

# QUICK GLANCE GUIDE TO SPIROMETRY

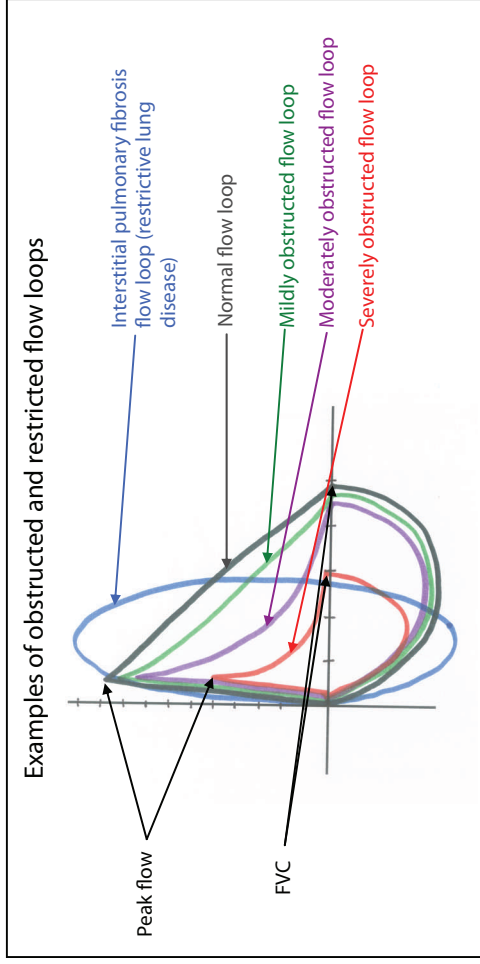
## Spirometry: a measure of airflow (how fast) and volume (how much)

### Definitions:

**Forced Vital Capacity (FVC):** the volume delivered during an expiration made as forcefully and completely as possible starting from full inspiration  
**Forced Expiratory Volume in the first second (FEV<sub>1</sub>):** the volume delivered in the first second of an FVC maneuver

**Obstruction:** flow limitation is observed during spirometry. If the observed FEV<sub>1</sub>/FVC ratio is down 10 or more from the predicted, obstruction is present.

**Restriction:** Spirometry with low FVC (< 80%) can only suggest restriction. Further testing is needed to confirm.



Spirometry must establish a solid baseline meeting all criteria for acceptability and repeatability. Use GLI-2012 multi-ethnic reference ranges when available. NHANES III reference values remain appropriate for patients 8-80, where maintaining continuity is important. For children ages 5-8, Wang reference values are recommended when GLI-2012 is not available. GLI-2012 has a grading system range of A-F, spirometry tests with grades of A-C are clinically useful. Follow all OSHA and JCAHO standards for infection control. Note: Testing children < age 5 is likely to be unsuccessful.

### Contraindications:

- Recent surgery
- Within one month of a myocardial infarction
- Recent pneumothorax
- Unable to understand directions or inability to seal mouthpiece

### CPT codes for spirometry:

94010 spirometry 94060 spirometry with bronchodilator (pre- and post-test)  
 When using these CPT codes, better reimbursement happens when current symptoms are associated with the appropriate ICD9 code for asthma or COPD.

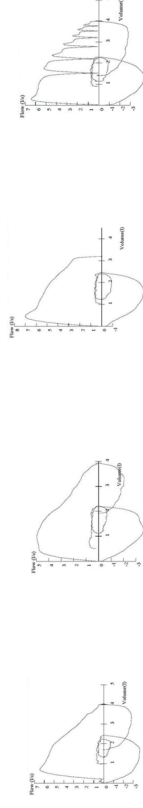
### Refer to a specialist:

- If patient has **severe obstruction**
- If patient has a **restrictive pattern**
- If patient **does not respond to medications**

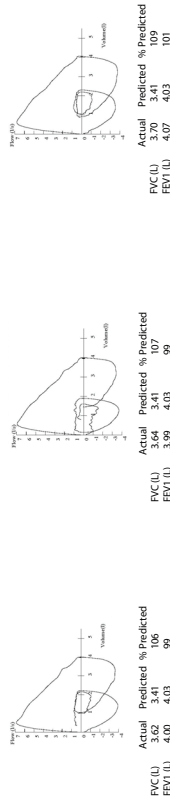
**Acceptability criteria from the American Thoracic Society:** Global Lung Function Initiative (GLI)-2012 multi-ethnic reference ranges are recommended. NHANES III reference values remain appropriate where maintaining continuity is important. Following a grading system range of A-F, spirometry tests with grades of A-C are clinically useful.

### Examples of unacceptable tests

- Slow start of test
- Rounded peak
- Early termination
- Cough in first second



**Repeatability criteria for the American Thoracic Society:** Recommended repeatability criteria of 150 ml.



### Coaching patients through spirometry:

Instruct patient to breathe normally. When patient is ready, have him/her take his/her deepest breath and blow as hard as he/she can as long as he/she can. There is a learning curve for spirometry. Use positive reinforcement to build on the patient's successes. (For example, "That was really good; this time take an even deeper breath.") Always demonstrate the spirometry maneuver, especially if language is a barrier or communication issues arise.

### Appropriate bronchodilator use:

If testing for reversibility, give patient 4 puffs of bronchodilator with a spacer or a standard nebulized dose. Wait 15 minutes after last dose to perform post-bronchodilator maneuver. If a patient cannot perform acceptable baseline maneuvers according to American Thoracic Society criteria or there is no evidence of airflow obstruction, do NOT give a bronchodilator.

### References:

1. Repeatability criteria for the American Thoracic Society: Three (3) acceptable tests must be performed with two (2) tests having FEV<sub>1</sub> and FVC within .15L or 150mL of each other.
2. Miller M, Hankinson J, Brusasco V, et al. Standardisation of spirometry. *European Respiratory Journal*. 2005;26:319–338.
3. Pellegrino R, Viegi G, Brusasco V, et al. Interpretative strategies for lung function tests. *European Respiratory Journal*. 2005;26:948–968.
4. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. Updated 2007. Available at <http://www.goldcopd.com>.
5. National Heart, Lung and Blood Institute National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. 2007. Available at <http://www.nhlbi.nih.gov>.

# SPIROMETRY INTERPRETATION

## ASTHMA

## COPD

