

## Chronic Obstructive Pulmonary Disease Medplex Small Talk-October 2007-J. Lewis

1. Please review carefully the staging and management of COPD as described by the Global Initiative for Chronic Obstructive Lung Disease (GOLD). The ensuing questions are largely based upon this.

### Therapy at each stage of COPD

Stage	Characteristics	Recommended treatment
ALL		- Avoidance of risk factor (s) - Influenza vaccination
I: Mild COPD	FEV <sub>1</sub> /FVC < 70 percent FEV <sub>1</sub> ≥ 80 percent predicted With or without symptoms	- Short-acting bronchodilator when needed
II: Moderate COPD	FEV <sub>1</sub> /FVC < 70 percent 50 percent ≤ FEV <sub>1</sub> < 80 percent Dyspnea with exertion, with or without cough and sputum production	- Short-acting bronchodilator when needed - Regular treatment with one or more long-acting bronchodilators - Rehabilitation
III: Severe COPD	FEV <sub>1</sub> /FVC < 70 percent 30 percent ≤ FEV <sub>1</sub> < 50 percent Increased dyspnea, reduced exercise capacity, fatigue, and repeated exacerbations	- Short-acting bronchodilator when needed - Regular treatment with one or more long-acting bronchodilators - Rehabilitation - Inhaled glucocorticosteroids if significant symptoms, lung function response, or if repeated exacerbations
IV: Very severe COPD	FEV <sub>1</sub> /FVC < 70 percent FEV <sub>1</sub> < 30 percent predicted or < 50 percent plus respiratory failure	- Short-acting bronchodilator when needed - Regular treatment with one or more long-acting bronchodilators - Inhaled glucocorticosteroids if significant symptoms, lung function response, or if repeated exacerbations - Treatment of complications - Rehabilitation - Long-term oxygen therapy if chronic respiratory failure - Consider surgical treatments

### *Global Strategy for the Diagnosis, Management, and Prevention of COPD, 2006*

2. A 55 y.o. man with a 60 pack year smoking history comes to you for a periodic health examination. He has a chronic cough productive of 2-3 tablespoons of whitish sputum daily. His physical examination is normal. On spirometry his FEV<sub>1</sub> is 85% of predicted and his FEV<sub>1</sub>/FVC ratio is 72%. Does he have COPD? If so, what stage? Finally, what intervention is likely to improve his prognosis? (choices-influenza vaccine, pneumococcal vaccine, smoking cessation, testing for alpha 1 antitrypsin deficiency.)

3. The patient returns to your care three years later. He is still smoking one pack per day. In addition to chronic cough he now has occasional wheezing and SOB. Spirometry reveals an FEV<sub>1</sub> of 80%, but his FEV<sub>1</sub>/FVC ratio has dropped to 65%. What is indicated at this time along with continued emphasis on smoking cessation?

- a. Short-acting prn bronchodilator
- b. Long acting B-2 bronchodilator
- c. Long-acting anticholinergic bronchodilator
- d. Nocturnal theophylline
- e. Pulmonary rehabilitation

4. The patient returns two years later. He now has dyspnea on exertion along with chronic cough and occasional wheezing. He uses his inhaler several times a week. Spirometry reveals an FEV<sub>1</sub>/FVC ratio of 60% and a FEV<sub>1</sub> of 70%. What should now be added to his regimen?

- a. Long-acting B-2 agonist
- b. Long-acting anticholinergic
- c. Inhaled corticosteroids
- d. Pulmonary rehabilitation
- e. Chronic oxygen therapy

5. The patient's dyspnea continues to worsen over the next two years. He has occasional morning headaches. He has required two hospitalizations over six months for COPD exacerbations. When spirometry is repeated, it reveals an FEV<sub>1</sub> of 40% and an FEV<sub>1</sub>/FVC ratio of 50%. He is currently on salmeterol, tiotropium, and prn albuterol. What additional test is indicated diagnostically and what should be added to his therapy?

6. What are the three indications for home oxygen therapy?

- a. pCO<sub>2</sub> > 50
- b. SaO<sub>2</sub> ≤ 88
- c. pO<sub>2</sub> ≤ 55
- d. Nocturnal dyspnea
- e. pO<sub>2</sub> ≤ 60 with signs/sx. of hypoxemia

7. Your patient is now home oxygen dependent and subject to frequent exacerbations despite adding inhaled steroids to his regimen. His FEV<sub>1</sub> has dipped to 20%. His exercise capacity is poor despite repeated pulmonary rehabilitation efforts. He is on a combination of tiotropium, salmeterol/fluticasone, and prn albuterol. If his CXR and/or CT scan shows primarily upper lobe emphysema, what might give him a survival advantage?

- a. Lung transplantation
- b. Lung volume reduction surgery
- c. Oral corticosteroids
- d. Mucolytics
- e. Cyclic antibiotics

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Answers**

2. **Answer:** He has Stage O COPD with chronic cough and sputum, but normal spirometry. Annual influenza vaccination and a single pre-65 pneumococcal vaccination are indicated. However, the use of pneumococcal vaccine has not been proven to reduce death (in contrast to the flu vaccine). Alpha-1 antitrypsin assay is indicated only in COPD patients < age 45 or in patients with a strong family history of COPD. AI-AT deficiency causes panlobular emphysema. Smoking cessation will improve prognosis and slow the progressive decline in FEV<sub>1</sub> by 50%.

3. **Answer: a** This is stage 1 COPD. The patient needs a short-acting bronchodilator-either a B-2 agonist or an anticholinergic. Use of theophylline in any stage of COPD is controversial because of its potential toxicity. Inhaled bronchodilators are always preferred.

4. **Answer: a and/or b, d** This is stage 2 COPD. Patients benefit from either a long acting B-2 agonist or a long-acting anticholinergic plus pulmonary rehabilitation. The long-acting bronchodilators have been shown to reduce exacerbations, improve quality of life, and improve FEV<sub>1</sub>. A combination of the two improves lung function better than a single agent alone. Pulmonary rehabilitation improves exercise capacity, QOL (quality of life) and dyspnea and decreases health care utilization. Mortality benefits are less clear.

5. **Answer:** Pulse oximetry should be measured when the FEV<sub>1</sub> is less than 60%. However, full ABGs should be obtained in this case with an FEV<sub>1</sub> of <50%. One reference recommends ABGs when FEV<sub>1</sub> <40% or if symptoms suggest respiratory failure, ® heart failure, or sleep apnea. Morning headaches may be a clue to hypercarbia. This patient now has Stage III COPD. Inhaled corticosteroids are beneficial in the setting of stage III COPD with exacerbations. Triple therapy (long-acting B2 agonist, long-acting anticholinergic, and inhaled steroids) reduces hospitalizations. However, the TORCH trial suggests steroids may increase the risk of pneumonia without changing mortality. Nevertheless, steroids may be added in combination with a long-acting B2 agonist such as salmeterol (Advair) or formoterol (Symbicort).

6. **Answer: b, c, e** The use of continuous home oxygen prolongs life if the pO<sub>2</sub> is ≤55, the SaO<sub>2</sub> ≤88%, or if the pO<sub>2</sub> is ≤60 and/or SaO<sub>2</sub> ≤89 along with evidence of pulmonary hypertension, right-sided CHF, or polycythemia. Home oxygen is often indicated in Stage IV COPD assuming criteria are met.

7. **Answer: b** This is Stage IV or very severe COPD. Lung transplantation can be considered for FEV<sub>1</sub> <25% or pCO<sub>2</sub> > 55 or limited life expectancy, but survival advantage is unproven. However, LVRS in a major trial did improve survival in upper lobe emphysema. Systemic corticosteroids are used almost exclusively now for acute COPD exacerbations, not maintenance therapy. Mucolytics are not indicated in COPD.

## **References**

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