

DISCUSSION PAPER

The use and abuse of office spirometry

*Paul Enright^a^a Professor of Medicine, The University of Arizona, Tucson, Arizona, USA

Received 20th September 2008; accepted 23rd September 2008

Summary

Spirometry programs (outside of primary care settings) designed to detect COPD in the general adult population are not justified, since the true positive yield (airway obstruction with an FEV₁ below 60% predicted) is very low, and the false positive rate is very high. However, spirometry is greatly under-utilised by GPs who often prescribe inhalers for patients haphazardly. Inhalers for COPD are expensive and risk serious side-effects, so they should not be prescribed for current or former smokers without confirming severe airway obstruction. A large program in Finland has shown that some GPs can perform good quality spirometry. If good quality spirometry is not available in the GP's office, patients should be referred to a local resource for pre- and post-bronchodilator spirometry. More studies are needed to show that GPs use spirometry results systematically to make decisions which truly benefit their patients with asthma or COPD.

© 2008 General Practice Airways Group. All rights reserved.

P Enright. *Prim Care Resp J* 2008; 17(X): XXX-XXX.

doi:10.3132/pcrj.2008.00065

Keywords Spirometry, case-finding, screening, reliability, primary care, COPD, asthma, FEV₁/FVCSee papers by Tuomisto *et al* (page XXX) and Kinnula *et al* (page XXX)

Introduction

In this issue of the *PCRJ*, two papers from Finland describe the surprising success of programs to promote the widespread use of spirometry in the offices (consulting rooms) of primary care practitioners.^{1,2} Similar efforts in other countries have not been successful, despite local pulmonary specialists providing free training, and drug companies providing free spirometers and supplies.³⁻⁷ The three most common evidence-based indications for office spirometry are: to detect COPD; to determine the severity of asthma; and to measure the response to asthma medications.

Screening spirometry is a waste of resources

For more than 30 years, pulmonary specialists have been trying to get primary care practitioners to "*Detect COPD Early*," but we still don't have the evidence that these efforts help more patients than they hurt. Public campaigns in the United States (USA) tell smokers to "*Test Your Lungs; Know Your Numbers*." Instead, I think that patients should be told to "*Blow Hard (into a spirometer) Before You Suck Deeply*"

(from an expensive inhaler). GPs should not even consider prescribing an inhaler for COPD until severe airway obstruction has been confirmed by spirometry.

Hundreds of thousands of smokers have received spirometry testing in national campaigns which have produced tens of thousands of "cases" of COPD. However, according to extensive literature reviews, the Agency for Healthcare Research and Quality (AHRQ) group in the USA has concluded that such programs are not justified.^{8,9} In fact, spirometry done in medical care settings for patients with chronic respiratory symptoms (at high risk for lung disease) is true "case finding", whereas "screening" spirometry is done outside of a physician's office or hospital, often for anyone who is interested in the test (and thus at low risk for lung disease).^{10,11} Screening spirometry projects are often said to be done to "increase awareness" of COPD, but considerable harm can occur when the person is inappropriately told that the results are abnormal.^{12,13} Misclassification of spirometry results commonly occurs due to poor coaching, poor inspiratory or expiratory effort, an inaccurate spirometer, or inappropriate interpretation of the spirometry tracing.

Smokers are not more likely to quit smoking successfully when faced with abnormal spirometry results.^{14,15} All smokers, regardless of spirometry results, should be helped by primary

* Corresponding author: Dr Paul Enright, Professor of Medicine, The University of Arizona, Tucson, Arizona, USA. E-mail: LungGuy@aol.com

care practitioners to quit smoking – and this help should include the prescription of bupropion or varenicline for those who have failed less expensive interventions.¹⁶ So, prompting smoking cessation is not a valid rationale for promoting screening spirometry; you should not need a "stage prop" (abnormal test result) to convince a smoker to allow you to help him or her quit smoking permanently.

False positive rates for "mild COPD" are very high

Somehow, COPD guidelines published by pulmonary specialists during the past decade became biased towards increasing prescriptions for expensive inhalers. Patients with a normal forced expiratory volume in one second (FEV₁) were classified as having mild COPD (GOLD Stage 1) if their FEV₁/forced vital capacity (FVC) ratio was below 0.70.^{17,18} But the FEV₁/FVC ratio decreases with age in healthy never-smokers, so the false positive rate for airway obstruction (and thus COPD) – as defined by several pulmonary professional societies – increases above the age of 50 and is very high in patients aged 70 years or above.¹⁹⁻²¹ The fifth percentile from spirometry reference equations derived from a healthy population sample should be used to determine the lower limit of the normal range (LLN) for both the FEV₁/FVC ratio and for the FEV₁ itself.²² The age and gender-corrected LLNs are calculated automatically by the majority of commercially available spirometers, so there is no need to use the faulty 0.70 ratio in practice.

There is also no need to detect COPD "early" because there is no evidence that GOLD Stage 1 is a disease or a risk factor.^{23,24} The risk of a subsequent rapid decline in lung function in an adult smoker with airway obstruction is substantially increased only after their FEV₁ has fallen to below about 65% predicted.²⁵

About one-third of adult smokers with airway obstruction found during screening spirometry will not have airway obstruction ten minutes after inhaling a fast-acting bronchodilator.²⁶ By definition, COPD is then ruled out. This finding increases the probability of asthma in those with asthma-like symptoms. Up to a half of adults with asthma are current smokers in some countries,^{27,28} and their asthma will be more easily controlled if they successfully quit smoking.²⁹ Primary care practitioners (outside of Finland) rarely have the time to repeat spirometry after salbutamol inhalation, so it follows that they should not make a diagnosis of COPD in a patient with mild to moderate airway obstruction without referring these patients for post-bronchodilator spirometry.³⁰ Differentiating asthma from COPD is important because asthma infrequently responds to the anti-cholinergic inhalers often prescribed for COPD, and the prognosis for asthma is much better.

Mild restriction is not early COPD

"Mild restriction" is a non-specific, non-diagnostic, spirometry result. It is often due to poor inspiratory or expiratory effort, not measuring the patient's height properly (men often exaggerate their height when asked), use of inappropriate reference values (e.g. using Caucasian reference values when testing a black patient), or using an interpretation scheme which is not evidence-based. A low FVC without a low FEV₁/FVC ratio is often interpreted as restriction, but at least half of such patients have normal lung volumes when referred to a pulmonary function laboratory and tested in a body plethysmograph.³¹ Clinical research is needed to determine the clinical correlates of this non-specific spirometry pattern, much of which is probably due to obesity or poor effort. There is no evidence that mild "spirometric restriction" is due to "air trapping" secondary to "small airways disease" or early COPD in patients who would benefit from treatment with inhalers.³² I would not use spirometric "restriction" for medical decision-making, or as an indication for referring the patient for complete pulmonary function testing, unless the FVC is repeatably below 60% predicted, or the patient has an abnormal chest x-ray, or has dyspnoea on exertion, but is not obese.

In order to minimise misclassification of spirometry interpretations, we should learn to accept uncertainty when the results are near the LLN (borderline abnormal), the quality of the test was poor (due to sub-maximal efforts), and when post-bronchodilator results are unavailable.¹¹

Yet spirometry is greatly under-utilised

According to studies in the USA, the majority of people reporting a doctor-diagnosis of COPD have never had spirometry testing to confirm the diagnosis.^{4,32} There was a wide geographic variation in the use of spirometry to confirm COPD,³³ and this is probably true between and within many other countries. This practice is akin to prescribing antihypertensive medications without measuring blood pressure... While they may be smokers with a chronic cough and perhaps some dyspnoea due to poor conditioning, many of these patients do not have airway obstruction.³⁴

Should GPs buy a spirometer or simply order spirometry tests?

In most countries, a minority of primary care practitioners have purchased a spirometer, and few have actually used it during the past month.^{3,5,35,36} Some GPs use a spirometer several times a month, but many of the tests fail the standard goals for good quality.³⁷ In the USA, a nurse or technologist performs the spirometry tests (not the doctor), but the majority of these staff have not been trained to perform spirometry tests properly, and post-bronchodilator spirometry

