Spirometry for Early Detection and Management of COPD

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Chronic obstructive pulmonary disease (COPD) has been pegged at number four on the leading causes of death in the United States, moving up from sixth place in 1990, and is expected to step up to third place by 2020. Studies have shown that those who smoke tobacco have the greatest risk of getting COPD, and those who are diagnosed with the disease have an accelerated decline in lung function beyond that of normal aging.

Smokers who quit the habit can slow or even stop the acceleration of decline and return to the accepted rate of decline that relates to age, although their lung function will not return to match that of their reference population (people of the same sex, race, height, and age). Unfortunately, the measurable damage is there and is permanent. Quitting smoking stops adding more damage to what is already there, but what damage is there apparently stays there.

When we mention “measurable,” we are talking about spirometry and the measurement of forced expiratory volume in first second (FEV₁), forced vital capacity (FVC), and FEV₁/FVC. Spirometry is the gold standard for both the diagnosis and the assessment of COPD. Note there is a move toward substituting the FEV₁ measurement for the FVC. This is reflected in the guidelines and recommendations of the National Lung Health Education Program™ (NLHEP). The FEV₁, FVC, and FEV₁/FVC have been used by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) to classify the severity of COPD into five stages. These range from Stage 0–At Risk to Stage IV–Very Severe COPD, with particular emphasis given to FEV₁ to differentiate the stages. In addition, GOLD recommendations for therapy are linked to the stages.

The British Thoracic Society also uses spirometry measurements to categorize COPD. The bottom line is this: Spirometry is recognized world wide as a very important tool for initial diagnosis, for following the stages of the disease, and for guiding the therapy to help patients with COPD.

“What you don’t know CAN hurt you”

Many people who have COPD may be unaware of the problem. They often have not had it diagnosed until they were admitted to a hospital for difficulty breathing. Some may be in denial that they have something wrong with their lungs even though they have early symptoms of a chronic cough (either productive or dry) and/or wheezing. This problem showed up in the Third National Health and Nutrition Examination Survey (NHANES III). This was a study done in the United States between 1988 and 1994 covering a total sample of 16,084 subjects representing a cross-section of the U.S. population.

Of the subjects found with low lung function based on spirometry, 63.3 percent had not been diagnosed with COPD; these were subjects with documented low lung function but no diagnosis reflecting this problem. Low lung function was...
defined as an FEV₁/FVC less than 70 percent and FEV₁ less than 80 percent of the predicted value. Even more surprising, 44 percent of those in the NHANES III who were found to have moderately severe to severe lung disease (as shown by a FEV₁, less than 50 percent of the predicted value) had not been diagnosed with COPD.⁶

**Screening or case-finding**

Measuring lung function by spirometry falls into two categories — either screening or case finding. Spirometry screening is typically done by a non-physician (for example, a therapist or technologist) and offered to the general public (possibly at a mall, health fair, or pharmacy) for no charge and with no reimbursement. Case finding involves spirometry that is typically done in a physician’s office by the medical doctor or a trained professional health care provider for a patient having respiratory symptoms. The procedure has a charge related to it and is reimbursable under Medicare (as appropriate).³

Screening in smokers may be useful even if the spirometry is normal if it brings up a discussion about lung health and awareness. Screening smokers should also include teaching about the risks related to smoking, such as increased risk of cancer, stroke, high blood pressure, cardiovascular disease, and heart attack. On the other hand, the smoker who has normal spirometry might be encouraged to continue smoking, with the thought, “It’s not going to happen to me.” Abnormal spirometry in smokers who have no other symptoms may contribute to the “teachable moments” where a therapist, technologist, nurse, or physician has the opportunity to encourage smoking cessation and motivate smokers to take care of their lungs.³

Abnormal spirometry, coupled with symptoms of lung problems (wheeze, cough, dyspnea, sputum production) should add even more emphasis to the idea that it is time to quit smoking, provided someone takes advantage of this teachable moment to drive the point home. Early spirometry may provide the impulse to quit smoking and/or to start taking pulmonary medications according to the health plan or “action plan.”

Quitting smoking often increases quality of life, increases the productive years of life, decreases environmental exposure to self and others, and saves money through regaining the money normally spent on smoking. In addition, by slowing the

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Bill Pruitt and respiratory therapy student Mandy Britain perform pulmonary function tests on a patient.
decline in lung function, quitting smoking should lead to a decrease in health care costs related to breathing disorders, thus reducing the burden on the economy as a whole and the individual who stops smoking.

Bringing the problem out in the open

In a case-finding study published in April 2004 in CHEST, a six-question survey on signs and symptoms of obstructive lung disease (OLD) — including asthma — was given to 35- to 70-year-old subjects in Belgium (n=3,408) who were visiting their general practitioner. Spirometry was performed in all who had at least one positive answer on the survey. All who were currently receiving bronchodilator and/or inhaled steroid therapy were excluded (n=250) with the exclusion based on the assumption that they had OLD. The predictive power of the questionnaire to uncover new cases of OLD was low: the sensitivity was 58 percent and the specificity 78 percent when checked against the spirometry results.6 Of the patients with at least one positive answer to the survey (n=728), 703 had spirometry and, of these, 126 new cases of OLD were uncovered.

Of the patients who had no positive answer to the survey, a sample of 10 percent was selected at random to be the control group and were given spirometry tests (n=222). Of these people with "no complaints," nine were found to have OLD. The authors extrapolated this finding to the entire group of "no complaints" and figured a total of 90 probable new cases of OLD. The total number of new OLD cases (extrapolated and actual) was 216. These represent cases that otherwise would not have been diagnosed except for spirometry and make up 7.4 percent of the total subjects in the study.

Office spirometry

Widespread use of office spirometry in the primary care physician's practice to evaluate all smokers more than 45 years old is one of the goals listed in the consensus statement from the NLHEP.7 This statement includes parameters for the quality, equipment, and cost of performing office spirometry. NLHEP recommends that the spirometers have the capability to check for and report on acceptability of the tests and repeatability of the FEV1 and FVC measurements. In addition, NLHEP recommends that the office spirometers be easy to use, following easily understood educational materials. In the summer of 2004, the NLHEP web site added details on a review process to evaluate office spirometers in light of the consensus statement criteria. Manufacturers can submit their spirometers for evaluation and if found acceptable, may include the wording "meets the NLHEP criteria for office-based spirometers" in their advertising.8

Office spirometry and early screening have been proven effective in finding undiagnosed cases of COPD; but the question still remains, "Does early spirometry testing influence smoking cessation and/or outcomes in patients at risk for COPD?" Common sense and logic point to "yes," but the studies that prove this to be the case are still needed.

As office spirometers become more prevalent, early screening will uncover more hidden cases of COPD. We need to look at the impact this will have on health, cost, quality of life, and smoking rates. Respiratory therapists have a great potential in this area to lead the way both in research and in practice. The challenge is before us, the need is great, and the reward is worth the cost. 

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References