CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) 
DIAGNOSIS, MANAGEMENT & PREVENTION INFORMATION
HS-1007

Chronic Obstructive Pulmonary Disease (COPD) Diagnosis, Management and Prevention Information

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a slowly progressive lung disease involving the airways and/or pulmonary parenchyma, resulting in a gradual loss of lung function. The symptoms of COPD range from chronic cough, sputum production, and wheezing to more severe symptoms, such as dyspnea, poor exercise tolerance, and signs or symptoms of right-sided heart failure. In the United States, COPD affects more than 5% of the adult population and is the 4th leading cause of death and the 12th leading cause of morbidity.

Risk Factors

- Tobacco smoke (cigarette, pipe, cigar, and other types of tobacco)
- Prolonged exposure to occupational dusts and chemicals (vapors, irritants, and fumes)
- Indoor air pollution (biomass fuel used for heating and cooking in poorly vented dwellings)
- Outdoor air pollution
- Factors that affect lung growth during gestation and childhood (e.g., low birth weight, respiratory infections)
- Genetic risk factor is a severe hereditary deficiency of alpha-1 antitrypsin

Key Indicators for Considering a COPD Diagnosis

Consider COPD and perform spirometry if any of the following indicators are present in an individual over age 40:

- Dyspnea that is progressive, worse with exercise, persistent (present every day) and described by the patient as an “increased effort to breathe, “heaviness”, “gasping”, etc.
- Chronic cough: may be intermittent and may be unproductive
- Chronic sputum production
- History of exposure to risk factors

Spirometry is a test that measures the amount and speed at which a person can exhale after a deep breath. Symptomatic and asymptomatic patients suspected of having COPD should have spirometry performed to determine airway limitation and disease severity. Spirometry is the gold standard for diagnosing COPD because it is the most standardized and reproducible measurement of airflow limitation. Only one in three patients newly diagnosed with COPD receives a spirometry-based screening (NCQA, 2014).

Note: The diagnosis should be confirmed by spirometry. When performing spirometry, measure Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV1). Calculate FEV1/FVC ratio. Spirometric results are expressed as % Predicted using appropriate normal values for the person’s sex, age, and height.
Stages of COPD

Stage I: Mild COPD
Mild airflow limitation (FEV₁/FVC < 70%; FEV₁ ≥ 80% predicted) and sometimes, but not always, chronic cough and sputum production. At this stage, the individual may not be aware that his or her lung function is abnormal.

Stage II: Moderate COPD
Worsening airflow limitation (FEV₁/FVC < 70%; 50% ≤ FEV₁ < 80% predicted) with shortness of breath typically developing on exertion. This is the stage at which patients typically seek medical attention because of chronic respiratory symptoms or an exacerbation of their disease.

Stage III: Severe COPD
Further worsening of airflow limitation (FEV₁/FVC < 70%; 30% ≤ FEV₁ < 50 % predicted), greater shortness of breath, reduced exercise capacity, and repeated exacerbations which have an impact on patient’s quality of life.

Stage IV: Very Severe COPD
Severe airflow limitation (FEV₁/FVC < 70%; FEV₁ < 30% predicted) or FEV₁ < 50% predicted plus chronic respiratory failure. Patients may have Very Severe (Stage IV) COPD even if the FEV₁ > 30% predicted, whenever this complication is present. At this stage, quality of life is very appreciably impaired and exacerbations may be life-threatening.

Differential Diagnosis of COPD

COPD: Onset in mid-life; symptoms slowly progressive; long smoking history; dyspnea during exercise; largely irreversible airflow limitation.

Asthma: Onset early in life; symptoms vary from day to day; symptoms at night/early morning; allergy, rhinitis and/or eczema also present; family history of asthma; largely reversible airflow limitation.

Congestive Heart Failure: Fine basilar crackles on auscultation; chest X-ray shows dilated heart, pulmonary edema; pulmonary function tests indicate volume restriction, not airflow limitation.

Bronchiectasis: Large volumes of purulent sputum; commonly associated with bacterial infection; coarse crackles/clubbing on auscultation; chest X-ray/CT shows bronchial dilation, bronchial wall thickening.

Tuberculosis: Onset all ages; chest X-ray shows lung infiltration or nodular lesions; microbiological confirmation; high local prevalence of tuberculosis.

Obliterative Bronchiolitis: Onset in younger age; non-smokers; may have history of rheumatoid arthritis or fume exposure; CT on expiration shows hypodense areas.

Diffuse Panbronchiolitis: Most patients are male and nonsmokers; almost all have chronic sinusitis; chest X-ray and HRCT show diffuse small centrilobular nodular opacities and hyperinflation.
Components of Care: A COPD Management Program

Source: Global Initiative for Chronic Obstructive Lung Disease, 2008

Component 1: Assess and Monitor Disease

A detailed medical history of a new patient known or thought to have COPD should assess:

- Exposure to risk factors, including intensity and duration
- Past medical history, including asthma, allergy, sinusitis or nasal polyps, respiratory infections in childhood, and other respiratory diseases
- Family history of COPD or other chronic respiratory disease
- Pattern of symptom development
- History of exacerbations or previous hospitalizations for respiratory disorder
- Presence of comorbidities, such as heart disease, malignancies, osteoporosis, and musculoskeletal disorders, which may also contribute to restriction of activity
- Appropriateness of current medical treatments
- Impact of disease on patient’s life, including limitation of activity, missed work and economic impact; effect on family routines; and feelings of depression and anxiety
- Social and family support available to the patient
- Possibilities for reducing risk factors, especially smoking cessation

In addition to spirometry, the following tests should be undertaken for the assessment of a patient with Stage II-IV COPD:

- Bronchodilator reversibility testing
- Chest X-ray
- Arterial blood gas measurement (in patients with FEV1 < 50% predicted or signs of respiratory or right heart failure)
- Alpha-1 antitrypsin deficiency screening (in patients of Caucasian descent under 45 years or with strong family history of COPD)

Component 2: Reduce Risk Factors

Possibilities for reducing risk factors include smoking prevention, reducing occupational exposures and avoiding indoor and outdoor air pollution. Smoking cessation is the most effective—and cost effective—intervention to reduce the risk of developing COPD and slow its progression.

- Counsel and aid the patient on smoking cessation
- Pharmacotherapy (nicotine replacement, bupropion/nortryptiline, and/or varenicline) is recommended when counseling is not sufficient. Special consideration should be given before using pharmacotherapy in people smoking fewer than 10 cigarettes per day, pregnant women, adolescents, and those with medical contraindications (unstable coronary artery disease, untreated peptic ulcer, and recent myocardial infarction or stroke for nicotine replacement; and history of seizures for bupropion)

Component 3: Manage Stable COPD

Management of stable COPD should be guided by the following general principles:

- Determine disease severity on an individual basis by taking into account the patient’s symptoms, airflow limitation, frequency and severity of exacerbations, complications, respiratory failure, comorbidities, and general health status.
- Implement a stepwise treatment plan that reflects this assessment of disease severity.
- Choose treatments according to national and cultural preferences, the patient’s skills and preferences, and the local availability of medications.
Patient education can help improve skills, ability to cope with illness, and health status. It is an effective way to accomplish smoking cessation, initiate discussions and understanding of advance directives and end-of-life issues, and improve responses to acute exacerbations.

Pharmacologic treatment can control and prevent symptoms, reduce the frequency and severity of exacerbations, improve health status and improve exercise tolerance. Pharmacologic treatment options include:

- **Bronchodilators**
  - Inhaled therapy is preferred
  - Give “as needed” to relieve intermittent or worsening symptoms, and on a regular basis to prevent or reduce persistent symptoms
  - Choice between β₂-agonists, anticholinergics, methylxanthines, and combination therapy depends on the availability of medications and each patient's individual response in terms of symptom relief, side effects.
  - Regular treatment with long-acting bronchodilators is more effective and convenient than treatment with short-acting bronchodilators.
  - Combining bronchodilators may improve efficacy and decrease the risk of side effects compared to increasing the dose of a single bronchodilator.

- **Glucocorticosteroids**
  - Regular treatment with inhaled Glucocorticosteroids is only appropriate for patients with an FEV₁ < 50% predicted and repeated exacerbations (for example, 3 in the past year). This treatment reduces the frequency of exacerbations but does not modify the long-term decline in FEV₁.
  - Treatment with inhaled Glucocorticosteroids increases the likelihood of pneumonia and has no significant effects on mortality.
  - Long-term treatment with oral Glucocorticosteroids is NOT recommended.

- **Vaccines**
  - Influenza vaccines reduce serious illness and death in COPD patients by 50%; given annually.
  - Pneumococcal polysaccharide vaccine is recommended for COPD patients 65 years and older, and has been shown to reduce community-acquired pneumonia in those under age 65 with FEV₁ < 40% predicted.

- **Antibiotics**
  - Not recommended except for treatment of infectious exacerbations and other bacterial infections.

- **Mucolytic (Mucokinetic, Mucoregulator) Agents**
  - Patients with viscous sputum may benefit but overall benefits are very small. Use is not recommended.

- **Antitussives**
  - Regular use contraindicated in stable COPD.

Non-Pharmacologic Treatment includes rehabilitation*, oxygen therapy, and surgical interventions. Rehabilitation programs should include, at a minimum: exercise training, nutrition counseling, and education.

Note: The minimum length of an effective rehabilitation program in six weeks. Benefit does wane after a rehabilitation program ends, but if exercise training is maintained at home the patient's health status remains above pre-rehabilitation levels.

- **Oxygen Therapy**
  - The long-term administration of oxygen (> 15 hours per day) to patients with chronic respiratory failure increases survival and has a beneficial impact on pulmonary hemodynamics, hematologic characteristics, exercise capacity, lung mechanics, and mental state.
  - Initiate oxygen therapy for patients with Stage IV COPD if:
    - PaO₂ is at or below 7.3 kPa (55 mm Hg) or SaO₂ is at or below 88% with or without hypercapnia; OR,
    - PaCO₂ is between 7.3 kPa (55 mm Hg) and 8.0 kPa (60 mm Hg) or SaO₂ is 88%, if there is evidence
of pulmonary hypertension, peripheral edema suggesting congestive heart failure, or polycythemia (hematocrit > 55%).

- **Surgical Treatments**
  - Bullectomy and lung transplantation may be considered in carefully selected patients with Stage IV COPD. There is currently no sufficient evidence that would support the widespread use of lung volume reduction surgery (LVRS).

Note: There is no convincing evidence that mechanical ventilatory support has a role in the routine management of stable COPD.

### Component 4: Manage Exacerbations

An exacerbation of COPD is defined as an event in the natural course of the disease characterized by a change in the patient's baseline dyspnea, cough, and/or sputum that is beyond normal day-to-day variations, is acute in onset, and may warrant a change in regular medication in a patient with underlying COPD. The most common causes of an exacerbation are infection of the tracheobronchial tree and air pollution, but the cause of about one-third of severe exacerbations cannot be identified.

#### How to Assess the Severity of an Exacerbation

**Arterial blood gas measurements (in hospital):**
- $\text{PaO}_2 < 8.0 \text{ kPa (60 mm Hg)}$ and/or $\text{SaO}_2 < 90\%$ with or without $\text{PaCO}_2 > 6.7 \text{ kPa (50 mm Hg)}$ when breathing room air indicates respiratory failure.
- Moderate-to-severe acidosis ($\text{pH} < 7.36$) plus hypercapnia ($\text{PaCO}_2 > 6-8 \text{ kPa, 45-60 mm Hg}$) in a patient with respiratory failure is an indication for mechanical ventilation.

**Chest X-ray & ECG:**
- Chest radiographs (posterior/anterior plus lateral) identify alternative diagnoses that can mimic the symptoms of an exacerbation.
- An ECG aids in the diagnosis of right ventricular hypertrophy, arrhythmias, and ischemic episodes.

**Other Laboratory Tests:**
- Sputum culture and antibiogram to identify infection if there is no response to initial antibiotic treatment
- biochemical tests to detect electrolyte disturbances, diabetes, and poor nutrition
- Whole blood count can identify polycythemia or bleeding

#### Home Management

- Bronchodilators: Increase dose and/or frequency of existing short-acting bronchodilator therapy, preferably with $\beta_2$-agonists. If not already used, add anticholinergics until symptoms improve.
- Glucocorticosteroids: If baseline $\text{FEV}_1 < 50\%$ predicted, add 30-40 mg oral prednisolone per day for 7-10 days to the bronchodilator regimen. Nebulized budesonide may be an alternative to oral Glucocorticosteroids in the treatment of nonacidotic exacerbations.

#### Hospital Management

Patients with the characteristics listed below should be hospitalized:
- Marked increase in intensity of symptoms, such as sudden development of resting dyspnea
- Severe background COPD
- Onset of new physical signs (e.g., cyanosis, peripheral edema)
- Failure of exacerbation to respond to initial medical management
- Significant comorbidities
- Frequent exacerbations
- Newly occurring arrhythmias
- Diagnostic uncertainty
Antibiotics should be given to patients:
- With three cardinal symptoms: increased dyspnea, increased sputum volume, increased sputum purulence;
- With increased sputum purulence and one other cardinal symptom; and
- Who require mechanical ventilation.

**Recommendations Qaseem & et al., 2011**

The American College of Physicians (2011) guideline for COPD addresses the value of history and physical examination for predicting airflow obstruction; the value of spirometry for screening or diagnosis of COPD; and COPD management strategies, specifically evaluation of various inhaled therapies, pulmonary rehabilitation programs, and supplemental oxygen therapy.

**Recommendation 1:** ACP, ACCP, ATS, and ERS recommend that spirometry should be obtained to diagnose airflow obstruction in patients with respiratory symptoms. Spirometry should not be used to screen for airflow obstruction in individuals without respiratory symptoms.

**Recommendation 2:** For stable COPD patients with respiratory symptoms and FEV₁ between 60% and 80% predicted, ACP, ACCP, ATS, and ERS suggest that treatment with inhaled bronchodilators may be used.

**Recommendation 3:** For stable COPD patients with respiratory symptoms and FEV₁ <60% predicted, ACP, ACCP, ATS, and ERS recommend treatment with inhaled bronchodilators.

**Recommendation 4:** ACP, ACCP, ATS, and ERS recommend that clinicians prescribe monotherapy using either long-acting inhaled anticholinergics or long-acting inhaled β-agonists for symptomatic patients with COPD and FEV₁ <60% predicted. Clinicians should base the choice of specific monotherapy on patient preference, cost, and adverse effect profile.

**Recommendation 5:** ACP, ACCP, ATS, and ERS suggest that clinicians may administer combination inhaled therapies (long-acting inhaled anticholinergics, long-acting inhaled β-agonists, or inhaled corticosteroids) for symptomatic patients with stable COPD and FEV₁ <60% predicted.

**Recommendation 6:** ACP, ACCP, ATS, and ERS recommend that clinicians should prescribe pulmonary rehabilitation for symptomatic patients with an FEV₁ <50% predicted. Clinicians may consider pulmonary rehabilitation for symptomatic or exercise-limited patients with an FEV₁ <50% predicted.

**Recommendation 7:** ACP, ACCP, ATS, and ERS recommend that clinicians should prescribe continuous oxygen therapy in patients with COPD who have severe resting hypoxemia (PaO₂ ≤55 mm Hg or SpO₂ ≤88%).

**REFERENCES**


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MEDICAL POLICY COMMITTEE HISTORY AND REVISIONS

<table>
<thead>
<tr>
<th>Date</th>
<th>History and Revisions by the Medical Policy Committee</th>
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<td>6/17/2014</td>
<td>Approved by MPC. No changes.</td>
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<tr>
<td>4/5/2012</td>
<td>Approved by MPC. Added recommendations by Global Initiative for Chronic Obstructive Lung Disease and NCQA re: spirometry.</td>
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<tr>
<td>12/1/2011</td>
<td>New template design approved by MPC.</td>
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