Interpretation of Spirometry in the Primary Care Setting

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MAO FP CONFERENCE 8/5/17

Indications

- Symptoms of possible underlying lung disease
- Abnormal clinical exam findings
- Monitoring known lung disease
- Exposure history
- Preoperative testing
Types

- Spirometry
  - Expiratory flow rates (FEV1/FVC, FEV1, FEF 25-75%)
  - Flow volume loops
- Full PFT
  - Lung volume measurement
  - TLC, RV, TV, ERV, VC
  - Diffusing capacity

Spirometry

- FEV1, FVC, FEV1/FVC, FEF 25-75%
- Cough, dyspnea, smokers
- Obtain maximal, reproducible efforts
Lung volumes

- RV - Unused space
- ERV/IRV
  - Full non-forced end expiration/inhalation to full forced end expiration/inhalation
- TV - Normal unforced ventilation
- VC
- TLC
Diffusing Capacity

- Alveolar-Capillary membrane
- Carbon Monoxide and Helium
- Obstructive vs. Restrictive disease
- Pulmonary vascular disease
- Interstitial lung disease
- Volume correction

The Alveolar-Capillary (A-C) Membrane

- Alveolar epithelium
- Epithelial basement membrane
- Alveolus
- Fluid and surfactant layer
- Interstitial space
- Capillary endothelium
- Red blood cell
- Capillary
Flow Volume Loops

- Obstructive pulmonary disease
- Restrictive pulmonary disease
- Upper airway obstruction
  - variable extrathoracic
  - variable intrathoracic
  - fixed upper airway
  - extraluminal
Upper Airway Obstruction

- Variable extrathoracic obstructions
  1. vocal cord paralysis,
  2. thyromegaly,
  3. tracheomalacia, or
  4. Neoplasm
- Large airways variable intrathoracic obstructions
  1. tracheomalacia or
  2. neoplasm
- Fixed obstruction
  1. tracheal stenosis,
  2. foreign body, or
  3. neoplasm.

Specific Lung Diseases

- Asthma
- Emphysema
- Chronic Bronchitis
- Interstitial lung disease
Predicted values for PFT's

- Age
- Height
- Weight
- Smoking history
- Gender
- Race

GOLD Therapy at Each Stage of COPD

1. Mild
   - FEV/JFVC < 0.70
   - FEV, 70% predicted
   - Active reduction of risk factor(s): influenza vaccination
   - Add short-acting bronchodilator (when needed)

2. Moderate
   - FEV/JFVC < 0.70
   - 50% ≤ FEV, 80% predicted
   - Add regular treatment with one or more long-acting bronchodilators (when needed)
   - Add pulmonary rehabilitation

3. Severe
   - FEV/JFVC < 0.70
   - 30% ≤ FEV, 50% predicted
   - Add inhaled glucocorticosteroids if repeated exacerbations

4. Very Severe
   - FEV/JFVC < 0.70
   - FEV, <30% predicted
   - FEV, <50% predicted plus chronic respiratory failure
   - Add long-term oxygen if chronic respiratory failure
   - Consider surgical treatments

Revised 2017 ABCD Criteria

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<thead>
<tr>
<th>FEV₁</th>
<th>GOLD 1</th>
<th>≥ 80%</th>
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<tbody>
<tr>
<td>GOLD 2</td>
<td>50-79%</td>
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<td>GOLD 3</td>
<td>30-49%</td>
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<td>GOLD 4</td>
<td>&lt; 30%</td>
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Exacerbation History

-≥ 2 or ≥ 1 requiring hospitalization

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<tr>
<th>mMRC 0-1 CAT &lt; 10</th>
<th>mMRC ≥ 2 CAT ≥ 10</th>
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≤ 1 not requiring hospitalization

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Global Strategy for Diagnosis, Management and Prevention of COPD

Modified MRC (mMRC)Questionnaire

Please tick in the box that applies to you (one box only)

- mMRC Grade 0. I only get breathless with strenuous exercise.
- mMRC Grade 1. I get short of breath when hurrying on the level or walking up a slight hill.
- mMRC Grade 2. 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. I stop for breath after walking about 100 meters or after a few minutes on the level.
- mMRC Grade 4. I am too breathless to leave the house or I am breathless when dressing or undressing.
References

- American Thoracic Society; www.thoracic.org
- GOLD COPD.ORG