Outpatient Management of COPD

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Disclosure

• No financial relationships.

• The following presentation does not reflect the views or opinions of EAMC, the Army Medical Corps or the Department of Defense.
Learning Objectives

• Review the classification schemes for COPD
• Enhance knowledge of non-pharmacologic and pharmacologic treatments for COPD
• Utilize disease severity to determine the optimal treatment regimen
WHO defines COPD

• “Chronic obstructive pulmonary disease (COPD), a common preventable and treatable disease, is characterized by airflow limitation that is usually progressive and 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."
Outline

• Introduction
• Classification and Prognostic determination
• Therapy and Management
  – Non-pharmacologic
  – Pharmacologic
  – Surgical
  – Acute exacerbation
• Questions
Which is true regarding mortality of COPD?

- A. 4\textsuperscript{th} leading cause of death in US and affects more women then men.
- B. #1 cause of death and affects sexes equally
- C. 4\textsuperscript{th} leading cause of death in US and affects more men than women
- D. 8\textsuperscript{th} leading cause of death

The correct answer is A.
Overview

• Growing global health problem
• 5% of population affected
• Chronicity resulting in rising health care costs
• Mortality rate: 4th leading cause of death according WHO statistics
  – Women account for rise in death rate over past 30 years (Mannino DM. Resp Care 2002;47:1184-99).
Definition

- **Symptoms**
  - Dyspnea
  - Cough
  - Sputum production

- **Exposure risk**
  - Tobacco (80%)
  - Occupational and Environmental exposure
    - Biomass fuels, dust, particulate matter

- **Airflow obstruction, persistent**
  - $\text{FEV1/FVC} < 0.7$
Pathophysiological Features of Airflow Obstruction in Chronic Obstructive Pulmonary Disease (PhPathoCOPD).

MIDVALE
SCHOOL FOR
THE GIFTED
Classification

• Symptom scales
  – Modified Medical Research Council (MMRC)
  – COPD assessment test (CAT)
  – St George’s Respiratory Questionnaire (SGRQ)

• Prognostic indicator
  – BODE=Body mass index, obstruction, dyspnea, exercise capacity

• GOLD 2011 vs 2007
  – Symptoms, exacerbation history & FEV1 to guide therapy
MMRC

• **Grade: [Blank] Description**

• **0** = I only get breathless with strenuous exercise

• **1** = I get short of breath when hurrying on level ground or walking up a slight hill

• **2** = On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace

• **3** = I stop for breath after walking about 100 yards or after a few minutes on level ground

• **4** = I am too breathless to leave the house or I am breathless when dressing.

**COPD Assessment Test**

- Designed as a quality of life measure
- 8 questions, each rated 0-5
  - Low impact 0-10
  - Medium impact 11-20
  - High impact 21-30
  - Very high impact 31-40
- Developed by industry and can be accessed at [www.catestonline.org](http://www.catestonline.org)
- Integrated by GOLD 2011 initiative
Take the COPD Assessment Test (CAT)

This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

Example: I am very happy [X] I am sad

I never cough

I have no phlegm (mucus) in my chest at all

My chest does not feel tight at all

When I walk up a hill or one flight of stairs I am not breathless

I am not limited doing any activities at home

I am confident leaving my home despite my lung condition

I sleep soundly

I have lots of energy

I cough all the time

My chest is full of phlegm (mucus)

My chest feels very tight

When I walk up a hill or one flight of stairs I am very breathless

I am very limited doing activities at home

I am not at all confident leaving my home because of my lung condition

I don’t sleep soundly because of my lung condition

I have no energy at all

COPD Assessment Test and CAT logo is a trade mark of the GlaxoSmithKline group of companies. ©2009 GlaxoSmithKline group of companies. All rights reserved.

CLICK TO GET YOUR TOTAL SCORE!
SGRQ

• Widely used in research protocols
• 76 item questionnaire
  – 3 component scores
    • Symptoms
    • Activity
    • Impact on daily life
  – Total score
• Not used in routine clinical practice
Prognostic Tool

- **Body Mass Index**
  - Less than 21

- **Obstruction**
  - Severity of FEV1 post bronchodilator

- **Dyspnea**
  - MMRC rating

- **Exercise Capacity**
  - 6minute walk distance

Estimates 4 year survival

<table>
<thead>
<tr>
<th>Points</th>
<th>Survival (%)</th>
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<tbody>
<tr>
<td>0-2</td>
<td>80</td>
</tr>
<tr>
<td>3-4</td>
<td>67</td>
</tr>
<tr>
<td>5-6</td>
<td>57</td>
</tr>
<tr>
<td>7-10</td>
<td>18</td>
</tr>
</tbody>
</table>

GOLD Classification

• Global Initiative for chronic obstructive lung disease
• NHLBI and WHO collaboration
• 2007 Classification based on FEV1
• 2011 modifies classification
  – Deemphasize FEV1 alone
  – Adds symptom control and risk assessment
  – Annual updates
GOLD 2007

<table>
<thead>
<tr>
<th>Stage</th>
<th>Severity</th>
<th>Post BD FEV1 (%predicted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mild</td>
<td>&gt;80</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>50 - 79</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
<td>30 - 49</td>
</tr>
<tr>
<td>4</td>
<td>Very severe</td>
<td>&lt;30, or &lt;50 + CRF</td>
</tr>
</tbody>
</table>
GOLD 2011

Figure 1. COPD Patient Staging Assessment Tool

- **C**: High Risk, Less Symptoms
- **D**: High Risk, More Symptoms
- **A**: Low Risk, Less Symptoms
- **B**: Low Risk, More Symptoms

**RISK**
- 3-4
- 1-2

**GOLD Classification**
- 0-1
- ≥2

**Exacerbation History**
- 0-1
- ≥2

**SYMPTOMS**
- mMRC: Modified British Medical Research Council
- CAT: COPD Assessment Test
- COPD: chronic obstructive pulmonary disease
- GOLD: Global Initiative for Chronic Obstructive Lung Disease

Source: Reference 4.
First pants, THEN your shoes
Which of the following management strategies provides a mortality benefit in COPD?

- A. Optimal medical therapy
- B. Pulmonary rehabilitation program
- C. Smoking cessation
- D. Insuring appropriate vaccination status

• The answer is C. smoking cessation
Management Goals

• Combine Non-pharmacologic and pharmacologic treatments
• Disease severity guides therapy
• Reduce symptom impact
  – Relieve acute and mitigate chronic symptoms
  – Improve exercise tolerance
• Reduce risk of long term complications
  – Prevent disease progression
  – Prevent and treat acute exacerbations
  – Reduce mortality

GOLD 2011 (updated Jan 2014).
Non-pharmacologic Therapy

- Smoking cessation
- Vaccines
- Pulmonary rehabilitation
- Oxygen therapy
Smoking Cessation

• Lung Health Study findings
• Cessation resulted in:
  – Reduction in FEV1 decline
  – Reduced long term, all cause mortality
• Mild to moderate COPD subjects
  – Extrapolated to severe patients

Smoking Cessation

• Approaches
  – Physician role
  – Counselling/group program
  – Nicotine replacement
  – Oral agents
  – eCigarettes
• Best results with combination therapy
• Effect of “lung age” on cessation

• Ask
• Advise
• Assess
• Assist
• Arrange

• 35% at 1 year
• 22% sustained at 5 years
  – Lung Health Study

Tobacco Use

• #1 risk factor
• 80% of COPD patients in US
  – Environmental exposure
• Dose response relationship
  – Genetic predisposition for susceptibility
• <15pk years unlikely to result in obstruction
• 40pk years predicts obstruction
Fletcher-Peto Curve
Natural history of chronic airflow obstruction and smoking status
Disease Specific Vaccines

• Increased morbidity in COPD
  – Influenza
  – Pneumonia

• ACIP/ACP recommendations
  – Influenza for all patients > 6 months; annual
  – PPV 23 all adults with COPD; re-vaccinate in 5 yrs
    • Any adult >65
  – PCV 13 all adults > 65 (1 time dose)
Targets of Exercise Training as Part of a Pulmonary Rehabilitation Program for Patients with COPD.

Central desensitization to dyspnea

Decreased anxiety and depression

Reduction in dynamic hyperinflation

Improved skeletal-muscle function

Pulmonary Rehabilitation

• Disease progression and functional status
  – Muscle and CV deconditioning
• Goal: improve functional status
  – Structured and individualized
  – Exercise and education
  – Multiple sessions over 6-12 weeks
Pulmonary Rehabilitation

• Studies in severe disease (FEV1 < 50%)
• Improvement in:
  – Dyspnea scores
  – 6 minute walk distance
  – Quality of life, depression, sense of breathlessness
• Waning effect in 1 year
• Conflicting results in setting of AECOPD
  – BMJ 2004;329:1209-11
  – BMJ 2014;349:4315
Pulmonary Rehabilitation

- Who should be referred
  - Moderate to Severe disease
  - Reduced functional capacity
  - Cardiovascular disease excluded

- Combine with smoking cessation
Which of the following patient’s will derive a mortality benefit from long term oxygen therapy?

• A. 65 year old male with SaO2 86% during 6 minute walk test.
• B. 64 year old female with SaO2 nadir 84% during overnight oximetry testing
• C. 66 year old male with resting SaO2 86%
• D. 59 year old female with resting SaO2 89% without signs of cor pulmonale

• The answer is C.
Long Term Oxygen Therapy

- Mortality benefit in severe hypoxemia (PaO2 <55, SaO2 < 88% at rest)
  - MMRC (Lancet 1981:1:681-6)

- Established use of continuous O2
  - 18 hours/day including sleep
  - Target SaO2 >92%
Long Term Oxygen Therapy

• Mortality Benefit not proven
  – Moderate hypoxemia (PaO2 56-69)
    • Thorax 1997;52:674-9
  – Isolated nocturnal desaturation
    • Eur Respir J 1999;14:1002-8
  – Isolated exertional desaturation
    • Am J Respir Crit Care Med 2007;176:343-9

• Quality of life improvement?
  – In laboratory setting
  – Self reported metrics
## Indications for long-term oxygen therapy

<table>
<thead>
<tr>
<th>General indications</th>
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<tbody>
<tr>
<td>( \text{PaO}_2 \leq 55 \text{ mmHg} ) (7.32 kPa) or ( \text{SaO}_2 \leq 88 \text{ percent} )</td>
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</table>

<table>
<thead>
<tr>
<th>In the presence of cor pulmonale</th>
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</thead>
<tbody>
<tr>
<td>( \text{PaO}_2 \leq 59 \text{ mmHg} ) (7.85 kPa) or ( \text{SaO}_2 \leq 89 \text{ percent} )</td>
</tr>
<tr>
<td>EKG evidence of P pulmonale</td>
</tr>
<tr>
<td>Hematocrit &gt;55 percent</td>
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<tr>
<td>Clinical evidence of right heart failure</td>
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<tr>
<th>Specific situations</th>
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<tbody>
<tr>
<td>( \text{PaO}_2 \geq 60 \text{ mmHg} ) (7.98 kPa) or ( \text{SaO}_2 \geq 90 \text{ percent} ) with lung disease and other clinical needs such as sleep apnea with nocturnal desaturation not corrected by CPAP.</td>
</tr>
<tr>
<td>If the patient meets criteria at rest, ( \text{O}_2 ) should also be prescribed during sleep and exercise, and appropriately titrated.</td>
</tr>
<tr>
<td>If the patient is normoxemic at rest but desaturates during exercise (( \text{PaO}_2 \leq 55 \text{ mmHg} ) [7.32 kPa]), ( \text{O}_2 ) is generally prescribed for use during exercise. For patients who desaturate (( \text{PaO}_2 \leq 55 \text{ mmHg} ) [7.32 kPa]) during sleep, further evaluation with polysomnography may be indicated to assess for sleep-disordered breathing.</td>
</tr>
</tbody>
</table>
Long Term Oxygen Therapy

- Testing completed in stable, outpatient setting
- Target flow rate to SaO2 >92%
- 18 hours per day including sleep
  - For rest hypoxemia
- Exertional plus nocturnal use
  - For ambulatory only desaturation
- Nocturnal only
  - Isolated nocturnal hypoxemia in COPD
  - Consider PSG
"Oh, man! The coffee's cold!
They thought of everything!"
All of the following are true statements except:

- **A.** Long acting bronchodilators are favored over short acting agents for disease control
- **B.** Inhaled corticosteroid monotherapy is recommended for symptomatic COPD
- **C.** Oral glucocorticoids are not recommended for maintenance therapy
- **D.** Novel agents may reduce risk of exacerbations (roflumilast, azithromycin)

The answer is B.
Pharmacologic Management

- Determine symptoms
- Classify risk = stage
- Initiate therapy
- “Step up” therapy based on risk stratification and clinical course
Pharmacologic Therapy

- Bronchodilators
  - Short acting
  - Long acting
- Inhaled corticosteroid + Bronchodilator
- PDE-4 inhibitor
- Macrolide
- Oral corticosteroids
- Theophylline
Pharmacologic Therapy

- Short acting bronchodilators
  - Beta agonist
  - Anticholinergic
- Provide immediate symptom relief
- Improve FEV1 and symptoms
- Intermittent vs scheduled
  - Alone or in combination
  - Bronchodilator effect additive
  - No clear impact on frequency of exacerbations
Pharmacologic Therapy

• Long acting bronchodilators
  – Beta agonist
  – Anticholinergic (LAMA)
• Sustained symptom control
  – First line monotherapy
• Improve lung function, dyspnea
• Reduce exacerbations
• Additive effect of combination therapy
• CV risk not clear
Pharmacologic Therapy

• Inhaled corticosteroids
  – Not for monotherapy
  – Indicated in more severe disease
  – In combination with LABA
    • Reduce frequency of exacerbations
    • Improve lung function
    • Risk of Pneumonia
  – ICS/LABA vs LABA or LAMA monotherapy
Pharmacologic Therapy

• Methylxanthine
  – Theophylline
    • Bronchodilator effect
    • Benefit vs Placebo in lung function, dyspnea scores
    • Toxicity limits utility

• Phosphodiesterase 4 inhibitor
  – Roflumilast
    • Decrease inflammation, bronchodilator
    • Reduce frequency of exacerbations in severe disease
Pharmacologic Therapy

• Macrolide antibiotics
  – Erythromycin and Azithromycin
    • Anti-inflammatory properties
    • Reduce exacerbations?

• Oral corticosteroids
  – Not recommended for maintenance therapy
  – Treat acute exacerbations
Pharmacologic Therapy by GOLD Stage

- **A**
  - SABA or SA AC prn
  - SABA + SA AC

- **B**
  - LABA or LAMA
  - LABA + LAMA
  - SABA prn

- **C**
  - ICS + LABA or LAMA
  - ICS+LABA & LAMA
  - Add PDE 4 inhibitor
  - SABA prn

- **D**
  - ICS+LABA & LAMA
  - Add PDE 4 inhibitor
  - Add macrolide
  - SABA prn
Inhaled Medications by Class

• SABA
  – Albuterol
  – Levalbuterol

• SA AC
  – Ipratropium
  – Ipratropium/albuterol

• LABA
  – Salmeterol
  – Formoterol
  – Indacaterol
  – Arformoterol

• LAMA
  – Tiotropium
  – Aclidinium
  – Umeclidium

• ICS + LABA
  – Fluticasone/salmeterol
  – Mometasone/formoterol
  – Budesonide/formoterol

• LABA + LAMA
  – Vilanterol/umeclidium
All the following statements regarding surgical management of COPD are true except?

- A. Lung volume reduction surgery (LVRS) improves lung function and quality of life
- B. LVRS improves survival in all COPD patients
- C. Lung transplantation (LT) has no mortality benefit compared to medical therapy in COPD
- D. LT improves quality of life and exercise capacity in COPD patients.

The answer is B.
Surgical management

• LVRS
  – Resect emphysematous segments
    • Reduce hyperinflation
    • Improve physiologic function

  – No mortality benefit vs optimal medical therapy
    • Improved FEV1, exercise capacity, quality of life
  – Sub group analysis
    • Increased mortality: homogeneous disease by CT (FEV1 < 20%, DLCO < 20%)
    • Improved survival: Upper lobe predominant and low exercise capacity at baseline

Surgical management

• Transplant
  – No clear mortality benefit vs medical therapy
  – Median survival =5 years
    • Lower than most other solid organ transplant
  – Improves QOL and functional capacity

• Criteria for referral
  – BODE Index > 5
  – PH, Cor Pulmonale despite O2 therapy
  – Progressive decline despite optimal therapy
  – Acute hypercapnea (PaCO2 > 50)
Follow up visits

- Smoking cessation
- Oxygen therapy
- Symptom control (MMRC, CAT)
  - Exacerbation history
  - Functional status (6min walk)
  - PFT
    - Annual (GOLD 2014)
  - Radiograph
    - Lung Cancer Screening
- Medication reconciliation
- Vaccination status
- Pulmonary rehabilitation
Acute Exacerbation: Change in respiratory symptoms beyond baseline leading to change in medications

• Defined by change in:
  – Cough
  – Dyspnea
  – Sputum production

• Precipitants/Risk
  – Viral or bacterial URI
  – Smoke/pollutant exposure
  – Comorbid disease exacerbation
  – Medication noncompliance
  – Prior exacerbation

• Impact
  – Quality of life
  – Physiologic decline
  – Morbidity
  – Mortality
Outpatient Management of Acute Exacerbation

• Goals of therapy
  – Reduce symptoms/minimize impact
  – Prevent future exacerbations

• Components of therapy
  – Bronchodilators
    • Short acting provide symptom relief
  – Corticosteroids
    • Recovery time, lung function, relapse rate, LOS
    • Short vs long course
      – 40mg prednisone x 5 days (GOLD 2014)
  – Antibiotics
    • Moderate to Severe
      – Sputum purulence as marker of bacterial infection?
    • H influenza, M catarrhalis, S pneumonia
Questions?

“Mr. Osborne, may I be excused? My brain is full.”