QUESTION 97 Respiratory

A 67-year-old man with chronic obstructive pulmonary disease (COPD) has severe exertional dyspnoea and is receiving maximal inhaled bronchodilator therapy. He no longer smokes.

Lung function tests are as follows:
- forced expiratory volume in one second (FEV$_1$) 0.54 L (18% predicted)
- forced vital capacity (FVC) 2.87 L (75% predicted)
- FEV$_1$/FVC 19%
- total lung capacity (TLC) 7.96 L (121% predicted)
- residual volume (RV) 5.09 L (245% predicted)
- diffusing capacity for carbon monoxide (DLCO) 6.1 mL/min/mmHg (19% predicted)

Arterial blood gases on room air are as follows:
- PaO$_2$ 65 mmHg
- PaCO$_2$ 52 mmHg
- pH 7.36

What is the most appropriate management to reduce this man’s exertional dyspnoea?
A. Inhaled corticosteroids.
B. Pulmonary rehabilitation program.
C. Lung volume reduction surgery.
D. Supplemental oxygen.
E. Lung transplantation.

Testing us:
1) severity of COPD - LFT, ABG
2) treatment of exertional dyspnoea

Other learning issues for ourselves:
1) What is maximal inhaled bronchodilator therapy
2) How to read LFT

Classification of severity of COPD

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
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</thead>
<tbody>
<tr>
<td>0: At risk</td>
<td>Normal Spirometry</td>
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<tr>
<td></td>
<td>Chronic symptoms (cough, sputum production)</td>
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<tr>
<td>I: Mild COPD</td>
<td>FEV1/FVC &lt; 70%</td>
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<tr>
<td></td>
<td>FEV1 ≥ 80% predicted</td>
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<td>With or without chronic symptoms</td>
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<tr>
<td>II: Mod COPD</td>
<td>FEV1/FVC &lt; 70%</td>
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<td></td>
<td>FEV1 50 - 80% predicted</td>
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<td>With or without chronic symptoms</td>
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<td>III: Severe COPD</td>
<td>FEV1/FVC &lt; 70%</td>
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<tr>
<td></td>
<td>FEV1 30- 50% predicted</td>
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<td></td>
<td>With or without chronic symptoms</td>
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<tr>
<td>IV: Very severe COPD</td>
<td>FEV1/FVC &lt; 70%</td>
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<tr>
<td></td>
<td>FEV1 &lt; 30% predicted or FEV1 &lt; 70% predicted + respiratory failure</td>
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<td>(PaO2 &lt; 60mmHg ± PaCO2 &gt; 50mmHg)</td>
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Pulmonary function tests

- Spirometry: evaluate dyspnea
- Smokers over age 45 to detect COPD, HF
- Check recovery from exacerbation of asthma, COPD, HF
- Spirometry + bronchodilator: Chronic cough or chest tightness
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- Suspect asthma or COPD
- Determine response to specific bronchodilatory therapy

**DLCO**
- Differential diagnosis of abnormal spirometry
- Obstruction: asthma vs COPD
- Restriction: interstitial (normal) vs COPD (low)
- Infiltrates on Cxr
- Suspect pulmonary vascular disease
- Evaluate dyspnoea

**Flow volume loop**
- Inspiratory stridor

**Lung volumes**
- Low FVC on spirometry: differentiate restriction vs hyperinflation or mixed

**6 min walk test**
- Index of physical function in pts with chronic lung disease
- Fall of SpO2 of > 4% ending below 93% - significant desaturation

**Methacholine challenge**
- Suspect asthma but normal spirometry

**Approach to patient with dyspnea**

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**each stage of COPD**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Recommended treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Avoidance of risk factors</td>
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<tr>
<td></td>
<td>Influenza vaccination</td>
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<tr>
<td>Mild</td>
<td>Short acting bronchodilator</td>
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<tr>
<td>Mod</td>
<td>Regular treatment with 1 or more bronchodilators</td>
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<tr>
<td></td>
<td>Rehab</td>
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<tr>
<td>Severe</td>
<td>Regular treatment with 1 or more bronchodilators</td>
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<tr>
<td></td>
<td>Inhaled glucorticosteroids if significant symptoms</td>
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<tr>
<td></td>
<td>Rehab</td>
</tr>
<tr>
<td>Very severe</td>
<td>Bronchodilators</td>
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</tbody>
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Year 2005 Paper two: Questions supplied by Ilynn

Inhaled glucocorticosteroids
Rehab
Long term O2 if respiratory failure
Consider surgical treatments

Treatment
1) Beta-agonist
   a) short acting Beta 2 agonist
      - used when required
      - S.E: tremor, reflex tachycardia, hypokalaemia
   b) long acting
      - use of long acting Beta agonist plus anticholinergic showed to have greater improvement in lung function and QOL compared to single agent use

2) Anticholinergics
   - reduced frequency of severe exacerbations and respiratory deaths
   - tiotropium (long acting) achieved longer bronchodilation and lessen frequency of acute exacerbations

3) Corticosteroid
   - Improve symptoms, FEV1 and PaO2 in moderate to severe exacerbations
   - reduce treatment failure, relapse and length of stay
   - mortality unaltered

4) Theophylline
   - controversial
   - Reduced dyspnoea, improved ABG, FEV1 compared to placebo
   - problems with toxicity

5) O2 therapy
   - improve QOL and survival
   - Criteria: PaO2 < 55, SaO2 < 88%, PaO2 < 59 if evidence of cor pulmonale and RHF

6) Rehabilitation
   - improve exercise capacity, reduced hospitalization, and enhance QOL

7) Surgery
   - lung volume reduction surgery or lung transplantation
   - Criteria: FEV1 < 25% predicted
     PaO2 > 55
     Cor pulmonale present
     < 65 yo
   - Benefits: functional capacity improved but no survival benefit

8) Nutrition
   - high caloric dietary supplements
   - magastrol acetate: stimulate appetite & wt gain but not shown to improve lung function

9) Patient education
   - Quit smoking

10) Prevention
    - pneumococcal vaccine (every 5 years)
    - influenza vaccine (annually)