



SPIROMETRY FOR HEALTH CARE PROVIDERS: QUICK GUIDE Global Initiative for Chronic Obstructive Lung Disease (GOLD)

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 **FEV₁/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 FEV₁ 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

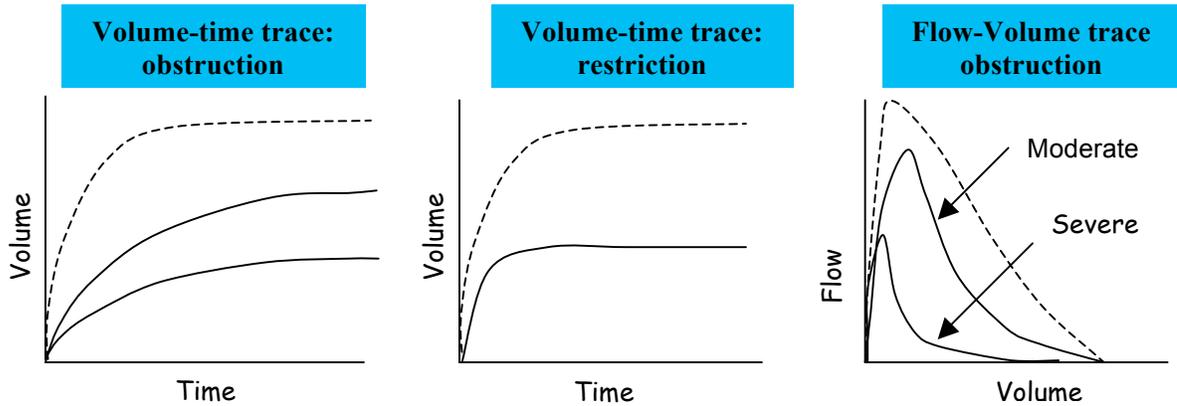
In making a diagnosis of COPD, post bronchodilator FEV₁/FVC remains < 0.7. However, the FEV₁ may improve significantly after bronchodilator, and a change of > 12% AND > 200 mL in FEV₁ can occur in COPD. Larger changes in FEV₁ do not negate a diagnosis of COPD, although the greater these are, the greater the likelihood that asthma is present.

Figure 1. GOLD Spirometric Criteria for COPD Severity

| | |
|----------------------|---|
| I: Mild COPD | <ul style="list-style-type: none"> • FEV₁/FVC < 0.7 • FEV₁ ≥ 80% predicted |
| II: Moderate COPD | <ul style="list-style-type: none"> • FEV₁/FVC < 0.7 • 50% ≤ FEV₁ < 80% predicted |
| III: Severe COPD | <ul style="list-style-type: none"> • FEV₁/FVC < 0.7 • 30% ≤ FEV₁ < 50% predicted |
| IV: Very Severe COPD | <ul style="list-style-type: none"> • FEV₁/FVC < 0.7 • FEV₁ < 30% predicted <i>or</i> FEV₁ < 50% predicted <i>plus</i> chronic respiratory failure |

Figure 2. PATTERNS OF VENTILATORY ABNORMALITIES

(----- normal pattern; _____ abnormal pattern)

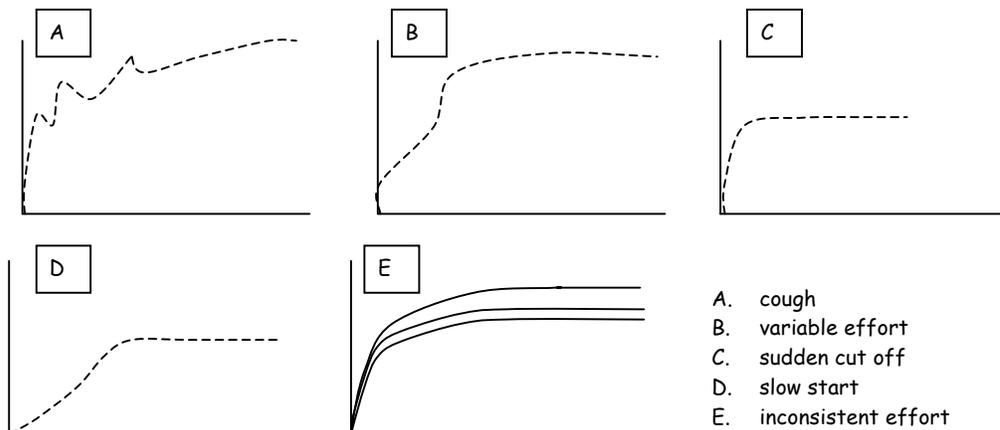


| | OBSTRUCTIVE | RESTRICTIVE | MIXED |
|----------------------------|--------------------|---------------------|--------------|
| FEV₁ | REDUCED | REDUCED OR NORMAL | REDUCED |
| FVC | REDUCED OR NORMAL | REDUCED | REDUCED |
| FEV₁/FVC | REDUCED | NORMAL OR INCREASED | REDUCED |

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



- A. cough
- B. variable effort
- C. sudden cut off
- D. slow start
- E. inconsistent effort