

## Chronic Obstructive Pulmonary Disease (COPD) Guideline

### Tier 2 Guideline

**Developed by:** The Scott & White COPD CHASM Working group

**Contact physician:** Thu P Vo, DO

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### SWHP COPD GUIDELINE, 2016.

This is an evidence based guideline built by the CHASM COPD working group and based on multiple published guidelines. The article reviews those guidelines, evidence for their effectiveness, and approaches to improve their implementation. Please see references at end.

Chronic Obstructive Pulmonary Disease (COPD) is defined as a disease state characterized by airflow limitation that is not fully reversible (<http://www.goldcopd.com/>). COPD includes *emphysema* and *chronic obstructive bronchitis*. COPD is present only if chronic airflow obstruction occurs; chronic bronchitis *without* chronic airflow obstruction is *not* included within COPD.

COPD is the fourth leading cause of death and affects >10 million persons in the United States. COPD is also a disease of increasing public health importance around the world. Estimates suggest that COPD will rise from the sixth to the third most common cause of death worldwide by 2020.

## RISK FACTORS

### CIGARETTE SMOKING

By 1964, the Advisory Committee to the Surgeon General of the United States had concluded that cigarette smoking was a major risk factor for mortality from chronic bronchitis and emphysema. Subsequent longitudinal studies have shown accelerated decline in the volume of air exhaled within the first second of the forced expiratory maneuver (FEV<sub>1</sub>) in a dose-response relationship to the intensity of cigarette smoking, which is typically expressed as pack years (average number of packs of cigarettes smoked per day multiplied by the total number of years of smoking). This dose-response relationship between reduced pulmonary function and cigarette smoking intensity accounts for the higher prevalence rates for COPD with increasing age. The historically higher rate of smoking among males is the likely explanation for the higher prevalence of COPD among males; however, the prevalence of COPD among females is increasing as the gender gap in smoking rates has diminished in the past 50 years.

Although the causal relationship between cigarette smoking and the development of COPD has been absolutely proved, there is considerable variability in the response to smoking. Although pack years of cigarette smoking is the most highly significant predictor of FEV<sub>1</sub> (Fig.1), only 15% of the variability in FEV<sub>1</sub> is



explained by pack-years. This finding suggests that additional environmental and/or genetic factors contribute to the impact of smoking on the development of airflow obstruction.

**The following are specific recommendations:**

**1) Prevention:**

- a) Teens and pre-teens are high risk for smoking onset if their peers or parents smoke. SWHP should partner with community agencies to actively deter onset of smoking in these high risk individuals.

**2) Screening:**

- a) Smokers or former smokers age 40 or older should be screened with a simple five question questionnaire. See Figure 2. A score of 5 or higher (out of a possible 10) should trigger a diagnostic spirometry test.
- b) Others should be screened if there is a high index of suspicion such as positive family history, daily productive cough two years in a row, or significant occupational exposure.
- c) Alpha 1 antitrypsin testing should be done on those with COPD onset at age less than 45, familial COPD, or low alpha 1 serum levels.

**3) Diagnosis:**

- a) Spirometry is the gold standard. Spirometry should be done in any individual suspected of having COPD. Spirometry can be office based or Pulmonary Function hospital laboratory based. A high quality test is present when values are reproducible on at least three attempts +/- 3%. An FEV1 less than 80% and FEV1/FVC ratio below 70% is considered abnormal and proof of disease, in appropriate settings. See Figure 3. Post bronchodilator results are the preferred ones (according to GOLD criteria).
  - 1) Suggestive symptoms are shortness of breath with minor exertion, daily productive cough, and wheezing. However, these are non-specific.
  - 2) All patients who have a positive population health screener or who are suspected of having COPD should have spirometry. Other lung diseases or even anemia can induce shortness of breath. An accurate diagnosis is always desirable

**4) Emergency Department and Inpatient Diagnosis and Treatment:**

- a) The recommended corticosteroid dose is 40 mg/day of oral prednisone (or equivalent intravenously) for 10 days or less.
- b) Frequent albuterol inhalations via MDI or nebulizer are recommended.
- c) Antibiotics are useful in an exacerbation especially if increased sputum and fever are present.
- d) Arterial Blood Gases are recommended in those patients who appear ill. (Difficulty speaking, tachypnea, altered mental status, sternocleidomastoid accessory muscle use for example.) ABGs allow stratification of severity. Consider ICU admission if respiratory acidosis is present.
- e) Indications for hospitalization may include:
  - i) High risk co-morbid conditions such as pneumonia, CHF, cardiac arrhythmias.



- ii) Failed outpatient management.
- iii) Unrelieved dyspnea
- iv) Inability to eat or sleep due to dyspnea.
- v) Progressive hypoxemia or hypercarbia
- vi) Altered mental status
- vii) Inability to care for oneself at home.
- viii) Marked worsening from baseline
- f) Indications for Intensive Care Admission may include:
  - i) Respiratory Failure requiring mechanical ventilation or continuous noninvasive ventilation
  - ii) Presence of other end organ dysfunction: shock, renal failure, coma, myocardial infarction and so on.
  - iii) Hemodynamic instability.
  - iv) Inability to clear secretions
  - v) Respiratory acidosis or impending respiratory failure
- g) Indications for Non-Invasive Ventilation:
  - i) Respiratory acidosis with  $\text{pH} < 7.36$  and  $\text{PaCO}_2 > 45$  torr.
  - ii) Tachypnea with breath rate  $> 25/\text{min}$
  - iii) Intact gag reflex
  - iv) Able to cooperate and follow commands
  - v) Consider ICU admission if non-invasive ventilation is initially continuous.
- h) Consider the addition of ipratropium to albuterol if unrelieved tachypnea or dyspnea.
- i) Consider Pulmonary Medicine consultation if the patient fails to improve promptly.
- j) Consider other precipitating causes for COPD exacerbation (besides viral or bacterial bronchitis) such as:
  - i) Congestive Heart Failure
  - ii) Community Acquired Pneumonia
  - iii) DVT/PE
- k) Oxygen therapy
  - i) Commonly needed during exacerbations because of V/Q mismatching.
  - ii) Prescribe to attain  $\text{SaO}_2$  at least 88% or  $\text{PaO}_2$  at least 60 mm Hg.
- l) Criteria for Discharge:
  - i) Symptoms returning to baseline. Patient able to eat and sleep.
  - ii) Hemodynamics stable.
  - iii) Able to ambulate (presuming ambulatory pre-hospitalization)
  - iv) Understands home medications.
  - v) Able to go at least four hours in between albuterol usages.
- m) Transition of care issues:
  - i) Consider Outpatient Pulmonary Consult if frequent admissions or exacerbations are occurring.
  - ii) See PCP within 7 days of discharge.
  - iii) May need short term oxygen. Re-assess after 30 days or when stable at home.

## 5) Outpatient maintenance therapy

- a) Smoking cessation:
  - i) This is the only intervention proven to change disease trajectory and lengthen lifespan.



- ii) Severely addicted patients will need adjunctive therapy.
  - (1) The absolute best results occur with group therapy, nicotine replacement, and bupropion. Bupropion may be needed for several months in some individuals.
- b) Frequent exacerbations:
  - i) One hospitalization or more per year and/or two or more exacerbations of COPD/year = frequent.
  - ii) Review for possible reasons of exacerbation: CHF, poorly controlled hypertension, bronchiectasis, continued smoking.
  - iii) Medical therapy:
    - (1) Inhaled corticosteroid (Advair; Symbicort; others) with a long acting Beta agonist OR
    - (2) A PGE2 inhibitor such as theophylline or roflumilast (daliresp) OR
    - (3) A macrolide such as azithromycin or erythromycin
  - iv) Pulmonary Medicine consultation
- c) Corticosteroids
  - i) Only indicated for exacerbations and should be used in doses of 40 mg prednisone or less over 7 to 10 days.
- d) Vaccinations
  - i) Yearly influenza vaccine.
  - ii) Pneumovax is recommended although efficacy is in question from recent studies.
- e) GOLD STAGING:
  - i) Minimal symptoms, no hospitalizations in the previous year, and mild to moderate obstruction on Spirometry.
  - ii) More symptoms. No recent hospitalizations. Mild to Moderate obstruction on Spirometry. Dyspnea with exercise or ADLs.
  - iii) Moderate to Severe Obstruction on Spirometry. Hospitalized within last year or 2 or more exacerbations. Minimal baseline symptoms or Dyspnea.
  - iv) Moderate to Severe Obstruction on Spirometry. Hospitalized within last year or 2 or more exacerbations. Quite symptomatic.
- f) Therapy by GOLD Stage:
  - i) Prn Albuterol inhaler 2 puffs every four hours indicated for all groups.
  - ii) Some patients will benefit from addition of Ipratropium (combivent
  - iii) respimat inhaler). It is unclear which patients fit this however.
  - iv) Groups B through D benefit significantly from Pulmonary rehabilitation:
    - (1) PFTs do not typically improve but Quality of Life scores improve exacerbations and doctor visits decrease, and hospitalizations decrease.
    - (2) Pulmonary Rehab programs include education including tips for self-management and graded exercise to improve flexibility and endurance.
  - v) Group B:
    - (1) Long acting anticholinergic such as Tiotropium 18 mcg , 1 puff a day OR
    - (2) Long acting beta inhaler such as Formoterol or Salmeterol.
  - vi) Group C:
    - (1) Long acting anticholinergic such as Tiotropium 18 mcg , 1 puff a day OR
    - (2) Combination long acting Beta Agonist/Corticosteroid agonist such as Advair 250/50 1 puff twice a day.
  - vii) Group D:
    - (1) Long acting anticholinergic such as Tiotropium 18 mcg , 1 puff a day AND



- (2) Combination long acting Beta Agonist/Corticosteroid agonist such as Advair 500/50 1 puff twice a day.
- g) Oxygen
  - i) Oxygen is indicated for those patients with baseline hypoxemia ( $\text{PaO}_2 < 55$  or  $< 60$  with objective erythrocytosis or right heart failure).
  - ii) Some patients may need oxygen with exercise or sleep. Specific testing in those situations is needed to determine need.
- h) Surgical approaches:
  - i) Lung Volume reduction surgery can be considered in those patients with unremitting symptoms, apical bullous disease, and normal diffusing capacities.
  - ii) Lung transplant can be considered for those individuals with the following:
    - (1) Age  $< 65$
    - (2) GOLD D stage and an elevated BODE score.
    - (3) No active tobacco or substance abuse
    - (4) No significant other co-morbidities or recent malignancies.

**The COPD CHASM working group consisted of:**

Jim Barker, MD

David Perez, RRT, MBA

Richard Beckendorf, MD

Emran Rouf, MD, MPH

David Bonnet, MD

Sunita Varghees MD, PHD

Monica L Brown, BS, MPH student

Thu Vo, DO

Elizabeth Fomby, MD

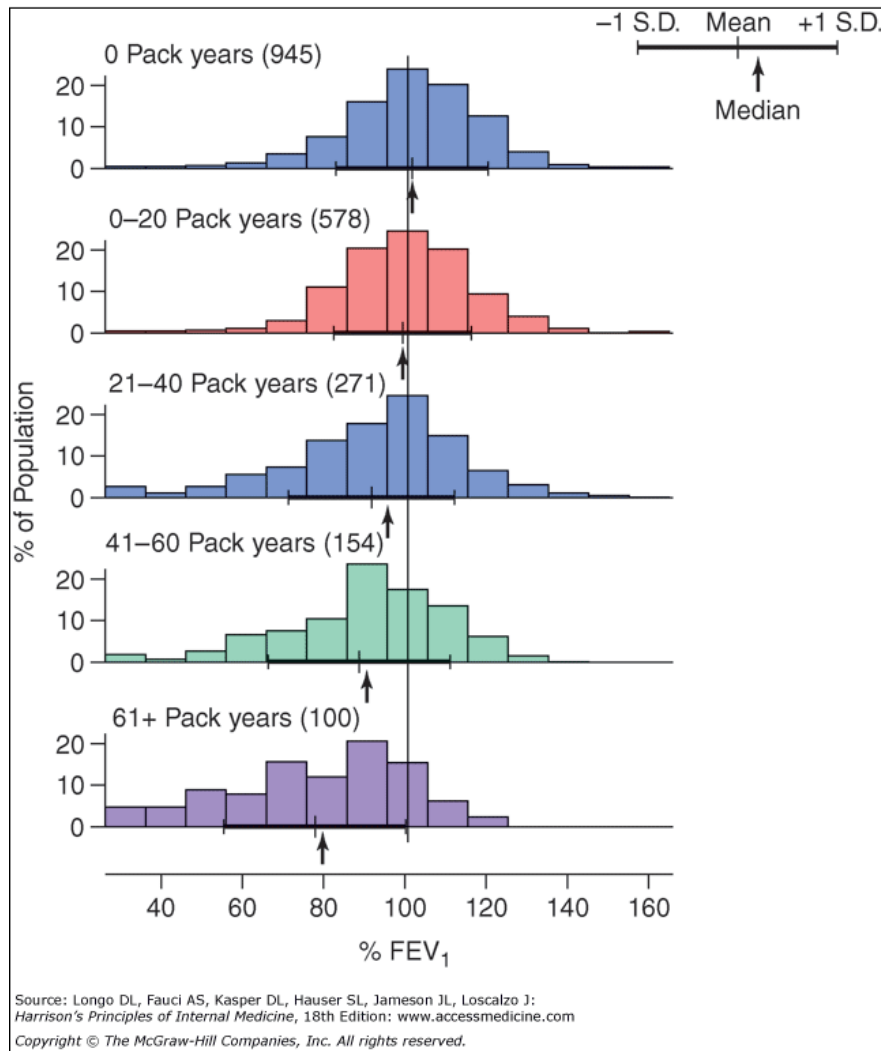
Pam York, RRT

Christopher Grant, MD

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## Appendix A – Chronic Obstructive Pulmonary Disease



**Figure -1 Distributions of forced expiratory volume in 1 s (FEV<sub>1</sub>) values in a general population sample, stratified by pack-years of smoking.** Means, medians, and  $\pm 1$  standard deviation of percent predicted FEV<sub>1</sub> are shown for each smoking group. Although a dose-response relationship between smoking intensity and FEV<sub>1</sub> was found, marked variability in pulmonary function was observed among subjects with similar smoking histories. (From B Burrows et al: *Am Rev Respir Dis* 115:95, 1977; with permission.)

## Appendix B – COPD Population Screener



This survey asks questions about you, your breathing and what you are able to do. To complete the survey, mark an X in the box that best describes your answer for each question below.

**1. During the past 4 weeks, how much of the time did you feel short of breath?**

None of the time	A little of the time	Some of the time	Most of the time	All of the time
<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 2

**2. Do you ever cough up any “stuff,” such as mucus or phlegm?**

No, never	Only with occasional colds or chest infections	Yes, a few days a month	Yes, most days a week	Yes, every day
<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2

**3. Please select the answer that best describes you in the past 12 months. I do less than I used to because of my breathing problems.**

Strongly disagree	Disagree	Unsure	Agree	Strongly agree
<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2

**4. Have you smoked at least 100 cigarettes in your ENTIRE LIFE?**

No	Yes	Don't know
<input type="checkbox"/> 0	<input type="checkbox"/> 2	<input type="checkbox"/> 0

**5. How old are you?**

Age 35 to 49	Age 50 to 59	Age 60 to 69	Age 70+
<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 2

**How to Score Your Screener:** In the spaces below, write the number that is next to your answer for each of the questions. Add the number to get the total score. The total score can range from 0 to 10.

\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \_\_\_\_\_  
 (#1) (#2) (#3) (#4) (#5) TOTAL SCORE

**If your total score is 5 or more,** this means your breathing problems may be caused by chronic obstructive pulmonary disease (COPD). The higher your score, the more likely you are to have COPD. COPD is often referred to as chronic bronchitis and/or emphysema and is a serious lung disease that slowly gets worse over time. While COPD cannot be cured, it is treatable, so please share your answers to the five question screener with your healthcare professional (HCP).

**If your total score is between 0 and 4,** and you are experiencing problems with your breathing, please share your answers to the five-question screener with your HCP.

Only your HCP can decide if you have COPD. Your HCP can help evaluate your breathing problems by performing a breathing test, also known as spirometry. Don't wait. Call your HCP today to make an appointment to see if you may be at risk for COPD. Remember, when speaking to your HCP, be honest and open in describing your symptoms and explain how your breathing problems affect your activity level on a daily basis.

Figure -2 **Note to Doctor/Healthcare Provider:** The COPD Population Screener™ (COPD-PS™) on the reverse side of this



page is an easy-to-use, validated tool designed to identify patients at risk for COPD.

- The COPD-PS™ has been validated in a diverse population age 35 and older
- The five questions in the COPD-PS™, culled from a 52-question initial survey, were found to be the most likely to predict COPD
- The study’s predictive value is 0.59 (AUC) with 88% of COPD cases correctly classified
- A clinical diagnosis of COPD should be confirmed with spirometry
- Please visit [DRIVE4COPD.COM](http://DRIVE4COPD.COM) to learn more about this screener and its validation

**About the score:**

- Score 5-10 — High risk of COPD
- Score 0-4 — Low risk of COPD

**Appendix C – GOLD SPIROMETRIC CRITERIA**

I: Mild COPD	<ul style="list-style-type: none"> <li>• <math>FEV_1/FVC &lt; 0.7</math></li> <li>• <math>FEV_1 \geq 80\%</math> predicted</li> </ul>	At this stage, the patient may not be aware that their lung function is abnormal.
II: Moderate COPD	<ul style="list-style-type: none"> <li>• <math>FEV_1/FVC &lt; 0.7</math></li> <li>• <math>50\% \leq FEV_1 &lt; 80\%</math> predicted</li> </ul>	Symptoms usually progress at this stage, with shortness of breath typically developing on exertion.
III: Severe COPD	<ul style="list-style-type: none"> <li>• <math>FEV_1/FVC &lt; 0.7</math></li> <li>• <math>30\% \leq FEV_1 &lt; 50\%</math> predicted</li> </ul>	Shortness of breath typically worsens at this stage and often limits patients’ daily activities. Exacerbations are especially seen beginning at this stage.
IV: Very Severe COPD	<ul style="list-style-type: none"> <li>• <math>FEV_1/FVC &lt; 0.7</math></li> <li>• <math>FEV_1 &lt; 30\%</math> predicted <i>or</i> <math>FEV_1 &lt; 50\%</math> predicted plus chronic respiratory failure</li> </ul>	At this stage, quality of life is very appreciably impaired and exacerbations may be life-threatening.

**Figure -3 GOLD SPIROMETRIC CRITERIA FOR COPD SEVERITY<sup>1</sup>**