

## SPIROMETRY BASICS



Simple, inexpensive, and noninvasive, spirometry is a versatile measure of lung function and is the most objective, reproducible test for COPD. Spirometry measures the volume of air forcefully exhaled from the point of maximal inspiration and the amount of time (in seconds) taken to complete.<sup>4</sup>

In obstructive lung disease, such as COPD, lung volume may be normal, but air flow is diminished. Conversely, in restrictive lung disease, such as pulmonary fibrosis, lung volume is reduced, but air flow may be normal. Postbronchodilator spirometry can be used for the differential diagnosis of COPD and asthma because it can confirm the partially reversible airway limitation that is characteristic of COPD.<sup>6</sup>

## PERFORMING SPIROMETRY

Spirometry can be performed in the primary care setting, provided that good skills training and an ongoing quality assurance program are available.<sup>4</sup> To ensure a meaningful test result, patients should be fully instructed as follows<sup>7</sup>:

- Explain or demonstrate how the procedure works to aid compliance and ease anxiety<sup>7</sup>
- Make sure patients are seated upright rather than bent over<sup>7</sup>
- Place and adjust nose clips to prevent air leakage<sup>7</sup>
- Instruct patients to breathe in as deeply as they can and exhale as forcefully as they can. For a COPD diagnosis, an expiratory time of at least 6 seconds generally is recommended<sup>7</sup>

3

## SPIROMETRY IN PRIMARY CARE

Primary care physicians who want to conduct in-office spirometry need to have staff specially trained in spirometry to perform the test and maintain the equipment.

More information about spirometry is available from these resources:

American Thoracic Society: Standardization of Spirometry. [www.thoracic.org/sections/publications/statements/pages/pfet/pft2.html](http://www.thoracic.org/sections/publications/statements/pages/pfet/pft2.html)

American Thoracic Society: Interpretative Strategies for Lung Function Tests. [www.thoracic.org/sections/publications/statements/pages/pfet/pft5.html](http://www.thoracic.org/sections/publications/statements/pages/pfet/pft5.html)

National Lung Health Education Program (NLHEP). Simple Office Spirometry for Primary Care Practitioners. [www.nlhep.org/books/Pet\\_Enright\\_v22.pdf](http://www.nlhep.org/books/Pet_Enright_v22.pdf)

Priory Lodge Education Limited. Spirometry Questions and Answers. [www.priory.com/chest.htm](http://www.priory.com/chest.htm)

Global Initiative for Chronic Obstructive Lung Disease (GOLD). [www.goldcopd.org](http://www.goldcopd.org)

**References:** **1.** Mannino DM, Homa DM, Akinbami LJ, et al. Chronic obstructive pulmonary disease surveillance—United States, 1971–2000. *MMWR Surveill Summ.* 2002;51(SS-6):1-16. **2.** Lethbridge-Cejku M, Rose D, Vickerie J. Summary health statistics for U.S. adults: National Health Interview Survey, 2004. National Center for Health Statistics. *Vital Health Stat.* 2006;10(228). **3.** National Heart, Lung, and Blood Institute. Morbidity & Mortality: 2004 chart book on cardiovascular, lung, and blood diseases. May 2004. Bethesda, Md: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health; 2004. [www.nhlbi.nih.gov/resources/docs/04\\_chtbk.pdf](http://www.nhlbi.nih.gov/resources/docs/04_chtbk.pdf). Accessed March 8, 2007. **4.** Global Initiative for Chronic Obstructive Lung Disease. *Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease* (Updated 2006). [www.goldcopd.org](http://www.goldcopd.org). Accessed March 8, 2007. **5.** National Committee for Quality Assurance. *HEDIS 2006, Volume 2: Technical Specifications*. Washington, DC: National Committee for Quality Assurance, 2005. **6.** American Thoracic Society/European Respiratory Society Task Force. Standards for the diagnosis and management of patients with COPD (Internet). Version 1.2. New York: American Thoracic Society; 2004 (updated September 8, 2005). [www.thoracic.org/sections/copd/resources/copddoc.pdf](http://www.thoracic.org/sections/copd/resources/copddoc.pdf). Accessed March 7, 2007. **7.** National Heart, Lung, and Blood Institute. Nurses: partners in asthma care. 1995. National Institutes of Health. NIH Publication 95-3308. [www.nhlbi.nih.gov/health/prof/lung/asthma/nurs\\_gde.pdf](http://www.nhlbi.nih.gov/health/prof/lung/asthma/nurs_gde.pdf). Accessed March 8, 2007.

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## Spirometry

### The Standard for Diagnosing COPD



## SPIROMETRY—A TOOL FOR DIAGNOSING COPD

While more than 24 million U.S. adults have evidence of impaired lung function, only 12.6 million have been diagnosed with chronic obstructive pulmonary disease (COPD).<sup>1,2</sup> As the fourth-leading cause of death in the U.S.,<sup>3</sup> it is evident that COPD is underdiagnosed and undertreated.<sup>1,2</sup>

Patients are usually seen by primary care practitioners during the early stages of COPD. Therefore, it is increasingly important for primary care practitioners to know that spirometry is the standard for the differential diagnosis of COPD. Spirometry should be ordered for patients with COPD risk factors or those with symptoms of lung impairment.<sup>4</sup>

## A HEDIS® MEASURE FOR SPIROMETRY

The National Committee for Quality Assurance (NCQA) has recognized the importance of COPD with a HEDIS measure for spirometry. The measure targets the use of spirometry testing in assessment and diagnosis and determines whether spirometry was included in the clinical workup and assessment of a new diagnosis/new onset of COPD.<sup>5</sup>

The CPT codes used to identify spirometry testing in the HEDIS measure are 94010, 94014, 94015, 94016, 94060, 94070, 94620.<sup>5</sup>

\*HEDIS® (Healthcare Effectiveness Data and Information Set) is a registered trademark of the National Committee for Quality Assurance (NCQA).

## PERFORMING SPIROMETRY (cont.)



Accurate spirometry requires three acceptable spirometry tests that demonstrate reproducibility. The FVC and FEV<sub>1</sub> values from these three tests should vary by no more than 5% or 100 mL, whichever is greater. The FEV<sub>1</sub>/FVC ratio should be

taken from the technically acceptable tests with the largest sum of FVC and FEV<sub>1</sub>.<sup>4</sup>

## SPIROMETRY MEASUREMENTS

The following spirometric measurements are used in diagnosing COPD:

- FVC (forced vital capacity): maximum volume of air that can be exhaled during a forced maneuver<sup>4</sup>
- FEV<sub>1</sub> (forced expiratory volume in 1 second): volume exhaled in the first second of this maneuver<sup>4</sup>
- FEV<sub>1</sub>/FVC: the ratio of these 2 measurements should be calculated<sup>4</sup>

In normal adults, the ratio FEV<sub>1</sub>/FVC is between 70% and 80%; a value less than 70% indicates airflow limitation and the possibility of COPD.<sup>4</sup>

## INTERPRETING THE RESULTS

Spirometry measurements are evaluated by comparison with reference values based on age, height, sex, and race.<sup>4</sup>

The major differential diagnosis for COPD is asthma. Although a clear distinction between the two is not always possible, postbronchodilator spirometry may confirm the partially reversible airway obstruction characteristic of COPD.<sup>4,6</sup> For in-office classification of COPD, practitioners can use postbronchodilator spirometry values expressed as a percentage of the predicted normal value range for the individual:

COPD DISEASE CLASSIFICATIONS* <sup>4</sup>		
Severity	FEV <sub>1</sub> /FVC	FEV <sub>1</sub> % predicted
Mild COPD	<0.7	≥80
Moderate COPD	<0.7	50 to <80
Severe COPD	<0.7	30 to <50
Very Severe COPD	<0.7	<30 or <50 with chronic respiratory failure

\*Based on postbronchodilator spirometry.

FEV<sub>1</sub> = The volume of air exhaled in 1 second.

FVC = Forced vital capacity; the volume of air that can be exhaled.

% predicted = Values corrected for age, sex, ethnicity, and height.

Adapted from Global Initiative for Chronic Obstructive Lung Disease (GOLD).<sup>4</sup>

If spirometry is performed at a laboratory, it is important for physicians to know what reference values the lab is using for interpretation. While the theory behind spirometry is fairly simple, test procedures have to be handled with care and results interpreted with an understanding of test parameters to decide what constitutes a normal value for the particular patient.<sup>4</sup>