BaylorScott&White QUALITY ALLIANCE

Quality Improvement Guideline

COPD Assessment, Management and Use of Spirometry

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Purpose

This is a guide for the assessment and management of stable Chronic Obstructive Pulmonary Disease (COPD). It also contains information regarding the use of spirometry in the screening and diagnosis of COPD.

Scope

The patient population is any adult patient with a diagnosis of COPD.

Guideline

Use of Spirometry for COPD Screening

In order to diagnose COPD as early as possible, primary care physicians should consider performing spirometry on the following patients:

1. Patients with a history of smoking who present to the office with a complaint of coughing, shortness of breath, wheezing, acute bronchitis, etc.
2. Patients with a history of smoking who call in with a complaint of coughing, shortness of breath, wheezing, acute bronchitis, etc.
3. Patients with a history of smoking who call in or present to the office requesting antibiotics for respiratory symptoms.

Use of Spirometry for COPD Diagnosis

A diagnosis of COPD should be considered in any individual who has dyspnea, chronic cough or sputum production, and a history of exposure to risk factors for the disease, especially cigarette smoking.

Consider COPD, and perform spirometry, if any of these indicators are present in an individual over age 40. These indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of a diagnosis of COPD. Spirometry is required to establish a diagnosis of COPD.

1. Dyspnea that is:
    a. Progressive (worsens over time)
    b. Characteristically worse with exercise
    c. Persistent

2. Chronic cough:
    a. May be intermittent and may be unproductive

3. Chronic sputum production:
    a. Any pattern of chronic sputum production may indicate COPD

4. History of exposure to risk factors:
    a. Tobacco smoke (including popular local preparations)
    b. Smoke from home cooking and heating fuels
    c. Occupational dusts and chemicals

5. Family history of COPD

6. Alpha-1 antitrypsin deficiency (AATD) Screening: All patients with the diagnosis of COPD younger than 45 years should be screen once for AATD. A concentration of less than 20% normal is highly suggestive of homozygous deficiency. Family members should be screened and, together with the patient, be referred to a pulmonologist for counseling and management.

Spirometry is required to make a clinical diagnosis of COPD; the presence of a post-bronchodilator FEV1/FVC < 0.70 confirms the presence of persistent airflow limitation and thus of COPD, in the proper clinical setting. All health care workers who care for COPD patients should have access to spirometry.

Asthma-COPD Overlap is defined by presence of airway obstruction with FEV1/FVC <0.7 with evidence of reversible airways on spirometry. This requires an increase of 200 mL airflow improvement and a 12% increase in percentage. The clinical picture should be accompanied by a history of atopy, smoking, and blood eosinophilia. This is a mixed pattern of reversible and irreversible airway disease.

Clinical management of Asthma-COPD Overlap includes treating with inhaled corticosteroids, smoking cessation, bronchodilators and referral for asthma and atopy therapy if needed. This may include referral to an allergist or pulmonologist for further work up and treatment.

Standardization of Spirometry Reference Values

The reference values from the National Health and Nutrition Examination Survey (NHANES III) should be utilized to ensure all patients in the BSW Health system are tested for spirometry in an accurate, precise, and comparable manner.

NHANES III has been the standard by which both adult and pediatric patients have been measured since the mid 1990's. The study that provided this data sampled patients from Caucasian, African-American, and Mexican American populations. Spirometry was performed on 20,627 patients (16,484 adults and 4143 youths). Patient exclusions included a variety of reasons including tobacco use, persistent cough, lung cancer, etc. Patients height and weight was measured, then they each performed five (5) Forced Vital Capacity (FVC) maneuvers. Using these values, researchers determined a set of standards for lung function based on height, age, sex, and race.

The benefit of using this standard is that it has been utilized in most drug and treatment studies on lung function for the past 20 years. There is a more recent large-scale study done in Europe by the European Respiratory Society Global Lung Initiative 2012 (GLI 12). While the two standards are similar, there are variabilities and can cause significant differences in patient's predictive spirometry. The NHANES III represents a long-standing number of United States patients from various ethnic backgrounds, and it will remain the standard for the BSW Health system.

Assessment of COPD

The goals of COPD assessment are to determine the severity of the disease, its impact on patient's health status, and the risk of future events (exacerbations, hospital admissions, death) in order to guide therapy. Assess the following aspects of the disease separately

1. **Assess Symptoms:** Validated questionnaires such as the Modified British Medical Research Council (mMRC) breathlessness scale should be used to assess symptoms. Note that while a more comprehensive assessment such as the COPD Assessment Test (CAT) is recommended for more complete assessment, its use can be cumbersome in the ambulatory setting.

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.

2. **Assess Risk of Exacerbations:** An exacerbation of COPD is defined as *an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication.* The best predictor of having frequent exacerbations (2 or more per year) is a history of previous treated events. The risk of exacerbations also increases as airflow limitation worsens.

3. **Assess Degree of Airflow Limitation Using Spirometry:** The table below provides the classification of airflow limitation severity in COPD. Decline in FEV_1 can be tracked by spirometry performed at least once a year. If symptoms are stable, spirometry can be done less often.

Classification of Severity of Airflow Limitation in COPD (Based on Post-Bronchodilator FEV_1)		
In patients with $FEV_1/FVC < 0.70$:		
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

4. **Assess Comorbidities:** Cardiovascular diseases, osteoporosis, depression and anxiety, skeletal muscle dysfunction, metabolic syndrome, and lung cancer among other diseases occur frequently in COPD patients. These comorbid conditions may influence mortality and hospitalizations and should be looked for routinely and treated appropriately. In addition, a nutrition consult should be considered if the patient's Body Mass Index (BMI) is under 19, especially if muscle wasting is present, or if the BMI is over 35 if weight is felt to contribute to dysfunctional breathing.

Combined Assessment of COPD: The table below provides a rubric for combining these assessments to improve the management of COPD.

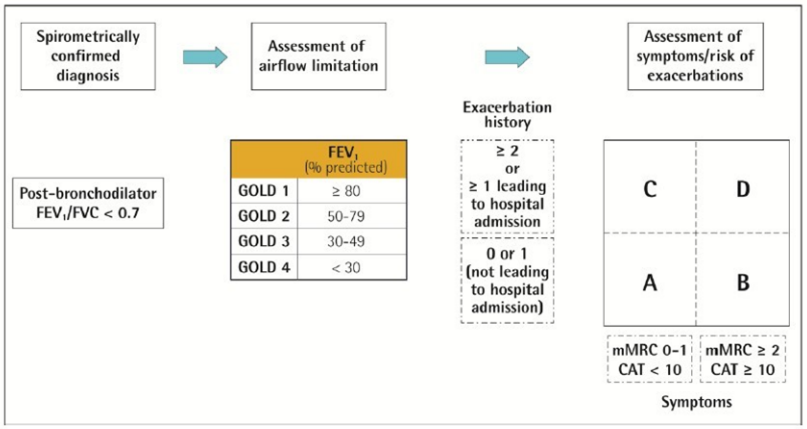
1. Assess Symptoms:
    a. Less Symptoms (mMRC 0-1 or CAT <10): patient is (A) or (C)
    b. More Symptoms (mMRC ≥ 2 or CAT ≥ 10): patient is (B) or (D)

2. Assess Exacerbation History:
    a. Low Risk (≤ 1 per year): patient is (A) or (B)
    b. High Risk (≥ 2 per year): patient is (C) or (D)

3. Assess Airflow Limitation (Spirometric grade)

4. Use Refined Combined Assessment table below

Figure 2.4. The refined ABCD assessment tool



5. The Primary Care Physician may refer to a Pulmonologist for consultation and management of COPD if clinically warranted.

Treatment

Once COPD has been diagnosed, effective management should be based on an individualized assessment of current symptoms and future risk:

- Reduce Symptoms
  - Relieve symptoms
  - Improve exercise tolerance
  - Improve health status

  And
- Reduce Risk
  - Prevent disease progression
  - Prevent and treat exacerbations
  - Reduce mortality

These goals should be reached with minimal side effects from treatment, a particular challenge in COPD patients because they commonly have comorbidities that also need to be carefully identified and treated.

Therapeutic Options: Key Points

<u>Nonpharmacological Therapy:</u>

1. Smoking cessation has the greatest capacity to influence the natural history of COPD. Health care providers should encourage all patients who smoke to quit. Click here to access the Smoking Cessation Algorithm, including medication guidelines.
2. Pharmacotherapy reliably increase long-term smoking abstinence rates.

3. All COPD patients benefit from regular physical activity and should repeatedly be encouraged to remain active.
4. Structured pulmonary rehab, where available, should be considered in most patients to improve dyspnea and exercise tolerance and to reduce hospitalizations in those who have had recent exacerbations. A personalized, 6-8 week program that includes supervised exercise twice weekly is recommended.
5. Influenza and pneumococcal vaccination should be encouraged.
6. Emphasize primary prevention, best achieved by elimination or reduction of exposures in the workplace. Secondary prevention, achieved through surveillance and early detection, is also important.
7. Advise patients to reduce or avoid indoor air pollution from biomass fuel, burned for cooking and heating in poorly ventilated dwellings.
8. Advise patients to monitor public announcements of air quality and, depending on the severity of their disease, avoid vigorous exercise outdoors or stay indoors during pollution episodes.
9. Oxygen therapy for patients with resting hypoxemia increases survival.
10. Early Advanced Care Planning is advised. Palliative care strategies around managing dyspnea, nutrition, fatigue, anxiety and depression are relative to most COPD patients. Hospice should be offered to patients with advanced/terminal disease.

<u>Pharmacologic Therapy:</u>

2. Appropriate pharmacologic therapy can reduce COPD symptoms, reduce the frequency and severity of exacerbations, and improve health status and exercise tolerance.
3. None of the existing medications for COPD has been shown conclusively to modify the long-term decline in lung function.
4. Education around proper inhaler technique when initiating therapy and at each follow up is vital.

<u>Bronchodilator Recommendations:</u>

- For both $beta_2$-agonists and anticholinergics, long-acting formulations are preferred over short-acting formulations for regular use.
    - Exceptions for use of short-acting treatment:
        - Patients with occasional as-needed treatment of shortness of breath
        - Patients on long-acting bronchodilators who need quick improvement in symptoms.
- The combined use of short- or long-acting $beta_2$-agonists and anticholinergics may be considered if symptoms are not improved with single agents.

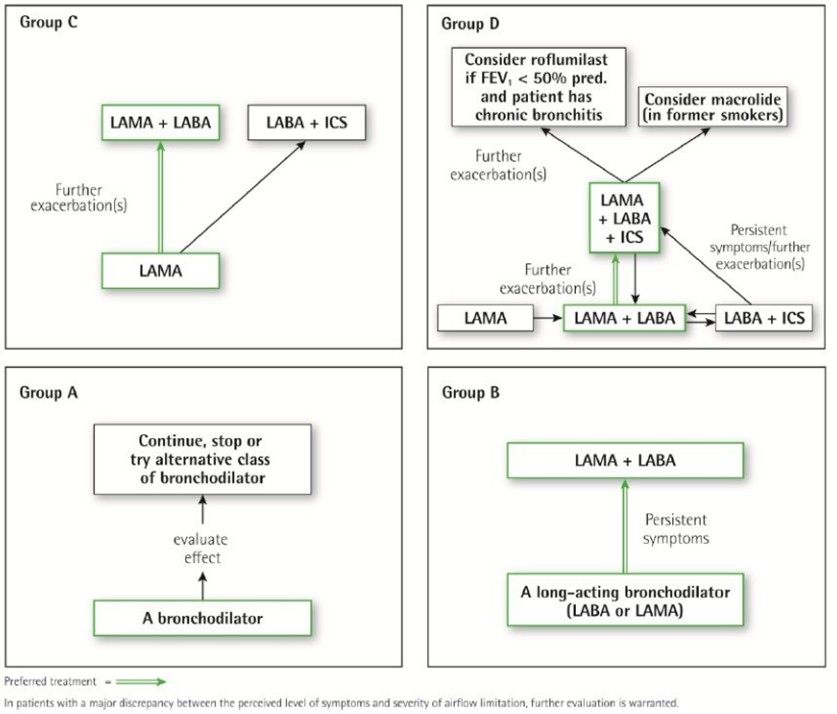
- LA anticholinergics better reduce exacerbations and hospitalizations when compared to LA beta agonists. Combination treatment is more effective than monotherapy for improving lung function, reducing symptoms and exacerbation rates.
- Based on efficacy and side effects, inhaled bronchodilators are preferred over oral bronchodilators.
- Based on evidence of relatively low efficacy and greater side effects, treatment with theophylline is not recommended unless other bronchodilators are not available or unaffordable for long-term treatment.

Corticosteroids and Phosphodiesterase-4 Inhibitors Recommendations:

- There is no evidence to recommend a short-term therapeutic trial with oral corticosteroids in patients with COPD to identify those who will respond to inhaled corticosteroids or other medications.
- Long-term treatment with an inhaled corticosteroid combined with a LA beta agonist is an option for patients with moderate to very severe airflow limitation and for patients with frequent exacerbations that are not adequately controlled by long-acting bronchodilators alone.
- Long-term monotherapy with oral corticosteroids is not recommended in COPD.
- Long-term monotherapy with inhaled corticosteroids is not recommended in COPD because it is less effective than the combination of inhaled corticosteroids with long-acting $beta_2$-agonists.
- Long-term treatment containing inhaled corticosteroids should not be prescribed outside their indications, due to the risk of pneumonia and the possibility of a slightly increased risk of fractures following long-term exposure.
- Triple therapy with ICS/LA beta agonist + LA anticholinergic more effectively improves lung functions, symptoms and reduces exacerbations than monotherapy.
- The phosphodiesterase-4 inhibitor roflumilast may also be used to reduce exacerbations for patients with chronic bronchitis, severe and very severe airflow limitation, and frequent exacerbations that are not adequately controlled by long-acting bronchodilators.
- Macrolides (i.e., azithromycin) can be an option for former smokers who have further exacerbations on maximal therapy.

Pharmacologic Therapy for Stable COPD

Figure 4.1. Pharmacologic treatment algorithms by GOLD Grade [highlighted boxes and arrows indicate preferred treatment pathways]



Glossary: SA: short-acting, LA: long-acting, ICS: inhaled corticosteroid, PDE-4: phosphodiesterase-4

Additional Resources

The COPD Action Plan was created to help people with chronic obstructive pulmonary disease (COPD) follow treatment, stay alert to signs and symptoms, and take timely actions to address problems. The patient can complete the action plan with his/her healthcare provider and bring it to appointments. Follow the links to access the action plan in English and Spanish.

Guideline Developers: BSWH/BSWQA Pulmonary Disease Council

Approved by: BSWH/BSWQA Pulmonary Disease Council, BSWQA Primary Care Subcommittee, BSWQA Quality Improvement Committee, BSWQA Board of Managers

BSWQA Related Focus Measures: Plan All-Cause All-Condition Readmission Rate

References

Global Strategy for the Diagnosis, Management, and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017. Available from: http://goldcopd.org.