A Guide to COPD Guidelines
2014

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Disclosures (or lack thereof…)

- I have no disclosures.
Objectives

• Overview of definition and current guidelines for the diagnosis and classification of COPD.

• Review current treatment guidelines for COPD and prevention of acute exacerbation of COPD.

• Discuss the benefits of disease management programs for patients with COPD.
A case of shortness of breath

• A 49 year old male presents to the outpatient pulmonary clinic with symptoms of shortness of breath. He is a former smoker, quit in his 30’s after smoking about $\frac{1}{2}$-1ppd on and off for about 10 years. He is an artist and lives in rural area in western Massachusetts. He has not had any exposures to tuberculosis. He has not had asthma. He does not recall being exposed to pertussis or having childhood infections.

• He has several episodes of bronchitis or pneumonia each year. He is very short of breath with exertion. He does not have any other medical problems.
A case continued…

- Exam: well appearing. No lymphadenopathy. Heart exam is normal. Lungs sounds are diminished but without wheezes or crackles.

- Labs: normal CBC and differential, normal electrolytes. Previously had a normal alpha-1 antitrypsin level. His IgG levels are slightly reduced.

- ECG: Normal sinus rhythm without ST or T wave changes.
### Spirometry:

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Measured</th>
<th>% Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>3.15</td>
<td>76</td>
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</tr>
<tr>
<td>FEV1</td>
<td>1.32</td>
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<td>FEF25-75%</td>
<td>0.46</td>
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<td>FEV1/FVC</td>
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<tr>
<td>TOT</td>
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### Lung Volumes:

<table>
<thead>
<tr>
<th></th>
<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
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</thead>
<tbody>
<tr>
<td>TLC</td>
<td>5.79</td>
<td>97</td>
<td>8.00</td>
</tr>
<tr>
<td>FRC</td>
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<tr>
<td>RV</td>
<td>2.56</td>
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<td>1.84</td>
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<td>RV/TLC</td>
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<td>144</td>
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<tr>
<td>VC</td>
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<tr>
<td>IC</td>
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<td>2.71</td>
</tr>
<tr>
<td>ERV</td>
<td>0.82</td>
<td>57</td>
<td>1.45</td>
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</table>

### Diffusion Capacity:

<table>
<thead>
<tr>
<th></th>
<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dsb</td>
<td>13.97</td>
<td>51</td>
<td>27.50</td>
</tr>
<tr>
<td>VAsb</td>
<td>4.71</td>
<td>79</td>
<td>6.00</td>
</tr>
<tr>
<td>Hgb</td>
<td>14.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinsp</td>
<td>3.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DsbHb</td>
<td>13.97</td>
<td>51</td>
<td>27.50</td>
</tr>
<tr>
<td>D/VAsbHb</td>
<td>2.97</td>
<td>65</td>
<td>4.58</td>
</tr>
</tbody>
</table>
What can we do?

- Lung transplant?
- More medications?
- Less medications?
- Pulmonary rehabilitation?
- Help him manage his COPD?
Definition of COPD (GOLD report 2009)

Chronic Obstructive Pulmonary Disease (COPD) is a *preventable and treatable disease* with some significant extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an *abnormal inflammatory response* of the lung to noxious particles or gases.
COPD is also associated with dyspnea, cough, exercise limitation, recurrent respiratory infections, and death.
Mechanisms of Disease

Figure 1. Specimens from the Small Airways in the Healthy Lung of a Nonsmoker and the Lung of a Smoker with COPD.

In the specimen of the small airways (membranous bronchioles) from the healthy lung of a nonsmoker (Panel A), the airway walls are thin, and intact alveoli are attached along its circumference. In a comparable specimen from the lung of a smoker with COPD (Panel B), the diameter of the airway is narrowed, the airway wall is thickened, and many of the alveolar attachments are broken. CD8+ T lymphocytes (in red) infiltrate the airway wall in the specimen from the smoker with COPD (Panel B) but not in the specimen from the nonsmoker (Panel A) (immunostaining with antihuman CD8; counterstained with hematoxylin). Images courtesy of Dr. Fiorella Calabrese.

Mechanisms of disease

Step 1 – Innate immune response to cigarette smoke

**Figure 3. Initial Response to Cigarette Smoke — Step 1 in the Process Leading to COPD.**

Cigarette smoke injures epithelial cells, which release "danger signals" that act as ligands for toll-like receptors (TLRs) in the epithelium. These actions trigger the production of chemokines and cytokines, which results in an innate inflammation. Products from the inflammatory cells may injure the extracellular matrix, leading to the release of TLR ligands and consequent TLR activation, which will promote further inflammation, tissue injury, and the production of antigenic substances. This chain of events may cause dendritic cells to mature and migrate to local lymph organs, where, if the conditions are favorable, T-cell activation may result, with progression of the disease. If the innate inflammation in step 1 is minimized or controlled, the inflammation will not progress to adaptive immunity, and the disease may be arrested. These processes are typical of smokers who have neither COPD nor Gold stage 1. GM-CSF denotes granulocyte–macrophage colony-stimulating factor. HSP heat-shock protein, ICAM-1 intercellular adhesion molecule 1, MCP-1 monocyte chemotactic protein 1, and TNF tumor necrosis factor.

Step 2 – Proliferation of T-cells

Step 3 – Adaptive immune response

Burden of COPD

• One of every 20 deaths.
• In 2009, 9.9 million persons were diagnosed with chronic bronchitis.
• 10% of general population and 50% of heavy smokers
• Excess health expenditures: $6,000 per year for every patient in the U.S.
• The number of deaths from COPD is increasing in women.
• COPD is the 3rd leading cause of death and the 12th leading cause of morbidity
So how do we manage a common, chronic disease associated with high morbidity and mortality?
Global initiative for chronic Obstructive Lung Disease (GOLD)

- 1998: Created by the U.S. NHLBI and WHO
- Goal of increasing awareness of COPD to improve prevention and management
- Published first consensus report 2001
- Updated recommendations in 1/2014
The “GOLD” Standard: Make the diagnosis!

• “Spirometry should be performed on individuals over age 40 with symptoms or history suggestive of COPD”

• Remember, it is a preventable and treatable disease!
Consider COPD Diagnosis if patients:

- Complain of dyspnea
- Complain of chronic cough
- Complain of chronic sputum production
- Have a history of exposure to risk factors (smoking/tobacco, biomass cooking, occupational and environmental exposures to dusts, chemicals, pollution)
- Have a history of previous infections (tuberculosis, childhood infections)
NOTE: Severity of COPD ≠ Severity of Obstruction

- Obstruction (defined as FEV1/FVC ratio of less than 0.7)
  - Stage I (Mild): FEV1 ≥ 80%
  - Stage II (Moderate): 50% ≤ FEV1 < 80%
  - Stage III (Severe): 30% ≤ FEV1 < 50%
  - Stage IV (Very Severe): FEV1 < 30% (OR < 50% plus chronic respiratory failure**)

- **PaO2 less than 60 mmHg and/or PaCO2 > 50 mmHg constitutes chronic respiratory failure
2009 GOLD Updated Statement

- “Where possible, values (for FEV1/FVC) should be compared to age-related normal values to avoid over-diagnosis of COPD in the elderly.”

- “Using the fixed ratio of FEV1/FVC (<0.7) is particularly problematic in milder patients who are elderly as the normal process of aging affects lung volumes”
Over-diagnosis of COPD

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
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<tbody>
<tr>
<td>Age</td>
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</tr>
<tr>
<td>Birth Date</td>
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</tr>
<tr>
<td>Height</td>
<td>154.90 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>55.00 kg</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
</tr>
<tr>
<td>Smoke Status</td>
<td>Quit</td>
</tr>
<tr>
<td>Pack years</td>
<td>43</td>
</tr>
<tr>
<td>Smoke Time</td>
<td>43</td>
</tr>
<tr>
<td>Quit Time</td>
<td>20</td>
</tr>
<tr>
<td>Smoke Per Day</td>
<td>1</td>
</tr>
<tr>
<td>Technician Name</td>
<td>dd</td>
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</table>

**Spirometry:**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>1.74</td>
<td>81</td>
<td>2.15</td>
</tr>
<tr>
<td>FEV1</td>
<td>1.17</td>
<td>84</td>
<td>1.39</td>
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<tr>
<td>FEF25-75%</td>
<td>0.63</td>
<td>37</td>
<td>1.69</td>
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<tr>
<td>FEV1/FVC</td>
<td>67.25</td>
<td>104</td>
<td>64.71</td>
</tr>
<tr>
<td>FEFmax</td>
<td>9.65</td>
<td>70</td>
<td>5.21</td>
</tr>
<tr>
<td>TET</td>
<td>11.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Age:** 67  
**Birth Date:** 1/2/1942  
**Height:** 174.00 cm 68.50 in  
**Weight:** 89.10 kg 196.02 lbs  
**Gender:** Male  
**Race:** White  
**Smoke Status:** Quit  
**Pack years:** 25  
**Smoke Time:** 25  
**Quit Time:** 12  
**Smoke Per Day:** 1  
**Technician Name:** DEF

### Spirometry:

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
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</thead>
<tbody>
<tr>
<td>FVC</td>
<td>2.27</td>
<td>54</td>
<td>4.23</td>
</tr>
<tr>
<td>FEV1</td>
<td>0.81</td>
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### Plethysmography:

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<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
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<tbody>
<tr>
<td>TLC</td>
<td>6.89</td>
<td>104</td>
<td>6.62</td>
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<tr>
<td>FRC</td>
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<td>168</td>
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</tr>
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</tr>
<tr>
<td>IC</td>
<td>1.38</td>
<td>48</td>
<td>2.87</td>
</tr>
<tr>
<td>ERV</td>
<td>1.32</td>
<td>97</td>
<td>1.36</td>
</tr>
</tbody>
</table>

### Diffusion Capacity:

<table>
<thead>
<tr>
<th></th>
<th>Pre-Drug Measured</th>
<th>Pre-Drug % Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dsb</td>
<td>3.90</td>
<td>15</td>
<td>25.19</td>
</tr>
<tr>
<td>VAsb</td>
<td>3.80</td>
<td>57</td>
<td>6.62</td>
</tr>
<tr>
<td>Hgb</td>
<td>14.60</td>
<td></td>
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</tr>
<tr>
<td>Vinsp</td>
<td>2.45</td>
<td>15</td>
<td>25.19</td>
</tr>
<tr>
<td>Dsh/Hgb</td>
<td>3.90</td>
<td>27</td>
<td>3.81</td>
</tr>
<tr>
<td>D/VAsbHgb</td>
<td>1.03</td>
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</table>
Combined Assessment Using Spirometry, Symptoms, and Exacerbation History
mMRC (modified British Medical Research Council) dyspnea scale

Table 1. Modified Medical Research Council Dyspnoea Scale*. From the Global Strategy for Diagnosis, Management, and Prevention of COPD, revised 2011. Used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

| mMRC Grade 0 | 1. I only get breathless with strenuous exercise. |
| mMRC Grade 1 | 2. I get short of breath when hurrying on the level or walking up a slight hill. |
| mMRC Grade 2 | 3. I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level. |
| mMRC Grade 3 | 4. I stop for breath after walking about 100 meters or after a few minutes on the level. |
| mMRC Grade 4 | 5. I am too breathless to leave the house or I am breathless when dressing or undressing. |

*The original MRC scale has a score of 1-5 whilst the mMRC scores 0-4. An mMRC score of 0 corresponds to an MRC score of 1, mMRC score of 1=mMRC score 2 etc.
From Diagnosis to Treatment: COPD
Therapy Goals

- Reduce mortality
- Symptom control (dyspnea, exercise limitation, cough, wheezing)
- Reduce exacerbation frequency
- Reduce need for hospitalizations
Reducing Mortality

• **Smoking cessation:** should be first and foremost focus of treatment as it is the only proven method of reducing mortality and rate of lung function decline

• **Oxygen therapy:** Patients with resting hypoxemia has been shown to reduce mortality
  - ≤ 88 % (PaO2 55 mmHg) oxygen should be prescribed for 15-18 hours a day to keep PaO2 > 60mmHg and SaO2 > 90%**
  - ≤ 89% with presence of cor pulmonale

Smoking Cessation

• “At every possible opportunity individuals who smoke should be encouraged to quit”.
  – GOLD Executive Summary 2009

• “At every possible opportunity, healthcare providers should be encouraged to help their patients quit smoking”.
  – Douglas Beach, Today
Smoking Cessation (at every visit)

US Public Health Service 5 step program

1. ASK
2. ADVISE
3. ASSESS
4. ASSIST
5. ARRANGE

JAMA 2000; 28:3244-54
NEJM 2011;365:1222-31
Fiore M, et al. NEJM 2011

- For patients who are not ready to quit...

- *Motivational Interviewing* to discuss the “5 R’s”
  - personally *relevant* reasons to quit
  - *risks* associated with continued smoking
  - *rewards* for quitting
  - *roadblocks* to successful quitting
  - *repetition* of the counseling at subsequent clinic visits
Table 1. Treatment Recommendations for Counseling Smokers.*

Smokers who are willing to attempt to quit now

Provide support.

- Provide an empathic environment.
- Encourage the patient: “My office staff and I are here to help you quit.” “I’m recommending treatments that can help you succeed.”
- Provide brief counseling on smoking cessation.
- Ask the patient: “Set a quit date, ideally within 2-3 wk; tell others and ask for support (e.g., ask other smokers not to smoke around the patient); and anticipate and plan for challenges and temptations.
- Discuss when the patient can overcome future challenges (including stress, alcohol use, exposure to other smokers, and weight gain).
- Ask when these challenges will occur and what they will be, and discuss how the patient can avoid them or cope. Emphasize healthy eating and an active lifestyle.
- Encourage the patient to remove tobacco from his or her home, car, and work environment.
- Urge total abstinence starting on the quit date, and emphasize adherence to treatment, even if a brief return to smoking occurs.

Provide counseling about medication.

- Note the effectiveness of seven FDA-approved medications for smoking cessation.
- Discuss the patient’s concerns.
- Recommend medication with consideration of its effectiveness, cost, and contraindications as well as the patient’s preferences.
- Encourage the use of varenicline or combination nicotine-replacement therapy.
- Consider optional use of nicotine patch for 2-3 wk before the patient attempts to quit.
- Encourage adherence to medication.
- Address myths about the addictiveness and harm of medications.

Provide supplemental materials and information.
- Cessation counseling by telephone (e.g., 1-800-QUIT-NOW [1-800-784-8669]).
- Online cessation support (e.g., www.smokefree.gov and www.womensmokefree.gov).
- Booklets on relapse prevention (e.g., Forever Free, available at www.smokefree.gov/resources.aspx).

Smokers who are unwilling to attempt to quit now

Use motivational interviewing techniques.

- Express empathy.
  - Respond so that the patient feels heard and understood and knows that you care about his or her views and wishes.
  - Ask open-ended questions: “What might happen if you quit?”
  - Use reflective listening to communicate understanding: “I hear that you are worried about weight gain and not being successful in quitting.”
  - Normalize the patient’s feelings and concerns: “Most smokers, like you, have tried several times before they quit successfully.”
  - Support the patient’s autonomy: “I hear that you are not ready to quit. Just let me know when you would like to try and I will help.”
  - Encourage the patient to recognize the discrepancy between his or her continued smoking and the importance of quitting.
  - Accept the patient’s ambivalence about quitting, but support him or her strongly held values and goals that are inconsistent with smoking.
  - Highlight how the patient’s current behavior is inconsistent with important values and goals: “So, you are strongly committed to your kids, and you worry that your smoking is not the best thing for them.”
  - Support the patient’s “change talk”: “Yes, I think you are right that it helps to plan ahead for an attempt to quit.”
  - Strengthen the patient’s values that conflict with smoking: “I am impressed with your strong desire not to feel like an addict — to be free from smoking.”
  - Accept the patient’s resistance to change related to quitting.
  - Be open to the patient’s ambivalence and reason not to attempt to quit.
  - Back off if the patient expresses resistance: “You are tired of people trying to get you to quit — I can understand that.”
  - Tell the patient that you hear and respect his or her misgivings: “Because medication did not help you before, you think a different medication will not help you now.”
  - Ask permission to help: “May I tell you what I think will help you quit?”
  - Support the patient’s self-efficacy with respect to quitting and the patient’s belief that she or he can quit.
  - Build on past successes: “You were able to stop smoking for a couple of weeks the last time you tried — that means that you really have the skills to fight urges and resist temptation.”
  - Give the patient choices and control over how to proceed: “Which of these treatments sounds good to you?”
  - Encourage smoking reduction plus nicotine-replacement therapy.
  - Consider the use of nicotine-replacement therapy for 2-6 mo.

Help the patient formulate a smoking-reduction plan, including a reduction in daily smoking as much as possible and elimination of smoking entirely in key environments and activities (e.g., in the car and while watching television).

* Adapted from Fiore et al.2 FDA denotes Food and Drug Administration.
Motivational Interviewing (Fiore M, et al. NEJM 2011)

• Smokers who are willing to quit
  ▪ Discuss: Quit date, barriers, medication counseling
  ▪ “I’m recommending treatments that can help you succeed”
  ▪ Phone counseling (1-800-QUIT-NOW)
  ▪ Online Support:
    • www.smokefree.gov
    • www.quitworks.makesmokinghistory.org

• Smokers who are unwilling to quit
  ▪ Empathy: “What might happen if you quit”; “I understand you are not yet ready to quit. Let me know when you are and I can help.”
  ▪ Highlight discrepancy between smoking and desire for good health
  ▪ Accept the patient’s resistance to quitting
  ▪ Support self-efficacy and respect belief of ability to quit
  ▪ Encourage smoking reduction and NRT
Electronic cigarettes?

“freedom to have a cigarette without the guilt.”
— Jenny McCarthy

Find a blu Retailer Near you!

Check out Stephen Dorff in “Chase It”

Get Started
Are they safer than cigarettes?

Lethal Liquid Nicotine

Selling a Poison by the Barrel: Liquid Nicotine for E-Cigarettes

By MATT HOSTELL  MARCH 29, 2016
COPD Guidelines
Recommended treatment of COPD by GOLD stage (2009)

Stage I (MILD): FEV1 ≥ 80%
  - Short acting bronchodilator when needed
Stage II (MODERATE): 50% ≤ FEV1 < 80%
  - One or more long-acting bronchodilators
Stage III (SEVERE): 30% ≤ FEV1 < 50%
  - All of the above plus...
    - Inhaled corticosteroids if repeated exacerbations
Stage IV (VERY SEVERE): FEV1 < 30% OR < 50% plus chronic respiratory failure
  - Pulmonary rehabilitation
  - Consider surgical treatments
  - Oxygen therapy for hypoxemia
## GOLD updated 2014 Guidelines

### Management of stable COPD: Therapy by GOLD disease severity as assessed by symptoms and risk (as determined by exacerbations and airflow limitation)

<table>
<thead>
<tr>
<th>Category</th>
<th>Symptoms</th>
<th>Risk</th>
<th>Suggested Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Less symptomatic (less breathlessness with activity or negative impact on activity or work)</td>
<td>Low-risk</td>
<td>Avoidance of risk factors, smoking cessation, influenza vaccination, pneumococcal vaccination, regular physical activity, long-term oxygen therapy if severe hypoxemia, prednisone (if necessary)</td>
</tr>
<tr>
<td>B</td>
<td>More symptomatic (person to walk slower than others of same age due to breathlessness, has to stop to walk or breathless at 0.1 km or less due to breathlessness or 80 breaths/min)</td>
<td>Moderate-risk</td>
<td>Short-acting bronchodilator when needed and pharmacologic rehabilitation, First choice: short-acting bronchodilator, Second choice: regular treatment with a long-acting bronchodilator and long-acting beta agonist, Albuterol: short-acting beta agonist and/or short-acting anticholinergic as needed, Albuterol: short-acting beta agonist and/or short-acting anticholinergic, Canseverin, Influenza, Pneumococcal</td>
</tr>
<tr>
<td>C</td>
<td>Less symptomatic (less breathlessness with activity or negative impact on activity or work)</td>
<td>High-risk</td>
<td>Short-acting bronchodilator when needed and pharmacologic rehabilitation, First choice: long-acting bronchodilator and/or long-acting beta agonist, canseverin, Influenza, Pneumococcal, Canseverin, Influenza, Pneumococcal</td>
</tr>
<tr>
<td>D</td>
<td>More symptomatic (has to walk slower than others of same age due to breathlessness, has to stop to walk or breathless at 0.1 km or less due to breathlessness or 80 breaths/min)</td>
<td>High-risk</td>
<td>Short-acting bronchodilator when needed and pharmacologic rehabilitation, First choice: regular treatment with a combination inhaler (long-acting bronchodilator and/or long-acting beta agonist), canseverin, Influenza, Pneumococcal, Canseverin, Influenza, Pneumococcal</td>
</tr>
</tbody>
</table>

**Notes:**
- Patients must be taught how and when to use their treatments, and treatment choices are adjusted based on their response.
- Medications being prescribed for other conditions should be reviewed.
GOLD Recommendations

• Long-term monotherapy with inhaled corticosteroids is not recommended.

• Long-term therapy with oral corticosteroids is not recommended.

• Consider phosphodiesterase-4 inhibitor for patients with Stage 3 or 4 disease with frequent exacerbations.

• Theophylline (which has non-selective PDE inhibition) may be adjunctive therapy but is associated with increased cardiac AE.
ACP Clinical Practice Guidelines 2011

1. Spirometry to diagnose airway obstruction in symptomatic patients (strong)

2. Inhaled bronchodilators for symptomatic patients with FEV1 60-80% (weak)

3. Inhaled bronchodilators for symptomatic patients with FEV1 < 60% (strong)

4. Long acting BD for symptomatic patients with FEV1 < 60% (strong)

5. Combination LABA, LAMA, or ICS for symptomatic patients with FEV1 < 60% (weak)

6. Pulmonary rehabilitation for symptomatic patients with FEV1 < 50% or exercise limited patients with FEV1 > 50% (weak)

7. O2 therapy with resting hypoxemia (PaO2 < 55 mmHg or SaO2 < 89%) (Strong)
Inhaled Corticosteroids Increase Risk of Pneumonia

- TORCH Trial (fluticasone 1000mcg/day) associated with 64% increased risk of pneumonia vs. placebo

- INSPIRE Trial (fluticasone 1000mcg/day) associated with 94% increased risk of pneumonia vs. placebo

- High dose budesonide associated with lower risk of pneumonia vs. high dose fluticasone in a cohort study (RR 2.22 vs. 1.13) and no increased risk of pneumonia in low dose budesonide vs. Controls (No IC) (Suissa S et al. Thorax;68:2013.)
COPD Therapy Goals

- Reduce mortality
- Symptom control (dyspnea, exercise limitation, cough, wheezing)
- Reduce exacerbation frequency
- Reduce need for hospitalizations
Acute Exacerbations of COPD

- Defined by 2 or more cardinal features:
  - Change in baseline shortness of breath
  - Change in sputum volume
  - Change in sputum purulence
Exacerbations of COPD

- Exacerbations are “a natural event in the course of the disease...” GOLD Pocket Guide to COPD Diagnosis 2009
AECOPD Frequency

- N=2138
- Prospective
- “Events that led to prescription of ... antibiotic or corticosteroids (or both) ... or that led to hospitalizations.”
- Severe exacerbations defined as AECOPD leading to hospitalization
AECOPD (Hurst JR, et al, 2010)

- Rates of exacerbation increase with:
  - decrease in FEV1 (and GOLD stage)
  - prior history of exacerbations
  - GERD
  - Elevated WBC
  - Poorer QOL

<table>
<thead>
<tr>
<th>GOLD stage</th>
<th>Rate of AE per year (per person)</th>
<th>% with 2+ AE/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.85</td>
<td>22%</td>
</tr>
<tr>
<td>3</td>
<td>1.34</td>
<td>33%</td>
</tr>
<tr>
<td>4</td>
<td>2.0</td>
<td>47%</td>
</tr>
</tbody>
</table>
Does Pharmacologic Therapy help Achieve COPD Therapy Goals?

- Reduce mortality
- Symptom control (dyspnea, exercise limitation, cough, wheezing)
- Reduce exacerbation frequency
- Reduce need for hospitalizations
UPLIFT (Understanding Potential Long term Impacts on Function with Tiotropium, NEJM 2008)

- 4 year prospective trial of Placebo vs. tiotropium
- Improved health-related quality of life
- Delay in the time to first exacerbation (median time of 16.7 months vs. 12.5 months)
- Delay in the time to first hospitalization
- Reduced episodes of respiratory failure
- No change in mortality
TORCH (Towards a Revolution in COPD Health, NEJM 2007)

- 3 year RCT, n=6112
- Placebo vs. LABA vs. IC vs. IC+LABA
- Lower rates of exacerbations
- Lower rate of decline in FEV1 in all groups vs. placebo, greatest in the combined group
- Higher probability of pneumonia in groups with IC (19% vs. 12%)
- Higher drop-out rate in the placebo arm
Pulmonary Rehabilitation

"What do you mean you're out of breath? I haven't switched it on yet!"
Pulmonary Rehabilitation

- Generally 3 times per week for 7-10 weeks

- Benefits:
  - Reduce hospitalizations
  - Reduce depression/anxiety
  - Improve exercise tolerance

- Effect has been shown to persist for 12 months

- Cost: One estimate $2,200/patient

(Casaburi R. NEJM, 2009)
What is new? (And…Is “New” better?)

• LA-antimuscarinic monotherapy:
  ▪ aclidinium 400mcg inhaled BID (Tudorza Pressair)

• IC/LA-beta agonist combination therapy (once daily):
  ▪ fluticasone-vilanterol 100mcg-25 one inhalation QD (Breo Ellipta)

• LA-antimuscarinic/LA-beta agonist combination therapy:
  ▪ umeclidinium-vilanterol 62.5 mcg-25mcg inhaled QD (Anoro Ellipta)
  ▪ aclidinium-vilanterol (Phase III studies completed and NDA pending)
New therapies for prevention of acute exacerbation of COPD

• Roflumilast (Daliresp) for prevention of AECOPD
  ▪ Recently approved (2011)
  ▪ *Phosphodiesterase-4 inhibitor* (novel mechanism)
  ▪ Roflumilast 500 mcg vs 250 mcg vs placebo for 24 weeks
  ▪ 82% completed the study
  ▪ Fewer mean exacerbations in higher dose (0.75) vs. lower dose (1.03) vs placebo (1.13) over 24 weeks
  ▪ 50 ml improvement in FEV1 in roflumilast group (high dose) vs. placebo

Azithromycin for Prevention of AECOPD
(NEJM 2011;365:689-98.)

- 1142 patients, RCT of azithromycin 250 mg/day vs. placebo
- 1 year f/u ~90% both groups
- Frequency of exacerbations lower in azithromycin group

<table>
<thead>
<tr>
<th>Group</th>
<th>Rate of AECOPD per patient-year</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin</td>
<td>1.48</td>
<td>0.01</td>
</tr>
<tr>
<td>Placebo</td>
<td>1.83</td>
<td></td>
</tr>
</tbody>
</table>
Azithromycin reduces rates of AECOPD

- **Inclusion**
  - 40 years old
  - 10 pack years
  - Stage II or lower
  - Either: home o2, oral steroid in prior year, ED or hospital in prior year

- **Exclusion**
  - HR > 100
  - Prolonged QTc or meds that prolong QTc

- **Notable Side effects**
  - Hearing decrement in 25% vs. 20% (p=0.04)
Disease Management in COPD

- 743 patients with severe COPD at five VA Hospitals
- Spirometrically confirmed COPD at high risk for hospitalization (in past year):
  - Hospital admission
  - ED visit for COPD
  - Chronic home oxygen use
  - Course of systemic steroids

Rice et al. AJRCCM;182:2010.
Disease Management

• Control
  ▪ One page handout of the principles of COPD
  ▪ 24 hour VA nursing helpline (available to all VA patients)

• Intervention: (Monthly phone calls plus...)
  ▪ 1 to 1.5 hour group education session conducted by a respiratory therapist
    • General education of COPD
    • Inhaler technique
    • Review of medications
    • Smoking cessation counseling
    • Influenza and pneumococcal vaccine counseling
    • Recommendations for exercise
    • Hand hygiene
    • Refillable prescription for prednisone and an oral antibiotic prescription with action plan
# ALA Action Plan

**American Lung Association**

**My COPD Action Plan**

Actions to take if my symptoms get worse

This plan is to be completed by patients with the help of their physician/health care provider. The patient should bring this form to each doctor appointment and update as needed.

This symptom list below is comprehensive but you may experience other symptoms. If you are unclear as to the actions you should take, please contact your physician/health care provider.

<table>
<thead>
<tr>
<th>Green Zone: I am doing well today</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Usual activity and exercise level</td>
<td>• Take daily medicines</td>
</tr>
<tr>
<td>• Usual amounts of cough and phlegm/mucus</td>
<td>• Use oxygen as prescribed</td>
</tr>
<tr>
<td>• Sleep well at night</td>
<td>• Continue regular exercise/diet plan</td>
</tr>
<tr>
<td>• Appetite is good</td>
<td>• At all times avoid cigarette smoke, inhaled irritants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yellow Zone: I am having a bad day or a COPD flare*</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More breathless than usual</td>
<td>• Continue daily medications</td>
</tr>
<tr>
<td>• I have less energy for my daily activities</td>
<td>• Use quick relief inhaler every ____ hours</td>
</tr>
<tr>
<td>• Increased or thicker phlegm/mucus</td>
<td>• Start Prednisone: ______________________</td>
</tr>
<tr>
<td>• Change in color of phlegm/mucus</td>
<td>• Start Antibiotic: ______________________</td>
</tr>
<tr>
<td>• Using quick relief inhaler more often</td>
<td>• Use oxygen as prescribed</td>
</tr>
<tr>
<td>• Swelling of ankles more than usual</td>
<td>• Get plenty of rest</td>
</tr>
<tr>
<td>• More coughing than usual</td>
<td>• Use pursed lip breathing</td>
</tr>
<tr>
<td>• I feel like I have a &quot;chest cold&quot;</td>
<td>• At all times avoid cigarette smoke, inhaled irritants</td>
</tr>
<tr>
<td>• Poor sleep and my symptoms woke me up</td>
<td>• Call provider if symptoms don’t improve</td>
</tr>
<tr>
<td>• My appetite is not good</td>
<td></td>
</tr>
<tr>
<td>• My medicine is not helping</td>
<td></td>
</tr>
</tbody>
</table>

* Please call your physician immediately if your symptoms persist (see Red Zone below).

<table>
<thead>
<tr>
<th>Red Zone: I need urgent medical care</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Severe shortness of breath even at rest</td>
<td>• Call 911 or have someone take you to the emergency room</td>
</tr>
<tr>
<td>• Not able to do any activity because of breathing</td>
<td>• Increase oxygen to: ______________________</td>
</tr>
<tr>
<td>• Not able to sleep because of breathing</td>
<td>• Take Prednisone: ______________________</td>
</tr>
<tr>
<td>• Fever or chills</td>
<td></td>
</tr>
<tr>
<td>• Feeling confused or very drowsy</td>
<td></td>
</tr>
<tr>
<td>• Chest pains</td>
<td></td>
</tr>
<tr>
<td>• Coughing up blood</td>
<td></td>
</tr>
</tbody>
</table>

For more information visit www.lung.org or call 1-800-LUNGUSA (586-4872)
Baseline COPD Disease Management Trial
(Rice et al. 2010)

- 1739 patients eligible

- 761 attended initial study appointment (57.8%)
  - 371 Usual care
  - 372 Disease Management
Outcomes

• Primary
  ▪ Combined ED and hospitalizations (1-year follow-up)
    • Lower in intervention vs. control (27.4% vs. 39.1%)
    • 11.7% absolute risk reduction (CI, 4.9-19.4; p < 0.001)

• Secondary outcomes
  ▪ Significant reduction in COPD related ED visits
    • 42.4/100 patient- vs. 20.8; RR 0.49; 95% CI, 0.33-0.72)

Don’t try to improve a good thing

• Comprehensive Care Management Program (CCMP) for COPD
• Planned 960 patients
  ▪ Intervention: 4 individual sessions and 1 group session, COPD Action Plan
  ▪ Control: Handouts for COPD booklet
• Stopped early for increased mortality in intervention group (n=426) by VAMC Data/Safety Monitoring Board
  ▪ Intervention: 10 deaths from COPD
  ▪ Control: 3 deaths from COPD
  ▪ HR intervention 3.60 (CI, 0.99 to 13.08)

• Limitations included:
  ▪ Considerable variability in the intensity of initial educational program
  ▪ **Less focus** on smoking cessation, diet and exercise
  ▪ Less frequent phone calls from earlier trials
  ▪ Action plan **did not improve early initiation of therapy** for AECB
  • Patients instructed on start prednisone/abx within 2 days
  • AECB rates higher in intervention group (2.5/yr vs. 2.1/yr: \( p=0.011 \))
  • Delay treatment was similar:
    – Start prednisone: 6.4 days vs. 7.7 days in intervention vs. treatment \( p=0.48 \)
    – Start Abx: 7.0 days vs. 6.8 days in intervention vs. treatment \( p=0.84 \)
Advanced therapies

Referral to pulmonary medicine or other specialist:

- Persistent symptoms.
- Recurrent exacerbations.
- Consider alternative diagnosis: chronic obstructive asthma, bronchiectasis, alpha-1 antitrypsin deficiency, congestive heart failure.
- Significant comorbidities: cardiac, sleep disorders, or immune deficiency.
- Discussion of goals of care and palliation of symptoms.
- Help with medication compliance and other goals of care with Visiting Nurse or RN care management.
Take home points

• Spirometry should be performed in patients greater than age 40 who are at-risk for COPD.

• Severity of COPD is based on FEV1, presence of resting hypoxemia or hypercarbia, symptoms of dyspnea, and frequency of exacerbations.

• Medications for treatment of COPD are safe, improve symptoms, and reduce the risk of exacerbations.

• History of prior acute exacerbations of COPD is the main predictor of future exacerbations. GERD, severity of airflow obstruction, and leukocytosis are also predictors of future exacerbations.

• Disease management programs may reduce the risk of ED visits or hospitalizations
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- Douglas Beach, MD

- Allison Gold, RN

- Christy Smith, PFT Lab Manager