Updated COPD Guidelines: GOLD for Patients or Gold for Pharma?

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Objectives

- Review recent updates to the Global Initiative for Chronic Obstructive Lung Disease (GOLD)
- Comprehend the GOLD ABCD grading system
- Understand implications regarding pharmacologic management of COPD symptoms and exacerbation prevention
Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease

2017 Report

- Definition and Overview
- Diagnosis and Assessment
- Therapeutic Options
- Manage Stable COPD
- Manage Exacerbations
- Manage Comorbidities

139 Pages – Pretty Good Read!
Major Changes

- Ongoing refinement of the ABCD grading system
- Airflow limitation (obstruction on spirometry) is no longer a component of the ABCD severity system
  - Airflow limitation correlates less well with functional limitation and QOL than do patient reported symptoms (CAT) and exacerbation history
  - Spirometry remains important for diagnosis, prognosis, and consideration of therapies
Major Changes

- GOLD 2017 goes further in advising physicians exactly what class of medication to use in which COPD patients based on where they fall in the ABCD grading scheme (Individualized medicine)
### Description of Levels of Evidence

<table>
<thead>
<tr>
<th>Evidence Category</th>
<th>Sources of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Randomized controlled trials (RCTs). Rich body of data</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Randomized controlled trials (RCTs). Limited body of data</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Nonrandomized trials Observational studies</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Panel consensus judgment</td>
</tr>
</tbody>
</table>

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Global Strategy for Diagnosis, Management and Prevention of COPD, 2017: Chapters

- Definition and Overview
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Definition of COPD

- COPD is a common preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases.

- **Host factors** predispose individuals to develop COPD, including genetic abnormalities, abnormal lung development and accelerated aging.
Burden of COPD

- COPD is a leading cause of morbidity and mortality worldwide (4th leading cause of death)

- The burden of COPD is projected to increase in coming decades due to continued exposure to COPD risk factors and the aging of the world’s population (3rd by 2020)

- COPD is associated with significant economic burden ($32 billion direct, $20.4 billion indirect costs)
Mechanisms Underlying Airflow Limitation in COPD

Small Airways Disease
- Airway inflammation
- Airway fibrosis, luminal plugs
- Increased airway resistance

Parenchymal Destruction
- Loss of alveolar attachments
- Decrease of elastic recoil

AIRFLOW LIMITATION
Figure 1.1. Etiology, pathobiology and pathology of COPD leading to airflow limitation and clinical manifestations

**Etiology**
- Smoking and pollutants
  - Host factors

**Pathobiology**
- Impaired lung growth
- Accelerated decline
- Lung injury
- Lung & systemic inflammation

**Pathology**
- Small airway disorders or abnormalities
- Emphysema
- Systemic effects

**Airflow limitation**
- Persistent airflow limitation

**Clinical manifestations**
- Symptoms
- Exacerbations
- Comorbidities
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A clinical diagnosis of COPD should be considered in any patient who has dyspnea, chronic cough or sputum production, and a history of exposure to risk factors for the disease.

Spirometry is required to make the diagnosis; the presence of a post-bronchodilator FEV₁/FVC < 0.70 confirms the presence of persistent airflow limitation and thus of COPD.
Assessment of Airflow Limitation: Spirometry

- Spirometry should be performed after the administration of an adequate dose of a short-acting inhaled bronchodilator to minimize variability.
- A post-bronchodilator $\text{FEV}_1/\text{FVC} < 0.70$ confirms the presence of airflow limitation.
- “Diagnostic simplicity and consistency are crucial for the busy clinician. Thus, GOLD favors the fixed ratio over LLN.”
"While post-BD spirometry is required for diagnosis and assessment of COPD, assessing the degree of reversibility of airflow limitation to inform therapeutic decisions is no longer recommended (degree of reversibility has not been shown to augment diagnosis of COPD, differentiate from asthma, or predict response to long-term treatment with BD or CS)"
Determine the severity of the disease, its impact on the patient’s health status and the risk of future events (for example exacerbations) to guide therapy. Consider the following aspects of the disease separately:

- severity of the spirometric abnormality
- current level of patient’s symptoms
- frequency of exacerbations
- presence of comorbidities
### Classification of air flow limitation severity in COPD (Based on post-bronchodilator FEV₁)

<table>
<thead>
<tr>
<th>GOLD 1:</th>
<th>Mild</th>
<th>FEV₁ ≥ 80% predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 2:</td>
<td>Moderate</td>
<td>50% ≤ FEV₁ &lt; 80% predicted</td>
</tr>
<tr>
<td>GOLD 3:</td>
<td>Severe</td>
<td>30% ≤ FEV₁ &lt; 50% predicted</td>
</tr>
<tr>
<td>GOLD 4:</td>
<td>Very Severe</td>
<td>FEV₁ &lt; 30% predicted</td>
</tr>
</tbody>
</table>

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# Role of Spirometry

## Table 2.6. Role of spirometry

- **Diagnosis**
- **Assessment of severity of airflow obstruction (for prognosis)**
- **Follow-up assessment**
  - Therapeutic decisions.
  - Pharmacological in selected circumstances (e.g., discrepancy between spirometry and level of symptoms).
  - Consider alternative diagnoses when symptoms are disproportionate to degree of airflow obstruction.
  - Non-pharmacological (e.g., interventional procedures).
  - Identification of rapid decline.
Assess symptoms

COPD Assessment Test (CAT)

or

Clinical COPD Questionnaire (CCQ)

or

mMRC Breathlessness scale
"It is now recognized that COPD impacts beyond just dyspnea. For this reason, a comprehensive assessment of symptoms is recommended…"
Figure 2.3. CAT Assessment

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

Example:  

<table>
<thead>
<tr>
<th>I am very happy</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>I am very sad</th>
</tr>
</thead>
<tbody>
<tr>
<td>I never cough</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>I cough all the time</td>
</tr>
<tr>
<td>I have no phlegm (mucus) in my chest at all</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>My chest is completely full of phlegm (mucus)</td>
</tr>
<tr>
<td>My chest does not feel tight at all</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>My chest feels very tight</td>
</tr>
<tr>
<td>When I walk up a hill or one flight of stairs I am not breathless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>When I walk up a hill or one flight of stairs I am very breathless</td>
</tr>
<tr>
<td>I am not limited doing any activities at home</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>I am very limited doing activities at home</td>
</tr>
<tr>
<td>I am confident leaving my home despite my lung condition</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>I am not at all confident leaving my home because of my lung condition</td>
</tr>
<tr>
<td>I sleep soundly</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>I don’t sleep soundly because of my lung condition</td>
</tr>
<tr>
<td>I have lots of energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>I have no energy at all</td>
</tr>
</tbody>
</table>

TOTAL SCORE

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.
<table>
<thead>
<tr>
<th>CAT Score</th>
<th>Impact Level</th>
<th>Clinical Picture</th>
<th>Possible Management Considerations</th>
</tr>
</thead>
</table>
| >30       | Very High    | • Condition stops them from doing everything they want to do; never have any good days.  
            |               | • If able to bathe/shower, it takes them a long time.  
            |               | • Cannot go out of the house for shopping/recreation, or do housework.  
            |               | • Cannot go far from bed/chair.  
            |               | • Feel become an invalid. | • Patient has significant room for improvement.  
            |               | | • In addition to the guidance for patients with low and medium impact CAT scores consider:  
            |               | | o Referral to specialist care (if you are a primary care physician).  
            |               | | o Additional pharmacological treatments.  
            |               | | o Referral for pulmonary rehabilitation.  
            |               | | o Ensuring best approaches to minimizing and managing exacerbations. |
| >20       | High         | • Unable to do most things that they want to do; too much effort needed.  
            |               | • Breathless walking around the home and bathing/dressing or talking.  
            |               | • Cough makes them tired; chest symptoms disturb sleep most nights.  
<pre><code>        |               | • Do not feel in control of condition; afraid and panic. |
</code></pre>
<table>
<thead>
<tr>
<th>CAT Score</th>
<th>Impact Level</th>
<th>Clinical Picture</th>
<th>Possible Management Considerations</th>
</tr>
</thead>
</table>
| 10-20     | Med          | COPD is one of the most important problems that they have. Few good days a week but cough sputum most days and have 1-2 exacerbations/year. Wake up with chest tightness or wheeze. Breathless bending over most days; can only walk up a flight of stairs slowly. Do housework slowly or stop for rests. | Patient has room for improvement – optimize management. In addition to the guidance provided for patients with low impact CAT scores consider:  
  o Reviewing maintenance therapy – is it optimal?  
  o Referral for pulmonary rehabilitation  
  o Ensuring best approaches to minimizing and managing exacerbations  
  o Reviewing aggravating factors – is the patient still smoking? |
| <10       | Low          | Most days good; COPD causes a few problems; stops people doing 1-2 things they would like to do. Cough several days a week. Breathless when playing sports/games and carrying heavy loads; get exhausted easily. Slow down/stop walking up hills or walking fast on level ground. | Smoking cessation  
  Annual influenza vaccination  
  Reduce exposure to exacerbation risk factors  
  Therapy as warranted by further clinical assessment |
| 5         | Upper limit of normal in healthy non-smokers | | |
Assessment of exacerbation risk

- COPD exacerbations are defined as an acute worsening of respiratory symptoms that result in additional therapy
  - Mild – treated with short acting BDs only
  - Moderate – treated with short acting BDs plus antibiotics and/or corticosteroids
  - Severe – patient requires hospitalization or visits the ED
- The best predictor of having frequent exacerbations (≥2/yr) is a history of earlier treated events
- FEV1 by itself lacks sufficient precision to be used clinically as a predictor or exacerbation or mortality
Figure 2.4. The refined ABCD assessment tool

- Spirometrically confirmed diagnosis
  - Post-bronchodilator FEV₁/FVC < 0.7

- Assessment of airflow limitation

- FEV₁ (% predicted)
  - GOLD 1: ≥ 80
  - GOLD 2: 50-79
  - GOLD 3: 30-49
  - GOLD 4: < 30

- Exacerbation history
  - ≥ 2 or ≥ 1 leading to hospital admission
  - 0 or 1 (not leading to hospital admission)

- Assessment of symptoms/risk of exacerbations

- C
- D
- A
- B

- mMRC 0-1
  - CAT < 10

- mMRC ≥ 2
  - CAT ≥ 10

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Therapeutic Options: Key Points

- Smoking cessation has the greatest capacity to influence the natural history of COPD. Health care providers should encourage all patients who smoke to quit.

- Pharmacotherapy and nicotine replacement reliably increase long-term smoking abstinence rates.

- The effectiveness and safety of e-cigarettes as a smoking cessation aid is uncertain at present.
Appropriate pharmacologic therapy can reduce COPD symptoms, reduce the frequency and severity of exacerbations, and improve health status and exercise tolerance.

Each treatment regimen should be individualized and guided by the symptom severity, exacerbation risk, side-effects, comorbidities, drug availability and cost, and the patient’s response, preference and ability to use various drug delivery devices.
Inhaler technique needs to be assessed regularly

Influenza and Pneumococcal vaccination decreases the incidence of LRTI’s

Pulmonary rehab improves symptoms, QOL, and physical/emotional participation in everyday activities

In patients with severe resting chronic hypoxemia, long-term oxygen therapy improved survival
Therapeutic Options: Key Points

- In patients with stable COPD and resting or exercise-induced moderate desaturation, LTOT should not be prescribed routinely. However, individual patient factors must be considered when evaluating the patient’s need for supplemental O$_2$.

- In patients with severe chronic hypercarbia and a history of hospitalization for acute respiratory failure, long-term NIV may decrease mortality and prevent re-hospitalization.

- In select patients with advanced emphysema refractory to optimized medical care, surgical or bronchoscopic interventional treatments may be beneficial.

- Palliative approaches are effective in controlling symptoms in advanced COPD.
Therapeutic Options: COPD Medications

<table>
<thead>
<tr>
<th>Category</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta₂-agonists</td>
<td>Short-acting beta₂-agonists, Long-acting beta₂-agonists</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Short-acting anticholinergics, Long-acting anticholinergics</td>
</tr>
<tr>
<td>Combination short-acting beta₂-</td>
<td>Combination long-acting beta₂-agonist + anticholinergic in one inhaler</td>
</tr>
<tr>
<td>Systemic corticosteroids</td>
<td>Systemic corticosteroids</td>
</tr>
<tr>
<td>Phosphodiesterase-4 inhibitors</td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Inhaler (mcg)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Beta-agonists</td>
<td></td>
</tr>
<tr>
<td>Short-acting</td>
<td></td>
</tr>
<tr>
<td>Fenoterol</td>
<td>100-200 (MDI)</td>
</tr>
<tr>
<td>Levodilbuterol</td>
<td>45-90 (MDI)</td>
</tr>
<tr>
<td>Salbutamol (albuterol)</td>
<td>90, 100, 200 (MDI &amp; DPI)</td>
</tr>
<tr>
<td>Long-acting</td>
<td></td>
</tr>
<tr>
<td>Formoterol</td>
<td>0.008%</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>4.5-9 (DPI)</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>75-300 (DPI)</td>
</tr>
<tr>
<td>Icotocolterol</td>
<td>2.5 (SMI)</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>25-50 (MDI &amp; DPI)</td>
</tr>
<tr>
<td>Anticholinerges</td>
<td></td>
</tr>
<tr>
<td>Short-acting</td>
<td></td>
</tr>
<tr>
<td>Ipratropium bromide</td>
<td>20, 40 (MDI)</td>
</tr>
<tr>
<td>Nebutropium bromide</td>
<td>100 (MDI)</td>
</tr>
<tr>
<td>Long-acting</td>
<td></td>
</tr>
<tr>
<td>Arformoterol</td>
<td>12</td>
</tr>
<tr>
<td>Formoterol</td>
<td>12</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>24</td>
</tr>
<tr>
<td>Icotocolterol</td>
<td>24</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>12</td>
</tr>
<tr>
<td>Combination of short-acting beta-agonist plus anticholinergic in one device</td>
<td>12</td>
</tr>
<tr>
<td>Fenoterol/ipratropium</td>
<td>12</td>
</tr>
<tr>
<td>Salbutamol/ipratropium</td>
<td>12</td>
</tr>
<tr>
<td>Combination of long-acting beta-agonist plus anticholinergic in one device</td>
<td>12</td>
</tr>
<tr>
<td>Formoterol/indacaterol</td>
<td>12</td>
</tr>
<tr>
<td>Indacaterol/dicyclomine</td>
<td>12</td>
</tr>
<tr>
<td>Icotocolterol/indacaterol</td>
<td>24</td>
</tr>
<tr>
<td>Salmeterol/indacaterol</td>
<td>24</td>
</tr>
<tr>
<td>Methylxanthines</td>
<td></td>
</tr>
<tr>
<td>Aminophylline</td>
<td>105 mg/ml (solution)</td>
</tr>
<tr>
<td>Theophylline (SR)</td>
<td>100-600 mg (pills)</td>
</tr>
<tr>
<td>Combination of long-acting beta-agonist plus corticosteroids in one device</td>
<td>12</td>
</tr>
<tr>
<td>Formoterol/indacaterol</td>
<td>12</td>
</tr>
<tr>
<td>Icotocolterol/dicyclomine</td>
<td>12</td>
</tr>
<tr>
<td>Salmeterol/indacaterol</td>
<td>24</td>
</tr>
<tr>
<td>Vilanterol/indacaterol</td>
<td>24</td>
</tr>
<tr>
<td>Phosphodiesterase-4 inhibitors</td>
<td>12</td>
</tr>
<tr>
<td>Icotocolterol</td>
<td>12</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>24</td>
</tr>
<tr>
<td>Vilanterol</td>
<td>24</td>
</tr>
<tr>
<td>Phosphodiesterase-4 inhibitors</td>
<td>24</td>
</tr>
</tbody>
</table>

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Bronchodilator medications are central to the symptomatic management of COPD.

The principal bronchodilator treatments are beta_2- agonists, anticholinergics, theophylline or combination therapy.

The choice of treatment depends on the availability of medications and each patient’s individual response in terms of symptom relief and side effects.

Clinical trials have shown a greater effect on exacerbation rates for LAMA treatment (tiotropium) vs. LABA treatment.
Table 3.4. Bronchodilators in stable COPD

- Inhaled bronchodilators in COPD are central to symptom management and commonly given on a regular basis to prevent or reduce symptoms (Evidence A).
- Regular and as-needed use of SABA or SAMA improves FEV₁ and symptoms (Evidence A).
- Combinations of SABA and SAMA are superior compared to either medication alone in improving FEV₁ and symptoms (Evidence A).
- LABAs and LAMAs significantly improve lung function, dyspnea, health status, and reduce exacerbation rates (Evidence A).
- LAMAs have a greater effect on exacerbation reduction compared with LABAs (Evidence A) and decrease hospitalizations (Evidence B).
- Combination treatment with a LABA and LAMA increases FEV₁ and reduces symptoms compared to monotherapy (Evidence A).
- Combination treatment with a LABA and LAMA reduces exacerbations compared to monotherapy (Evidence B) or ICS/LABA (Evidence B).
- Iotropium improves the effectiveness of pulmonary rehabilitation in increasing exercise performance (Evidence B).
- Theophylline exerts a small bronchodilator effect in stable COPD (Evidence A) and that is associated with modest symptomatic benefits (Evidence B).
Regular treatment with inhaled corticosteroids improves symptoms, lung function and quality of life and reduces frequency of exacerbations for COPD patients with an FEV$_1$ < 60% predicted.

Inhaled corticosteroid therapy is associated with an increased risk of pneumonia.

Results from withdrawal studies provide equivocal results regarding consequences of ICS withdrawal on lung function, symptoms and exacerbations.
### Table 3.5. Anti-inflammatory therapy in stable COPD

#### Inhaled corticosteroids
- An ICS combined with a LABA is more effective than the individual components in improving lung function and health status and reducing exacerbations in patients with exacerbations and moderate to very severe COPD (Evidence A).
- Regular treatment with ICS increases the risk of pneumonia especially in those with severe disease (Evidence A).
- Triple inhaled therapy of ICS/LAMA/LABA improves lung function, symptoms and health status (Evidence A) and reduces exacerbations (Evidence B) compared to ICS/LABA or LAMA monotherapy.

#### Oral glucocorticoids
- Long-term use of oral glucocorticoids has numerous side effects (Evidence A) with no evidence of benefits (Evidence C).

#### PDE4 inhibitors
- In patients with chronic bronchitis, severe to very severe COPD and a history of exacerbations:
  - A PDE4 inhibitor improves lung function and reduces moderate and severe exacerbations (Evidence A).
  - A PDE4 inhibitor improves lung function and decreases exacerbations in patients who are on fixed-dose LABA/ICS combinations (Evidence B).

#### Antibiotics
- Long-term azithromycin and erythromycin therapy reduces exacerbations over one year (Evidence A).
- Treatment with azithromycin is associated with an increased incidence of bacterial resistance (Evidence A) and hearing test impairments (Evidence B).

#### Mucolytics/antioxidants
- Regular use of NAC and carbocysteine reduces the risk of exacerbations in select populations (Evidence B).

#### Other anti-inflammatory agents
- Simvastatin does not prevent exacerbations in COPD patients at increased risk of exacerbations and without indications for statin therapy (Evidence A). However, observational studies suggest that statins may have positive effects on some outcomes in patients with COPD who receive them for cardiovascular and metabolic indications (Evidence C).
- Leukotriene modifiers have not been tested adequately in COPD patients.
Table 3.2. Vaccination for stable COPD

- Influenza vaccination reduces serious illness and death in COPD patients (Evidence B).
- The 23-valent pneumococcal polysaccharide vaccine (PPSV23) has been shown to reduce the incidence of community-acquired pneumonia in COPD patients aged < 65 years with an FEV₁ < 40% predicted and in those with comorbidities (Evidence B).
- In the general population of adults ≥ 65 years the 13-valent conjugated pneumococcal vaccine (PCV13) has demonstrated significant efficacy in reducing bacteremia and serious invasive pneumococcal disease (Evidence B).
Therapeutic Options: Rehabilitation, Education & Self-Management

<table>
<thead>
<tr>
<th>Table 3.8. Pulmonary rehabilitation, self-management and integrative care in COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pulmonary rehabilitation</strong></td>
</tr>
<tr>
<td>- Pulmonary rehabilitation improves dyspnea, health status and exercise tolerance in stable patients <em>(Evidence A)</em>.</td>
</tr>
<tr>
<td>- Pulmonary rehabilitation reduces hospitalizations among patients who have had a recent exacerbation (≤ 4 weeks from prior hospitalization) <em>(Evidence B)</em>.</td>
</tr>
<tr>
<td><strong>Education and self-management</strong></td>
</tr>
<tr>
<td>- Education alone has not been shown to be effective <em>(Evidence C)</em>.</td>
</tr>
<tr>
<td>- Self-management intervention with communication with a health care professional improves health status and decreases hospitalizations and emergency department visits <em>(Evidence B)</em>.</td>
</tr>
<tr>
<td><strong>Integrated care programs</strong></td>
</tr>
<tr>
<td>- Integrated care and telehealth have no demonstrated benefit at this time <em>(Evidence B)</em>.</td>
</tr>
</tbody>
</table>
**Oxygen Therapy:** The long-term administration of oxygen (>15 hours per day) to patients with chronic respiratory failure has been shown to increase survival in patients with severe, resting hypoxemia.

- Long-term oxygen does not provide sustained benefit for any of the measured outcomes in patients with stable COPD and resting or exercise-induced moderate oxygen desaturation.

**Ventilatory Support:** Combination of noninvasive ventilation (NIV) with long-term oxygen therapy may be of some use in a selected subset of patients, particularly in those with pronounced daytime hypercapnia.
Table 3.10. Oxygen therapy and ventilatory support in stable COPD

**Oxygen therapy**
- The long-term administration of oxygen increases survival in patients with severe chronic resting arterial hypoxemia (Evidence A).
- In patients with stable COPD and moderate resting or exercise-induced arterial desaturation, prescription of long-term oxygen does not lengthen time to death or first hospitalization or provide sustained benefit in health status, lung function and 6-minute walk distance (Evidence A).
- Resting oxygenation at sea level does not exclude the development of severe hypoxemia when traveling by air (Evidence C).

**Ventilatory support**
- NPPV may improve hospitalization-free survival in selected patients after recent hospitalization, particularly in those with pronounced daytime persistent hypercapnia (PaCO₂ ≥ 52 mmHg) (Evidence B).
Global Strategy for Diagnosis, Management and Prevention of COPD, 2017: Chapters

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The management strategy for stable COPD should be predominantly based on the individualized assessment of symptoms and future risk of exacerbations.

All individuals who smoke should be strongly encouraged and supported to quit.

The main treatment goals are reduction of symptoms and future risk of exacerbations.

Management strategies are not limited to pharmacologic treatments, and should be complemented by appropriate non-pharmacologic interventions.
Manage Stable COPD: Goals of Therapy

- Relieve symptoms
- Improve exercise tolerance
- Improve health status
- Prevent disease progression
- Prevent and treat exacerbations
- Reduce mortality

Reduce symptoms
Reduce risk
The choice of inhaler device has to be individually tailored and will depend on access, cost, prescriber, and (most importantly) patient’s ability and preference.

It is essential to provide instructions and demonstrate the proper inhalation technique when prescribing a device.

Inhaler technique (and adherence) should be assessed before concluding that the current therapy requires modification.
Manage Stable COPD: Pharmacologic treatment

Table 4.5. Key points for the use of bronchodilators

- LABAs and LAMAs are preferred over short-acting agents except for patients with only occasional dyspnea (Evidence A).
- Patients may be started on single long-acting bronchodilator therapy or dual long-acting bronchodilator therapy. In patients with persistent dyspnea on one bronchodilator treatment should be escalated to two (Evidence A).
- Inhaled bronchodilators are recommended over oral bronchodilators (Evidence A).
- Theophylline is not recommended unless other long-term treatment bronchodilators are unavailable or unaffordable (Evidence B).

Table 4.6. Key points for the use of anti-inflammatory agents

- Long-term monotherapy with ICS is not recommended (Evidence A).
- Long-term treatment with ICS may be considered in association with LABAs for patients with a history of exacerbations despite appropriate treatment with long-acting bronchodilators (Evidence A).
- Long-term therapy with oral corticosteroids is not recommended (Evidence A).
- In patients with exacerbations despite LABA/ICS or LABA/LAMA/ICS, chronic bronchitis and severe to very severe airflow obstruction, the addition of a PDE4 inhibitor can be considered (Evidence B).
- In former smokers with exacerbations despite appropriate therapy, macrolides can be considered (Evidence B).
- Statin therapy is not recommended for prevention of exacerbations (Evidence A).
- Antioxidant mucolytics are recommended only in selected patients (Evidence A).
## Figure 2.4. The refined ABCD assessment tool

<table>
<thead>
<tr>
<th>Spirometrically confirmed diagnosis</th>
<th>Assessment of airflow limitation</th>
<th>Assessment of symptoms/risk of exacerbations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-bronchodilator FEV₁/FVC &lt; 0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirometry FEV₁ (% predicted)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOLD 1</td>
<td>≥ 80</td>
<td></td>
</tr>
<tr>
<td>GOLD 2</td>
<td>50-79</td>
<td></td>
</tr>
<tr>
<td>GOLD 3</td>
<td>30-49</td>
<td></td>
</tr>
<tr>
<td>GOLD 4</td>
<td>&lt; 30</td>
<td></td>
</tr>
</tbody>
</table>

Exacerbation history

- ≥ 2 or ≥ 1 leading to hospital admission
- 0 or 1 (not leading to hospital admission)

<table>
<thead>
<tr>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>mMRC 0-1</td>
</tr>
<tr>
<td>CAT &lt; 10</td>
</tr>
<tr>
<td>mMRC ≥ 2</td>
</tr>
<tr>
<td>CAT ≥ 10</td>
</tr>
</tbody>
</table>

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

Group C
- LAMA + LABA
- LABA + ICS
  Further exacerbation(s)
  LAMA

Group D
- Consider roflumilast if FEV₁ < 50% pred. and patient has chronic bronchitis
- Consider macrolide (in former smokers)
  Further exacerbation(s)
  LAMA + LABA + ICS
  Persistent symptoms/further exacerbation(s)
  LAMA
  LAMA + LABA
  LABA + ICS

Group A
- Continue, stop or try alternative class of bronchodilator
  evaluate effect
  A bronchodilator

Group B
- LAMA + LABA
  Persistent symptoms
  A long-acting bronchodilator (LABA or LAMA)

Preferred treatment = 
In patients with a major discrepancy between the perceived level of symptoms and severity of airflow limitation, further evaluation is warranted.

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- **GOLD Grade A**: Any bronchodilator (short or long acting), titrating or switching to another as appropriate

- **GOLD Grade B**: A long acting bronchodilator (LABA or LAMA), and both if symptoms persist on one drug

- **GOLD Grade C**: A long acting muscarinic antagonist (LAMA), switching to LABA+LAMA or LABA+ICS if further exacerbations occur

- **GOLD Grade D**: More complicated, requires individual management, often multiple drugs, consideration of roflumilast and azithromycin in selected patients
COPD Pharmacotherapy Reality

- The GOLD path through Grade B and C (most of the 11 million people living with COPD in the US) advises dual LABA/LAMA therapy
- The newest COPD combination inhalers aren’t on all formularies and will be out of financial reach for many patients
- “The choice of inhaler device has to be individually tailored and will depend on access, cost, prescriber, and most importantly the patient’s ability and preference.”
Manage Stable COPD: Non-Pharmacologic treatment

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Essential</th>
<th>Recommended</th>
<th>Depending on local guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Smoking cessation (can include pharmacologic treatment)</td>
<td>Physical activity</td>
<td>Flu vaccination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pneumococcal vaccination</td>
</tr>
<tr>
<td>B-D</td>
<td>Smoking cessation (can include pharmacologic treatment)</td>
<td>Physical activity</td>
<td>Flu vaccination</td>
</tr>
<tr>
<td></td>
<td>Pulmonary rehabilitation</td>
<td></td>
<td>Pneumococcal vaccination</td>
</tr>
</tbody>
</table>
Global Strategy for Diagnosis, Management and Prevention of COPD, 2017: Chapters

- Definition and Overview
- Diagnosis and Assessment
- Therapeutic Options
- Manage Stable COPD
- Manage Exacerbations
- Manage Comorbidities
An acute exacerbation (AE) of COPD is defined as an acute worsening of respiratory symptoms that results in additional therapy.

An AE COPD can be precipitated by several factors, most commonly respiratory tract infections.

The goal of treatment is to minimize the negative impact of the current AE and to prevent subsequent events.

Short-acting β₂ agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators for an AE.
Manage Exacerbations: Key Points

- Maintenance therapy with long-acting BD should be initiated ASAP before hospital discharge.
- Systemic CS can improve lung fxn (FEV1), oxygenation and shorten recovery time and hospitalization duration – duration of tx should not be more than 5-7 days.
- Antibiotics, when indicated can shorten recovery time, reduce risk of early relapse, treatment failure, and hospitalization duration – duration of tx should not be more than 5-7 days.

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Methylxanthines are not recommended due to increased side effect profiles.

Non-invasive mechanical ventilation should be the first mode of ventilation used in COPD patients with acute respiratory failure who have no absolute contraindication because it improves gas exchange, reduces WOB and need for intubation, decreases hospitalization duration and improves survival.

Following an AE, appropriate measures for AE prevention should be initiated.
# COPD Exacerbation Rate Reduction

<table>
<thead>
<tr>
<th>Intervention class</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchodilators</td>
<td>LABAs</td>
</tr>
<tr>
<td></td>
<td>LAMAs</td>
</tr>
<tr>
<td></td>
<td>LABA + LAMA</td>
</tr>
<tr>
<td>Corticosteroid-containing regimens</td>
<td>LABA + ICS</td>
</tr>
<tr>
<td></td>
<td>LABA + LAMA + ICS</td>
</tr>
<tr>
<td>Anti-inflammatory (non-steroid)</td>
<td>Roflumilast</td>
</tr>
<tr>
<td>Anti-infectives</td>
<td>Vaccines</td>
</tr>
<tr>
<td></td>
<td>Long term macrolides</td>
</tr>
<tr>
<td>Mucoregulators</td>
<td>N-acetylcysteine</td>
</tr>
<tr>
<td></td>
<td>Carbocysteine</td>
</tr>
<tr>
<td>Various others</td>
<td>Smoking cessation</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation</td>
</tr>
<tr>
<td></td>
<td>Lung volume reduction</td>
</tr>
</tbody>
</table>

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Thank you!!

QUESTIONS?

GET TO WORK
YOU AREN'T BEING PAID TO BELIEVE IN THE POWER OF YOUR DREAMS.