea, cough, and/or sputum beyond day to day variability that is sufficient to warrant a change in therapy. Common causes include exposure to air pollution or other irritants, ambient temperature, medical noncompliance, and respiratory infection.

Tests needed to assess an exacerbation:

- Arterial blood gas
- Chest x-ray to identify other diagnoses that produce symptoms similar to a COPD exacerbation
- ECG
- Sputum culture
- Biochemical tests to detect electrolyte disturbances
- Whole blood count to identify polycythemia, bleeding, or infection

Pulmonary Rehabilitation

Pulmonary rehabilitation should be considered for patients who have:

•GOLD B,C,D •FEV1<50% •persistent symptoms •limited functional capacity •difficulty adjusting to the illness

Supply the patient with a pulmonary rehabilitation booklet if the patient is unable to attend pulmonary rehabilitation.

Benefits of a pulmonary rehabilitation program include:

•improved quality of life •decreased dyspnea •decreased hospitalization and emergency room utilization

Pharmacological Treatment

Bronchodilators • Beta-2 agonists: short-acting include albuterol and levalbuterol; long-acting beta agonists (LABAs) include salmeterol, formoterol, arformoterol, indacaterol, olodaterol • Anticholinergics: short-acting include ipratropium, formoterol; long-acting muscarinic agents (LAMAs) include, aclidinium, tiotropium, umeclidinium, glycopyrronium • Combination therapy: short-acting beta-2 agonist plus anticholinergic include albuterol/ipratroium; long-acting beta-2 agonist plus anticholinergic include vilanterol/umeclidium, olodaterol.tiotropium, formoterol.glycopyrronium, indacaterol/ glycopyrronium • Methylxanthines: Theophylline	**Preferred Therapy** Inhaled. Regular treatment with long-acting bronchodilators is more effective than short- acting bronchodilators	**Combination Therapy** Combining bronchodilators of different classes may decrease side effects and improve efficacy
Inhaled Corticosteroids (ICS) • Combination of long-acting beta-2agonist plus corticosteroids include formoterol/budesonide, formoterol/mometasone, salmeterol/fluticasone, vilanterol/fluticasone	**Preferred Therapy** An ICS combined with a LABA is more effective than monotherapy in improving lung function and reducing exacerbations in patients with exacerbations and moderate-severe COPD. Triple inhaled therapy of ICS/ LAMA/LABA improves lung function, symptoms, and health status compared to ICS/LABA or LAMA alone	**Long-Term Therapy** Regular treatment with ICS increases risk of pneumonia especially in those with severe COPD and does not reduce mortality
Glucocorticosteroids (prednisone, methylprednisolone) Reduce frequency of exacerbations and improve health status for patients with an FEV1 less than 60%. No effect on the long-term decline in FEV1	**Preferred Therapy** For the acute management of exacerbations to reduce rate of treatment failure, rate of relapse, and improve lung function and breathlessness	**Long-Term Therapy** Numerous side effects including steroid myopathy
Phosphodiesterase-4 Inhibitors (roflumilast), daliresp) Reduce inflammation by inhibiting the breakdown of intracellular cyclic AMP	**Preferred Therapy** Once daily oral medication shown to decrease FEV in patients treated with salmeterol or tiotropium in patients with chronic bronchitis type of COPD	**Combination Therapy** Should always be combined with at least one long-acting bronchodilator and in patients who are controlled on fixed-dose LABA/ICS

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Pharmacological Treatment (*continued*)

1. Bronchodilators
   - Short-acting beta-2 agonist and/or ipratropium MDI with spacer or hand-held nebulizer as needed
   - Consider adding a long-acting beta-2 agonist or antimuscarinic bronchodilator
2. Glucocorticosteroids
   - Prednisone 40 mg orally daily for 5 days for non-critically ill patients, consider as the first line agent
   - Consider using an inhaled corticosteroid in patients experiencing recurrent exacerbations
3. Antibiotics to be given to patients:
   - With increased dyspnea, increased sputum volume, and increased sputum purulence (must have 2 out 3 symptoms)
   - Who require mechanical ventilation, pending sputum culture results
   - Consider macrolide or doxycycline or bactrim

Antitussives	Role of use inconclusive. Not recommended
Antibiotics	Continuous use not recommended. Azithromycin (250 mg/day or 500 mg three times per week) or erythromycin (500 mg BID) for one year in patients prone to exacerbations reduced risk of exacerbations.
Mucolytic agents	Use is **not** recommended
Vasodilators & Immunoregulators	Use is **not** recommended; May worsen oxygenation
Influenza vaccine	Reduces illness and death in COPD patients by 50%; should be given yearly
Pneumococcal vaccine	Individuals aged ≥65: PPSV23 (23-valent pneumococcal polysaccharide vaccine—Pneumovax 23) should be given 6 to 12 months following administration of PCV-13 (pneumococcal conjugate vaccine 13—Prevar 13). For patients who have previously received one or more doses of PPSV23, a single dose of PCV13 should be given 1 or more years after the last PPSV23 dose was received.
Be sure that each patient's vaccinations are up to date and documented in the medical record.	
Smoking Cessation Therapy	Nicotine replacement therapy is preferred option. Efficacy of e-cigarettes remains controversial for smoking cessation. Varenicline, bupropion, and nortriptyline have shown increased long-term quit rates.

Oxygen Therapy

Long-term oxygen therapy increases survival, exercise tolerance, and cognitive performance in hypoxemic patients. This therapy can reverse secondary polycythemia, prevent hypoxia, reverse hypoxia, decrease pulmonary artery pressure, and improve cardiac function.

Indications for initial oxygen therapy for Gold D COPD:

- PaO_2 is at or below 55mm Hg or SaO_2 is at or below 88% with or without hypercapnia confirmed twice over a three week period **OR**
- PaO_2 is between 55mm Hg and 60mm Hg or SaO_2 is 88%, and if there is evidence of pulmonary hypertension, peripheral edema which suggests congestive heart failure, or polycythemia (hematocrit greater than 55%).
- Re-evaluate after 60-90 days with repeat arterial blood gas or SaO_2 to determine if oxygen is therapeutic or still indicated.

Following an Emergency Department Visit or Hospitalization:

- Schedule office visit within two weeks
- Assess need for oxygen therapy
- Evaluate inhaler technique
- Evaluate symptoms and treatment regimen
- Review smoking status
- Treat with inhaled corticosteroid if not on yet; consider treatment with phosphodiesterase-4 (PDE-4) inhibitor
- Consider referral to a pulmonologist for severe COPD despite optimal treatment to include:
  - ◊ progressive FEV1 decline
  - ◊ frequent exacerbations
  - ◊ frequent emergency room visits and/or hospitalization

Potential Indications for Hospital Assessment of Admission

- Marked increase in intensity of symptoms, i.e., development of resting dyspnea
- Severe underlying COPD
- Onset of new physical signs (cyanosis, peripheral edema)
- Failure of exacerbation to respond to medical management
- Presence of serious comorbidities
- Frequent exacerbations
- Older age
- Insufficient home support

Management of Severe but not Life Threatening Exacerbations

- Assess severity of symptoms, arterial blood gas, chest radiograph
- Administer supplemental oxygen therapy; obtain serial arterial blood gas, venous blood gas, and pulse oximetry measurements
- Bronchodilators: increase doses and/or frequency of short-acting; combine short-acting beta-2 agonists and antimuscarinics; consider use of long-acting bronchodialators when patient becomes stable use spacers, chambers, and air-driven nebulizers
- Add oral or intravenous corticosteroids
- Consider antibiotics if there are signs of bacterial infection
- Identify and treat associated conditions, i.e., heart failure
- Monitor fluid balance and nutrition
- Consider subcutaneous heparin or low molecular weight heparin to prevent DVT
- Closely monitor the patient's condition

Patient Education

- Smoking cessation
- Education on prescribed medications and/or oxygen therapy
- Exercise and nutrition counseling
- Recognition of exacerbations

Palliative and Hospice Care

- The goal of palliative care is to relieve suffering, optimize function, provide emotional and spiritual support and support the best quality of life regardless of the stage of the disease. Palliative care has been shown to improve quality of life, reduce symptoms, and even prolong survival for some patients.
- Early referral to palliative and/or hospice care.
- Hospice care assists with the delivery of end of life care for patients who are terminally ill and predicted to have less than 6 months to live.

ICD-10 - Chronic Obstructive Pulmonary Disease (COPD)

ICD 10	Description
J40*	Bronchitis, not specified as acute or chronic
J41.0	Simple chronic bronchitis
J41.1	Mucopurulent chronic bronchitis
J44.9	Chronic obstructive pulmonary disease, unspecified
J43.9*	Emphysema, unspecified
J45.20	Mild intermittent asthma, uncomplicated
J45.22	Mild intermittent asthma with status asthmaticus
J45.21	Mild intermittent asthma with (acute) exacerbation
J44.9	Chronic obstructive pulmonary disease, specified
J44.0	Chronic obstructive pulmonary disease with acute lower respiratory infection
J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation
J45.990	Exercise induced bronchospasm
J45.991	Cough variant asthma
J45.909*	Asthma, unspecified type, unspecified
J45.902	Asthma, unspecified type, with status asthmaticus
J45.901	Asthma, unspecified type, with (acute) exacerbation

*Code to the highest degree of specificity

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