Assessment of airway obstruction plays a key role in the diagnosis and assessment of chronic obstructive pulmonary disease (COPD). The spirometric criterion required for a diagnosis of COPD is an \( \text{FEV}_1 / \text{FVC} \) ratio below 0.7 after bronchodilator.

**How to perform spirometry:** Explain the purpose of the test and describe it clearly to the patient. It may help to demonstrate or mimic the procedure yourself. Emphasize the need to take a full breath and blow out as fast and hard as possible. Record the patient’s age, sex, and height, and time of last bronchodilator use.

- Instruct the patient to **breathe in fully** until the lungs feel full.
- The patient should only hold their breath long enough to **seal their lips tightly around the mouthpiece**.
- **Blast the air out as forcibly and fast as possible** until there is no more air left.
- Check that an adequate **trace** has been achieved.
- **Repeat the procedure** – you need three acceptable blows within 150 mL or 5% of each other and best.
- Record the best readings of \( \text{FEV}_1 \) and FVC.

**Reversibility testing:** Perform pre-bronchodilator spirometry, give 400 µg of salbutamol, and wait 15 minutes before performing post-bronchodilator spirometry. Prior to testing, withhold:

- Short-acting bronchodilators 6 hours
- Long-acting bronchodilators for 12 hours

In making a diagnosis of COPD, post bronchodilator \( \text{FEV}_1 / \text{FVC} \) remains < 0.7. However, the \( \text{FEV}_1 \) may improve significantly after bronchodilator, and a change of >12% AND > 200 mL in \( \text{FEV}_1 \) can occur in COPD. Larger changes in \( \text{FEV}_1 \) do not negate a diagnosis of COPD, although the greater these are, the greater the likelihood that asthma is present.

| I: Mild COPD | • \( \text{FEV}_1 / \text{FVC} < 0.7 \)  
• \( \text{FEV}_1 \geq 80\% \text{ predicted} \) |
| II: Moderate COPD | • \( \text{FEV}_1 / \text{FVC} < 0.7 \)  
• \( 50\% \leq \text{FEV}_1 < 80\% \text{ predicted} \) |
| III: Severe COPD | • \( \text{FEV}_1 / \text{FVC} < 0.7 \)  
• \( 30\% \leq \text{FEV}_1 < 50\% \text{ predicted} \) |
| IV: Very Severe COPD | • \( \text{FEV}_1 / \text{FVC} < 0.7 \)  
• \( \text{FEV}_1 < 30\% \text{ predicted or } \text{FEV}_1 < 50\% \text{ predicted plus chronic respiratory failure} \) |
**Figure 2. PATTERNS OF VENTILATORY ABNORMALITIES**

(-- normal pattern; ______ abnormal pattern)

<table>
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**Troubleshooting:** The most common reason for inconsistent readings is patient technique. Common problems (and examples of traces where appropriate) include:

- Inadequate or incomplete inhalation and sub-maximal expiratory effort (3C, 3E)
- Delayed onset of maximal effort → under-estimates FEV₁ (3D)
- Incomplete emptying of lungs – common in COPD and elderly and infirm patients (3E)
- Lips not tight around mouthpiece → under-estimate FEV₁ and FVC
- A slow start to the blow → under-estimates FEV₁ (3D)
- Exhaling in part through the nose
- Coughing (3A)
- Glottic closure or obstruction of mouthpiece by teeth or tongue

**Figure 3: Examples - Visual Patterns of Poor Spirometric Performance**