COPD Update
Considerations for Older Adults

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Disclosures

Neither I, nor my spouse, have relationships with pharmaceutical companies, biomedical device manufacturers, or other commercial companies whose products or services are related to the subject matter of this presentation.
Objectives

Discuss updated guideline recommendations for treatment of chronic obstructive pulmonary disease (COPD)

Demonstrate the burden of COPD management in older adult patients

Define age-related physical changes associated with long-term COPD in relationship to medication management

Recommend appropriate medication therapy adjustments as needed for long-term COPD management to accommodate age-related physical changes
Extra References


Chronic obstructive pulmonary disease (COPD)

- Preventable and treatable
- Characterized by persistent airflow limitation that is usually progressive
- Associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases
- Exacerbations and comorbidities contribute to the overall severity in individual patients

GOLD Guidelines 2016. www.goldcopd.org
The direct costs of COPD for the US has been estimated at $29.5 billion.

Worldwide COPD is estimated to become the third leading cause of death in 2020 and fourth leading cause of death in 2030.

In the United States:
- In 2011, 6.5% of the US population had COPD.
- In 2010, there were 133,575 deaths caused by COPD.
- Overall, death rates for COPD have not declined.

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Age Adjusted Prevalence of COPD in adults >25 years of age in 2011

Age Adjusted Death-rates (per 100,000) of COPD in adults ≥25 years of age between 1999-2000

Age Adjusted Death-rates (per 100,000) of COPD in adults ≥25 years of age between 2009-2010

COPD in Older Adults

- The number of people >60 years of age is expected to rise from 810 million in 2012 to 2 billion in 2050
  - People >80 years of age is expected to increase 4-fold
- COPD is one of the most common chronic diseases affecting older adults

The United Nations.
Valente S. Respiration 2010;80:357-368.
Risk Factors for COPD Development & Progression

- Genetic factors
  - Alpha-1 antitrypsin deficiency
- Age and gender
- Lung growth and development
- Exposure to particles
  - Cigarette smoking
- Socioeconomic status—questionable
- Asthma/bronchial hyper-reactivity
- Chronic bronchitis
- Infections
COPD Symptoms and Diagnosis

Symptoms
- Dyspnea
- Cough
- Sputum production
- Wheezing and chest tightness

Diagnosis
- Spirometry demonstrating post-bronchodilator FEV₁/FVC <0.70

GOLD Guidelines 2016.  www.goldcopd.org
COPD Assessment
COPD Assessment

Goals of assessment
- Determine severity of the disease
- Impact on health status
- Determine risk of future events
- Used to guide therapy

Disease characteristics considered
- Spirometry
- Patient symptoms
- Exacerbation risk
- Comorbidities

GOLD Guidelines 2016.  www.goldcopd.org
Normal Spirometry

Time (seconds)

Volume (liters)

FEV₁ = 4L

FVC = 5L

FEV₁ /FVC= 0.8
Spirometry in Obstructive Disease

- FEV$_1$ = 1.5L
- FVC = 2.9L
- FEV$_1$/FVC = 0.57
COPD Assessment Combined

GOLD Spirometry

GOLD Guidelines 2016. www.goldcopd.org
COPD Assessment

Spirometry
Based on post-bronchodilator FEV$_1$

<table>
<thead>
<tr>
<th>GOLD Classification</th>
<th>Severity</th>
<th>FEV$_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>Mild</td>
<td>FEV$_1$ &gt; 80% predicted</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>Moderate</td>
<td>50% ≤ FEV$_1$ &lt; 80% predicted</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>Severe</td>
<td>30% ≤ FEV$_1$ &lt; 50% predicted</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>Very severe</td>
<td>FEV$_1$ &lt; 30% predicted</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2016.  www.goldcopd.org
COPD Assessment

Patient symptoms

- COPD Assessment Test (CAT)
  - 8 items
  - Score ranges 0-40
  - <10 means less symptoms, ≥10 means more symptoms

- COPD Control Questionnaire (CCQ)
  - 10 items—self administered
  - <1 more symptoms, ≥1 less symptoms

- Modified British Medical Research Council Questionnaire (mMRC)
  - 5 grades—score of 0-4
  - <2 less symptoms, ≥2 more symptoms

GOLD Guidelines 2016. www.goldcopd.org
Patient symptoms

COPD Assessment Test (CAT)

Patient ranks their symptoms on a scale of 0-5

Example questions:

0=I am not limited doing any activities at home to 5=I am very limited in doing activities at home

0=I have no phlegm in my chest to 5=my chest is full of phlegm

GOLD Guidelines 2016. www.goldcopd.org
COPD Assessment

Exacerbation risk assessment

Exacerbation

Acute event

Characterized by worsening of patient’s respiratory symptoms

Leads to change in medications

Frequent exacerbations are more than 2 per year

GOLD Guidelines 2016. www.goldcopd.org
Exacerbation risk assessment

High risk:
- ≥2 exacerbations per year
- ≥1 exacerbation leading to hospital admission

Lower risk: 1 exacerbation per year (not leading to hospital admission)
1. Assess symptoms with CAT or mMRC
2. Assess risk of exacerbations
   A. Evaluate spirometry
   B. Assess number of exacerbations within the previous 12 months
   C. Assess if patient has been hospitalized for exacerbation
MS is a 67 year old female who has had COPD for 9 years. During an MTM visit, you ask several questions to assess her COPD. Her CAT score is 16. FEV$_1$ at last measurement was 35%. She had one COPD exacerbation 8 months ago and was admitted to the local hospital for 5 days.
What group would you place MS into?
A
B
C
D
SN is a 72 year old male with COPD. As a part of his outpatient visit, you need to assess his COPD. His mMRC score is 2. He had one COPD exacerbation 3 months ago which was treated outpatient. His FEV$_1$ at last measurement was 52%.
Patient Case

What group would you place SN into?

A
B
C
D
## COPD Assessment Combined

<table>
<thead>
<tr>
<th>Pt Category</th>
<th>Character</th>
<th>Spirometry</th>
<th>Exacer/ year</th>
<th>CAT</th>
<th>mMRC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Low risk, Less symptoms</td>
<td>FEV(_1) \geq 50%</td>
<td>\leq 1</td>
<td>&lt; 10</td>
<td>&lt; 2</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Low risk, More symptoms</td>
<td>FEV(_1) \geq 50%</td>
<td>\leq 1</td>
<td>\geq 10</td>
<td>\geq 2</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>High risk, Less symptoms</td>
<td>FEV(_1) &lt; 50%</td>
<td>\geq 2</td>
<td>&lt; 10</td>
<td>&lt; 2</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>High risk, More symptoms</td>
<td>FEV(_1) &lt; 50%</td>
<td>\geq 2</td>
<td>\geq 10</td>
<td>\geq 2</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
COPD Treatment
COPD Treatment

- Pharmacologic treatment
  - No agent has been shown to decrease mortality for COPD patients
  - Reduces COPD symptoms, frequency of exacerbations, and improve health status

- Smoking cessation
  - Slows disease progression

- Oxygen therapy
  - Increases survival in patients with severe resting hypoxemia

- Pulmonary rehabilitation

GOLD Guidelines 2016. www.goldcopd.org
COPD Treatment Common Agents

**Inhalers**
- Beta agonists
  - Short vs. long acting
- Anticholinergics
  - Short vs. long acting
- Corticosteroids
- Combination inhalers

**Oral agents**
- Methylxanthines
  - Theophylline
  - Aminophylline
- Phosphodiesterase-4 inhibitor (PDE4 inhibitor)
  - Roflumilast (Daliresp®)
- Systemic corticosteroids

GOLD Guidelines 2016.  www.goldcopd.org
COPD Treatment

Methods of inhalation administration

- Metered dose inhalers
- Soft mist inhalers
- Dry powder inhalers
- Nebulizer solutions
COPD Treatment

Metered dose inhaler
- Medication is administered as aerosol with propellant
- Actuation and inhalation require coordination
  - Can use with spacer to help with coordination
- Patient should inhale slowly
- Priming is required
- Shake before use
COPD Treatment

- Soft mist inhalers
  - A type of metered dose inhaler
  - Dose loads by turning the base of the device
  - Dose released by mechanical power produced by a loaded spring
  - Patients seal their mouth around the mouthpiece and actuate a dose by pressing the dose-release button
  - Breathing in slowly is key!


Striverdi® Respimat® [package insert].
**COPD Treatment**

Dry powder inhaler

- Multiple forms on the market
  - Need to understand mechanics of each

- Current forms on the market
  - Diskus®, Ellipta®, Handihaler®, Neohaler®, Pressiar®

- Medication is in powder form
  - No propellant

- Patient inhalation triggers actuation

- Coordination is not necessary
  - Spacer cannot be used

- Patient should inhale quickly


GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)

Lexi-Comp Online [AUHSOP Intranet].
COPD Treatment

Nebulizers

- Medication is in liquid form
- Device uses compressed air to aerosolize medication
  - Nebulization device is bulky and requires electricity
  - Administration time is prolonged compared to other devices
- No coordination required
# COPD Inhalers: Beta$_2$-agonists

## Short-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol</td>
<td>ProAir HFA®; VoSpire ER®</td>
<td>MDI, DPI, nebs, PO</td>
</tr>
<tr>
<td>Levalbuterol</td>
<td>Xopenex HFA®; Xopenex®</td>
<td>MDI, nebs</td>
</tr>
</tbody>
</table>

## Long-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aformoterol</td>
<td>Brovana®</td>
<td>Nebs</td>
</tr>
<tr>
<td>Formoterol</td>
<td>Perforomist®</td>
<td>MDI, DPI, nebs</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>Arcapta Neohaler®</td>
<td>DPI</td>
</tr>
<tr>
<td>Olodaterol</td>
<td>Striverdi Respimat®</td>
<td>SMI</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>Serevent Diskus®</td>
<td>MDI, DPI</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Lexi-Comp Online [AUHSOP Intranet].
# COPD Inhalers: Anticholinergic Drugs

## Short-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipratropium</td>
<td>Atrovent HFA®</td>
<td>MDI, nebs</td>
</tr>
</tbody>
</table>

## Long-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aclidinium</td>
<td>Tudorza Pressiar®</td>
<td>DPI</td>
</tr>
<tr>
<td>Tiotropium</td>
<td>Spiriva Handihaler®; Spiriva Respimat®</td>
<td>MDI, DPI, nebs</td>
</tr>
<tr>
<td>Umeclidinium</td>
<td>Incruise Ellipta®</td>
<td>DPI</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Lexi-Comp Online [AUHSOP Intranet].
# COPD Inhalers: Combination Beta$_2$-agonists + Anticholinergics

## Short-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol+ipratropium</td>
<td>Combivent Respimat®; DuoNebs®</td>
<td>SMI, nebs</td>
</tr>
</tbody>
</table>

## Long-Acting

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indacaterol/glycopyrronium</td>
<td>Utibron Neohaler®</td>
<td>DPI</td>
</tr>
<tr>
<td>Olodaterol/tiotropium</td>
<td>Stiolto Respimat®</td>
<td>SMI</td>
</tr>
<tr>
<td>Vilanterol/umeclidinium</td>
<td>Anoro Ellipta®</td>
<td>DPI</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Lexi-Comp Online [AUHSOP Intranet].
## COPD Inhalers: Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>QVAR®</td>
<td>MDI, DPI</td>
</tr>
<tr>
<td>Budesonide</td>
<td>Pulmicort®; Pulmicort Flexhaler®</td>
<td>DPI, nebs</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>Flovent Diskus®; Flovent® HFA; Arnuity Ellipta®</td>
<td>MDI, DPI, nebs</td>
</tr>
</tbody>
</table>
# COPD Inhalers:
## Long-acting Beta\(_2\)-agonists + Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Generic</th>
<th>Brand</th>
<th>Formulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formoterol/budesonide</td>
<td>Symbicort(^\circ)</td>
<td>MDI</td>
</tr>
<tr>
<td>Formoterol/mometasone</td>
<td>Dulera(^\circ)</td>
<td>MDI</td>
</tr>
<tr>
<td>Salmeterol/fluticasone</td>
<td>Advair Diskus(^\circ)</td>
<td>DPI</td>
</tr>
<tr>
<td>Vilanterol/fluticasone</td>
<td>Breo Ellipta(^\circ)</td>
<td>DPI</td>
</tr>
</tbody>
</table>
Which method of inhalation requires the least hand-breath coordination?

- Metered dose inhaler
- Dry powder inhaler
- Nebulizer
<table>
<thead>
<tr>
<th>Group</th>
<th>First Line</th>
<th>Alternative</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SABA prn or SAAC prn</td>
<td>LAAC or LABA or SABA+SAAC</td>
<td>Theophylline</td>
</tr>
<tr>
<td>B</td>
<td>LAAC or LABA</td>
<td>LABA+LAAC</td>
<td>SABA and/or SAAC or Theophylline</td>
</tr>
<tr>
<td>C</td>
<td>ICS+LABA or LAAC</td>
<td>LABA+LAAC or LAAC+PDE4 inhibitor or LABA+PDE4 inhibitor</td>
<td>SABA and/or SAAC or Theophylline</td>
</tr>
<tr>
<td>D</td>
<td>ICS+LABA and/or LAAC</td>
<td>ICS+LABA+LAAC or ICS+LABA+PDE4 inhibitor or LAAC+LABA or LAAC+PDE4 inhibitor</td>
<td>Carbocysteine or N-acetylcysteine or SABA and/or SAAC or Theophylline</td>
</tr>
</tbody>
</table>

SABA: short-acting beta-agonist; SAAC: short-acting anticholinergic; LABA: long-acting beta agonist; ICS: inhaled corticosteroid

GOLD Guidelines 2016.  [www.goldcopd.org](http://www.goldcopd.org)
COPD Treatment Selection

- Long-acting formulations of beta$_2$ agonists and anticholinergics are recommended over short-acting.
- Beta$_2$ agonists may be combined with anticholinergics if needed.
- Inhaled medications are preferred.
- Long-term monotherapy with oral corticosteroids is not recommended in COPD.
  - It is less effective than combination ICS+LABA.
- Long-term use of ICS is recommended for patients with severe to very severe COPD uncontrolled by other medications.
- Roflumilast may reduce exacerbations for patients with chronic bronchitis, severe to very severe COPD, and frequent exacerbations not controlled by other long-acting agents.

GOLD Guidelines 2016. www.goldcopd.org
Earlier, we decided MS’s group was D_____.

MS is currently on scheduled formoterol and PRN albuterol. She is experiencing symptoms which are limiting her quality of life.

What is your recommendation?

- Change formoterol to nebulized albuterol
- Change formoterol to mometasone
- Change formoterol to formoterol plus budesonide
- Change formoterol to formoterol plus budesonide and tiotropium
Earlier, we decided SN’s group was _____.

SN is currently on albuterol as needed. As you have discovered, he is having increased dyspnea. What is your recommendation?

- Discontinue albuterol and start tiotropium
- Continue albuterol and start tiotropium
- Discontinue albuterol and start fluticasone
- Continue albuterol and start mometasone and formoterol
Application to Older Adults
Treatment of COPD in Older Adult

Considerations for pharmacists

- Age-related changes
- Peak inspiratory flow
- Patient education
- Smoking cessation
- Immunizations
Age Related Changes

Physical changes

- Manual dexterity
- Visual changes
- Age is inversely related to extremity muscle strength, respiratory muscle strength, and pulmonary function

Cognitive changes

- Patients with a Mini Mental Status Exam score of less than 23 out of 30 are unlikely to learn and retain correct MDI technique

Inhalers require a minimum peak inspiratory flow

Optimal peak inspiratory flows
- MDI—minimum 25 L/min
- DPI
  - Turbuhaler—minimum 60 L/min
  - HandiHaler—minimum 20 L/min
  - Diskus—minimum 30 L/min
- Most of the new DPIs have *in vitro* testing using 60 L/min
- Nebulizer—no peak inspiratory flow needed
Patient Education

Progression of disease
- Not curable and progressive
- Medical therapy will not be stepped down

Medication counseling
- Role of medications
  - Rescue medication vs maintenance medication
- Inhaler devices
  - Ensure correct use at each visit
  - Demonstrate technique for patient
  - Use teach-back approach
Smoking Cessation

Has the greatest impact on the progression of COPD
In 2011, 39% of the 15 million adults with COPD continued to smoke
Recommended for all GOLD categories
Most trials have been done in middle-aged populations

GOLD Guidelines 2016. www.goldcopd.org
Smoking Cessation

Lung function vs. age and the relationship between smoking and lung function decline

Parkes G. BMJ. 2008;336(7644):598-600
Loss of lung function over 11 years based on smoking status

Smoking Cessation

Counseling delivered by healthcare professionals increases quit rates

Brief strategies to help the patient willing to quit (the 5 A’s):

- Ask—identify all tobacco users
- Advise—strongly urge all tobacco users to quit
- Assess—determine willingness to make a quit attempt
- Assist—aid the patient in quitting
- Arrange—schedule follow-up contact

GOLD Guidelines 2016. www.goldcopd.org
Smoking Cessation

Products available for smoking cessation

- OTC
  - Nicotine replacement in the form of patches, gum, or lozenges
- Prescription only
  - Nicotine replacement in the form of inhaler or nasal spray
  - Varenicline (Chantix®)
  - Bupropion (Zyban®)

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Nicotine. In: Lexi-Comp Online [AUHSOP Intranet].
Which of the following is FALSE regarding smoking cessation?

A. It is recommended for all stages of COPD
B. Counseling by healthcare professionals increases likelihood of quitting
C. Smoking cessation stops the progression of COPD
Review the immunization history for all patients

- Can be done in community setting, clinic setting, or hospital setting
- Follow guidelines from the Centers for Disease Control Advisory Committee on Immunization Practices (CDC ACIP)
- Guidelines are released yearly

Available from:

- [http://www.cdc.gov/vaccines/schedules/hcp/adult.html](http://www.cdc.gov/vaccines/schedules/hcp/adult.html)
Immunizations

Influenza vaccination

- Inactivated influenza vaccine (IIV) recommended yearly
- A list of available flu vaccines can be found here: [http://www.cdc.gov/flu/protect/vaccine/vaccines.htm](http://www.cdc.gov/flu/protect/vaccine/vaccines.htm)
- 18-64 years of age may receive intradermal or intramuscular IIV
- >65 years of age may receive the standard IIV or the high-dose IIV

Benefits

- Reduces exacerbations
- Reduces influenza infections
- Decreases risk of death

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)
Pneumococcal vaccination

All COPD patients 19-64 years of age should receive PPSV23

At age ≥65 years:
- Administer PCV13 at least one year after PPSV23
- Followed by another PPSV23 at least one year after PCV13 and at least 5 years after PPSV23

Benefits

- Reduces community acquired pneumonia caused by pneumococcus
- Reduces pneumonia caused by both pneumococcus and unknown etiology for COPD patients <65 years of age and FEV\(_1\)<40% predicted

GOLD Guidelines 2016. [www.goldcopd.org](http://www.goldcopd.org)

WE is a 74 year old female patient with COPD. Upon reviewing her charts, you find out she received her influenza vaccine October of last year and a PPSV23 vaccine when she was 67.

What are your recommendations for vaccination?

Should WE get another pneumococcal vaccine?
AP is a 68 year old male patient with COPD. Upon reviewing his charts, you find out he received his influenza vaccine December of last year. He received a PPSV23 vaccine when he was 64.

What are your recommendations for vaccination?

Should AP get another pneumococcal vaccine?
### Potential Solutions for Older Patients

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires hand-breath coordination</td>
<td>Use a spacer or nebulizer</td>
</tr>
<tr>
<td>Lacking hand strength or dexterity</td>
<td>Use a spacer or nebulizer</td>
</tr>
</tbody>
</table>
| Difficulty generating adequate peak inspiratory flow | Change DPI to MDI  
Consider nebulizer                           |
| Possible cognitive impairment                | Have patient demonstrate proper technique at each visit                   |
| Patient on multiple inhalers                 | Change inhalers to same administration type (for example, all DPI)  
Combine active ingredients if possible into single inhalers  
Ensure proper use at each visit |
COPD Update
Considerations for Older Adults

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