Inhaler Use in Older COPD Patients

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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 guideline recommendations for treatment of chronic obstructive pulmonary disease (COPD)
- Demonstrate the burden of COPD management in elderly 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
COPD Definition

- 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

GOLD Guidelines 2014. [www.goldcopd.org](http://www.goldcopd.org)
COPD Prevalence

• 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

Age Adjusted Prevalence of COPD in adults ≥25 years of age in 2011

COPD Prevalence

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

COPD Prevalence

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

- Cigarette smoking
- Genetic factors
  - Alpha-1 antitripsyn deficiency
- Age
- Lung growth and development
- Exposure to particles
- Socioeconomic status—questionable
- Asthma/bronchial hyperreactivity
- Chronic bronchitis
- Infections

GOLD Guidelines 2014. [www.goldcopd.org](http://www.goldcopd.org)
COPD Symptoms and Diagnosis

• Symptoms
  – Dyspnea
  – Cough
  – Sputum production
  – Wheezing and chest tightness

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

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 2014. [www.goldcopd.org](http://www.goldcopd.org)
Normal Spirometry

Volume (liters)

Time (seconds)

FVC = 5L

FEV₁ = 4L

FEV₁ / FVC = 0.8
Spirometry in Obstructive Disease

![Graph showing spirometry results with FVC = 2.9L, FEV₁ = 1.5L, and FEV₁/FVC = 0.57]
COPD Assessment

• Spirometry
  – Based on post-bronchodilator FEV₁

<table>
<thead>
<tr>
<th>GOLD Classification</th>
<th>Severity</th>
<th>FEV₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>Mild</td>
<td>FEV₁ ≥ 80% predicted</td>
</tr>
<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>

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

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

COPD Assessment

• 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)

COPD Assessment

• Comorbidities
  – All comorbidities should be evaluated at each visit and treated according to guidelines

COPD Assessment
Combined

GOLD Spirometry

Exacerbation History

>2/year OR
>1 leading to admit

0-1 exacerbation/year

<table>
<thead>
<tr>
<th>Exacerbation History</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2/year OR &gt;1 leading to admit</td>
</tr>
<tr>
<td>0-1 exacerbation/year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-4</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>A</td>
</tr>
</tbody>
</table>

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

Symptoms

Breathlessness

GOLD Guidelines 2014. [www.goldcopd.org](http://www.goldcopd.org)
Method of Assessment

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
Patient Case

• 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. FEV₁ at last measurement was 35%. She had one COPD exacerbation 8 months ago and was admitted to the local hospital for 5 days.
Patient Case

What group would you place MS into?

- A
- B
- C
- D
Patient Case

• 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>Spriometry</th>
<th>Exacer/year</th>
<th>CAT</th>
<th>mMRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Low risk, Less symptoms</td>
<td>FEV₁≥50%</td>
<td>≤1</td>
<td>&lt;10</td>
<td>&lt;2</td>
</tr>
<tr>
<td>B</td>
<td>Low risk, More symptoms</td>
<td>FEV₁≥50%</td>
<td>≤1</td>
<td>≥10</td>
<td>≥2</td>
</tr>
<tr>
<td>C</td>
<td>High risk, Less symptoms</td>
<td>FEV₁&lt;50%</td>
<td>&gt;2</td>
<td>&lt;10</td>
<td>&lt;2</td>
</tr>
<tr>
<td>D</td>
<td>High risk, More symptoms</td>
<td>FEV₁&lt;50%</td>
<td>&gt;2</td>
<td>≥10</td>
<td>≥2</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2014. [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

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®)

COPD Treatment

Inhalers

• Beta$_2$-agonists
  – SABA: Short-acting beta agonists
    • Albuterol, levalbuterol
  – LABA: Long-acting beta agonists
    • Formoterol, aformoterol, indacaterol, salmeterol

• Anticholinergics (muscarinic agents)
  – SAAC: Short-acting anticholinergics
    • Ipratropium
  – LAAC: Long-acting anticholinergics
    • Aclidinium, tiotropium

• Corticosteroids
  – ICS—inhaled corticosteroid

COPD Treatment
Inhalers—Combination

- SABA + SAAC
  - Albuterol + ipratropium
- LABA + LAAC
  - Vilanterol + umeclidinium (Anoro Ellipta®)
- LABA + ICS
  - Formoterol + budesonide (Symbicort®)
  - Formoterol + mometasone (Dulera®)
  - Salmeterol + fluticasone (Advair®)
  - Vilanterol + fluticasone (Breo Ellipta®)

COPD Treatment

• Methods of inhalation administration
  – Metered dose 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

- Dry powder inhaler
  - Multiple forms on the market
    - Need to understand mechanics of each
  - Medication is in powder form
    - No propellant
  - Patient inhalation triggers actuation
  - Coordination is not necessary
    - Spacer cannot be used
  - Patient should inhale quickly
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
Self-Check

- Which method of inhalation requires the least hand-breath coordination?
  - Metered dose inhaler
  - Dry powder inhaler
  - Nebulizer
COPD Treatment Selection

• Bronchodilator medications are central to symptom management
• Inhaled therapy is preferred
• Choice of therapy is dependent on availability and patient response
• Long-acting inhaled bronchodilators are convenient and more effective for maintained symptom relief
• Combination products may improve efficacy and decrease risk of side effects

COPD Treatment Selection

- Long acting beta2-agonists and anticholinergicics are preferred over short term
- Long-term use of ICS alone is not recommended
  - Less effective than the combination of ICS + LABA
- Long-term monotherapy of oral corticosteroids is not recommended

# COPD Treatment Selection

<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 or SAAC</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 SABA and/or SAAC or Theophylline</td>
</tr>
</tbody>
</table>

GOLD Guidelines 2014.  [www.goldcopd.org](http://www.goldcopd.org)
Patient Case

• Earlier, we decided MS’s group was________.
• 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
Patient Case

• 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

Peak Inspiratory Flow

- 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
  - 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 2014. [www.goldcopd.org](http://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
Smoking Cessation

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 2014. [www.goldcopd.org](http://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®)
    • Buproprion (Zyban®)

Nicotine. In: Lexi-Comp Online [AUHSOP Intranet].
Self-Check

• Which of the following is FALSE regarding smoking cessation?
  – It is recommended for all stages of COPD
  – Counseling by healthcare professionals increases likelihood of quitting
  – Smoking cessation stops the progression of COPD
Immunizations

• 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
Immunizations

• Influenza vaccination
  – Inactivated influenza vaccine (IIV) recommended yearly
  – 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 2014. [www.goldcopd.org](http://www.goldcopd.org)
CDC ACIP 2014 Adult Immunization schedule.
Immunizations

• Pneumococcal vaccination
  – All patients ≥65 should receive one dose of the pneumococcal polysaccharide vaccine (PPSV23)
  – COPD patients 19-64 years of age should receive PPSV23
  – Patients should be revaccinated after age 65 if 5 years has passed since last vaccination

• Benefits
  – Reduces community acquired pneumonia caused by pneumococcus
  – Reduces pneumonia caused by both pneumococcus and unknown etiology for COPD patient <65 years of age and FEV$_1$<40% predicted

GOLD Guidelines 2014.  [www.goldcopd.org](http://www.goldcopd.org)
CDC ACIP 2014 Adult Immunization schedule.
Patient Case

• 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 pneumococcal vaccine when she was 67.

• What are your recommendations for vaccination?
Patient Case

- AP is a 68 year old male patient with COPD. Upon reviewing his charts, you find out he received her influenza vaccine December of last year. He received a pneumococcal vaccine when he was 64.
- What are your recommendations for vaccination?
## 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                                           |
Assessment Questions

• Which method of inhalation requires the most hand-breath coordination?
  – Metered dose inhaler
  – Dry powder inhaler
  – Nebulizer
Assessment Questions

• Which therapy has been shown to increase survival in COPD patients with persistent hypoxemia?
  – LABA + LAAC
  – LABA + ICS
  – Smoking cessation
  – Oxygen therapy
Assessment Questions

• TRUE or FALSE:
  – Smoking cessation is recommended only for COPD groups C and D.