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Early Detection of COPD: A Clinical Controversy

Chronic obstructive pulmonary disease (COPD) is acknowledged to be an under-recognized and under-treated disease. It is one of the most common respiratory diseases that cause a person to eventually seek medical care. The natural history of COPD is that of progressive airway obstruction and lung function decline over a period of many years.

How early is COPD detectable? Can early detection prevent or slow disease progression? Is the condition defined in guidelines as “early” or “mild” COPD even a disease in and of itself, and does it need to be treated? Are efforts at early detection worth their cost in time and money? These are questions that have been, and are currently debated by clinicians and investigators who bring solid evidence and argument to both sides of the controversy. The controversy is summarized by review of “pro” and “con” positions. Early recognition of COPD at a “mild” stage prompts follow-up observation, and early treatment to slow airway obstruction when treatment is justified by symptoms and airflow limitation.

Pro: Early Detection of COPD is Worth While and Should Be Promoted

Early detection of COPD is a worthwhile enterprise; the best means to consistently accomplish it is a subject worthy of continued investigation.

Contrary to outworn views of COPD as an “old man’s disease”, COPD affects a wide age-range of women as well as men. A smoking history is a frequent risk factor, among others that include:

- Age 40 and older;
- Occupational dust and chemical exposures; and,
- Genetic factors, including alpha₁-antitrypsin deficiency in a relatively small number of patients.

No single pathophysiologic factor defines COPD. It is a multi-component disease in which airway and systemic inflammation occurs in association with structural changes in lung parenchyma, mucociliary dysfunction, and in advanced disease comorbidities such as cardiovascular disease and muscle wasting. Damage to lung tissue and progressive thickening of airway wall is the major factor in progressive airway obstruction and decline in lung function.

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Early manifestations of COPD can range from “none” to identification of suggestive signs and symptoms such as chest hyperinflation, abnormal chest sounds, prolonged expiration time, and reduced airflow sounds. Chest X-ray may appear normal or be slightly “dirty” in appearance of the lungs.

Diagnosis of COPD usually derives from:

- Symptoms—cough, sputum production and/or dyspnea on physical effort;
- Risk factor exposures—tobacco smoke, occupational chemicals or dusts, indoor/outdoor pollution; and,
- Spirometry—identification of reduced airflow.

Under-diagnosis and misdiagnosis occurs frequently in early stages of COPD. The disease may not be recognized or may be mistaken for asthma, especially if asthma and early COPD are both present in the same patient as sometimes occurs.

A major factor contributing to under-diagnosis of early COPD is the infrequency of spirometry in examination by primary care physicians. Various studies have shown that spirometry is available and used in less than 20% of primary care physician offices. Spirometry, correctly used, can contribute substantially to diagnosis of early COPD whereas reliance on symptoms alone can result in failure to recognize early COPD in an asymptomatic patient.^{1,2} Spirometry may identify airflow limitation in patients with mild COPD, and as well in previously undiagnosed patients with moderate to severe COPD.³

Why spirometry is not more widely used by primary care physicians is not attributable to any single cause. Reasons for failure to include spirometry in office practice include:

- Spirometry may be too difficult to understand and interpret with its array of numbers and its “alphabet soup” of acronyms;
- No person or persons in the office have been trained to perform and interpret spirometry;
- Spirometry may be difficult to perform because of patient inability to provide an adequate sample, or because of equipment problems due to mechanical failure or incorrect calibration; and,

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- Reimbursement is not consistent with costs of providing the procedure.

The fact that spirometry is not more widely used in primary care is unsettling, because spirometry has its most useful effect in COPD detection by case-finding in the clinical setting. COPD case-finding is most effective when the patient with symptoms and/or risk factors is seen by a physician and spirometry is used to suggest or confirm a diagnosis.

Large-scale population screening using spirometry is not regarded as an effective means of finding early COPD. A 2008 report of the United States Preventive Task Force recommends against large-scale screening of adults for COPD using spirometry.⁴

Use of office spirometry to detect COPD is not adequately detecting cases, however. A review of data from a large number of patients by the National Committee for Quality Assurance showed that about 32% of patients with a new diagnosis of COPD had undergone spirometry in the 720 days prior to diagnosis and 180 days after diagnosis. Spirometric testing decreased with patient age.⁵

A study carried out in 12 primary care practices showed, that with adequate knowledge and technical expertise, spirometry can be effectively carried out by primary care physicians and can improve disease diagnosis and management. Interpretation of spirometric results was followed by changes in pharmacologic and non-pharmacologic management of 48% of patients with asthma and COPD.⁶

Training of physicians in use of spirometry must include recommended standards for lung function testing, and the necessity for regular checking of spirometer calibration.⁷ Regular calibration checks should be conducted for both volume and flow-type spirometers. Calibration checks themselves must be systematically reviewed regularly. Calibration check errors may be due to electronic or mechanical problems in equipment, in calibration technique, in humidity/temperature effects on equipment, or on incorrect transcription or reading of results.⁸

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When spirometry is done correctly in a clinical setting, and results are shared with patients, case-finding can be improved and patient compliance with treatment enhanced. Case-finding can be strongly associated with the patient assessed by spirometry--e.g., smoker or non-smoker, age under 50 or over 50, symptoms or no symptoms. Early detection is always useful; it is always useful to have clinical data on a patient with early/mild disease or who may be at risk for disease. More effort is needed to discover the most effective means of achieving consistently effective early detection.

Con: Don't Screen for Early COPD, Just Confirm Moderate to Severe COPD

In a 2007 statement, the American College of Physicians (ACCP) recommended: "Spirometry should not be used to screen for airflow obstruction in asymptomatic individuals".⁹ While early detection of COPD when it is still not causing symptoms seems at first glance to be rational, there are good reasons to the contrary based on good evidence:⁹

- Spirometric screening of asymptomatic individuals produces a high rate of false-positive results;
- A false-positive result may erroneously indicate need for prescription of an inhaled medication;
- A spirometric result does not necessarily prompt a patient to stop smoking; and,
- In any case, primary care physicians generally do not do spirometric testing.

The Global Obstructive Lung Disease (GOLD) Initiative defines Stage 1 "mild" COPD by a spirometric reading of $FEV_1/FVC < 0.70$, $FEV_1 \geq 80\%$ predicted.¹⁰ The FEV_1 given in the definition is consistent with a "normal" reading. Using this spirometric reading to define early, mild COPD produces an increasing false-positive probability in persons over age 50, when FEV_1/FVC declines with age.^{11,12} In addition, at GOLD Stage 1 dyspnea on effort is rare and there are few or no indications of disease compared to GOLD State 0 (no disease). There is no increase in all-cause mortality for smokers with GOLD Stage 1 disease.^{13,15}

Respiratory symptoms in smokers do not necessarily indicate COPD; symptoms of chronic cough, dyspnea and hyperinflation can also be associated with conditions such as asthma, post-nasal drip, poor physical conditioning, and cardiovascular disease.

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A false-positive identification of COPD can have adverse consequences:

- Time and cost of follow-up tests,
- Physical and psychological cost of effects of inappropriate medication, and
- Placing a “sick” label on a generally healthy person.

Spirometry has an important role in diagnosis and treatment of moderate to severe COPD. GOLD guidelines state that spirometry is needed to establish a firm diagnosis of COPD. When diagnosis leads to treatment, treatment should be reserved for patients who are symptomatic and have $FEV_1 < 60\%$ predicted.⁹ Physicians should consider spirometric confirmation of disease status essential before prescribing an inhaled medication.

A spirometric reading that indicates no disease rules out clinically important COPD and no pharmacologic treatment for COPD is indicated. Unfortunately, spirometry to confirm COPD is under-utilized in the United States.¹⁸ Physicians who use spirometry, or who would consider using spirometry to confirm a COPD diagnosis may find it helpful to review pulmonary function testing laboratory standards developed by a committee of the American Thoracic Society (ATS) and European Respiratory Society (ERS).¹ In the ATS/ERS standards, moderate COPD is defined by FEV_1 50-59% predicted. Confidence in a spirometric confirmation of moderate COPD should be assured before an inhaled medication is prescribed. Inhaled medications are expensive and carry some degree of risk for significant side effects.^{17, 20-22} A study published in 2008 looked at a variety of international guidelines for defining airway obstruction and found that using the lower limit of normal (LLN) for the FEV_1/FEV ratio reduces misclassification of airway obstruction.¹²

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Standard of Practice

Reliable detection and confirmation of chronic obstructive pulmonary disease (COPD) remains an unresolved problem, especially in regard to mild-to-moderate disease. COPD is acknowledged to be an under-recognized and under-treated or incorrectly treated disease.

Mild-to-moderate COPD is more likely to be unrecognized or misdiagnosed at the primary care level than at the level of physicians specializing in respiratory disease. A major factor in under-recognition and misdiagnosis by primary care physicians is the frequent absence of spirometry in the primary care setting. Spirometry is available and regularly used for diagnosis or as adjunct to treatment in only about a fifth of primary care physician offices, studies have shown. Reasons for the absence of spirometry vary, but include lack of training, lack of understanding of spirometry, and reimbursement issues.

Reliable diagnosis of early/mild COPD that lowers risk for false-positive findings is best achieved at the primary care level when diagnosis is based on symptoms, risk factors, and spirometry. Spirometric screening for early/mild COPD in large populations is not recommended and increases risk for false-positive findings.

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Controversy continues regarding the value of early/mild COPD case-finding. Information indicating that a patient may be at risk for COPD progression can be regarded as valuable, even if no treatment is indicated. On the other hand, some guideline-definitions of early/mild COPD are not far removed from “normal”. COPD defined by these criteria may not even qualify as disease, and should not be treated pharmacologically.