# LET'S CLEAR THE AIR
## LUNG FUNCTION TESTING FOR ASTHMA OR COPD

### WHY LUNG FUNCTION TESTING IS ESSENTIAL WHEN SUSPECTING ASTHMA OR COPD

Asthma and COPD (chronic obstructive pulmonary disease) are among the most common chronic diseases in Canada. The diagnosis of these conditions requires lung function testing, starting with a simple spirometry and bronchodilator response test.[1, 2] Yet more often than not, both asthma and COPD are diagnosed based on symptoms and physical exam findings rather than with objective testing.

### WHAT IS THE SIZE OF THIS GAP?

More than half of Canadians receive a diagnosis of asthma or COPD without lung function testing. Large Canadian studies have shown that only **43%** and **36%** of patients who receive a diagnostic label of asthma[3] and COPD[4], respectively, have had pulmonary function testing within 1 year before or after the time of diagnosis.

### WHY IS LUNG FUNCTION TESTING IMPORTANT?

Both asthma and COPD can be challenging to diagnose and assess based on history and physical examination alone. Some patients have both conditions (asthma-COPD overlap), which can be even more challenging to diagnose without objective testing.

#### Asthma

All that wheezes is not asthma! In Canada, **33%** of patients diagnosed with asthma by a physician in the last 5 years did not have objective evidence of asthma on lung function testing.[5]

However, **79%** of these patients without asthma were using asthma medications. "Overdiagnosis" of asthma results in overtreatment, resulting in unnecessary costs and possible medication side effects.[5] Further, the actual diagnosis may be overlooked, resulting in ongoing symptoms and diagnostic delays (asthma mimickers include allergic/non-allergic rhinitis with post-nasal drip, gastro-esophageal reflux disease (GERD), anxiety disorders, and some serious cardiopulmonary conditions).[5]

#### COPD

As with asthma, studies show that **31** to **44%** of patients who received a clinical diagnosis of COPD did not actually have the condition when tested objectively.[6-8] Similarly, these patients are exposed to unnecessary costs and possible inhaler side effects, while their true diagnosis remains unidentified.

When COPD is diagnosed without spirometry, providers underestimate the severity of the condition.[9] Accordingly, providers prescribe more appropriate (evidence-supported) medications for patients with suspected COPD when they have undergone spirometry.[10] As a result, patients with COPD have both lower hospital admission rates and lower mortality when the diagnosis is confirmed by spirometry, as opposed to clinically.[10]

## WHAT TESTING IS REQUIRED TO MAKE A DIAGNOSIS OF ASTHMA OR COPD?

### Asthma

For patients aged 6 or older, the first test required to make the diagnosis is spirometry with bronchodilator response testing. In cases where asthma is suspected, the diagnosis requires presence of obstruction and an improvement in the FEV1 (forced expiratory volume in the first second) of at least **12%** and 200cc from the baseline value after administration of the bronchodilator.

Although this finding is sufficient to make the diagnosis, if the test is negative, it does not rule out asthma. In fact, about **40%** of patients who do not have a bronchodilator response still have asthma.[11] These patients require further testing, most commonly with a methacholine challenge test.

It is important to note that when asthma is suspected, other lung function tests, such as plethysmography (i.e. lung volumes) and diffusion capacity testing are not required.

### COPD

In cases where COPD is suspected, the diagnosis requires the presence of obstruction (i.e. a reduced FEV1/Forced Vital Capacity ratio) on the post-bronchodilator spirometry. As long as the patient is not on therapy, this is both a highly sensitive and specific test, and no further testing is required in most cases.

## HOW CAN YOU OVERCOME THE BARRIERS TO USING LUNG FUNCTION TESTING?

We recognize that there are sometimes barriers to the use of lung function testing in patients with suspected asthma or COPD.

Some clinicians have access to in-office spirometry, but without trained personnel to conduct spirometry, high-quality testing is difficult to achieve.[12] Interpreting results can also be challenging. To help with this, the Lung Health Foundation has developed educational webinars and modules on spirometry.

Visit www.ChoosingWiselyCanada.org/Airways/#education for more information.

Alternatively, many clinicians send their patients to an outside lab for spirometry. Availability of outside labs varies widely by region, often resulting in diagnostic delays.[13] If testing is not readily available, it may be reasonable to initiate therapy in a symptomatic patient prior to lung function testing. It is critical, however, to order lung function testing at the same time so that the diagnosis can be definitively confirmed. In suspected asthma, medication weaning may also be required to demonstrate or rule out the diagnosis, given that inhaled corticosteroids reduce the sensitivity of lung function tests. In some cases, objective tests are negative, but patients consistently worsen when therapy is withdrawn. In such cases, it may not be possible to objectify the diagnosis or safely stop therapy.

Some patients may refuse lung function testing in a lab due to travel and inconvenience. To help address this, a wide-ranging patient-facing campaign to try to convey the importance of objective testing to the public is being launched simultaneously.

We encourage you to share our online resources with your patients, available at:

www.ChoosingWiselyCanada.org/Airways.

## THIS CAMPAIGN IS LED BY:

- Choosing Wisely Canada
- The College of Family Physicians of Canada
- The Canadian Thoracic Society

## AND SUPPORTED BY:

- The Canadian Society of Allergy and Clinical Immunology
- The Family Physicians Airway Group of Canada
- The Canadian Society of Internal Medicine
- The Canadian Lung Association
- The Canadian Society of Respiratory Therapists
- Asthma Canada
- COPD Canada
- The Lung Health Foundation

## REFERENCES


[1] Yang CL, Hicks EA, Mitchell P, Reisman J, Podgers D, Hayward KM, et al. Canadian Thoracic Society 2021 Guideline update: Diagnosis and management of asthma in preschoolers, children and adults. Canadian Journal of Respiratory, Critical Care, and Sleep Medicine. 2021;5(6):348-61.

[2] Bourbeau J, Bhutani M, Hernandez P, Aaron SD, Balter M, Beauchesne M-F, et al. Canadian Thoracic Society Clinical Practice Guideline on pharmacotherapy in patients with COPD – 2019 update of evidence. Canadian Journal of Respiratory, Critical Care, and Sleep Medicine. 2019;3(4):210-32.

[3] Gershon AS, Victor JC, Guan J, Aaron SD, To T. Pulmonary function testing in the diagnosis of asthma: a population study. Chest. 2012;1(5):1190-6.

[4] Gershon AS, Hwee J, Croxford R, Aaron SD, To T. Patient and physician factors associated with pulmonary function testing for COPD: a population study. Chest. 2014;145(2):272-81.

[5] Aaron SD, Vandemheen KL, FitzGerald JM, Ainslie M, Gupta S, Lemiere C, et al. Reevaluation of Diagnosis in Adults With Physician-Diagnosed Asthma. JAMA. 2017;1(3):269-79.

[6] Gershon AS, Hwee J, Chapman KR, Aaron SD, O'Donnell DE, Stanbrook MB, et al. Factors associated with undiagnosed and overdiagnosed COPD. European Respiratory Journal. 2016;48(2):561-4.

[7] Hill K, Goldstein RS, Guyatt GH, Blouin M, Tan WC, Davis LL, et al. Prevalence and underdiagnosis of chronic obstructive pulmonary disease among patients at risk in primary care. Cmaj. 2010;182(7):673-8.

[8] Walters JA, Walters EH, Nelson M, Robinson A, Scott J, Turner P, et al. Factors associated with misdiagnosis of COPD in primary care. Prim Care Respir J. 2011;20(4):396-402.

[9] Mapel DW, Dalal AA, Johnson P, Becker L, Hunter AG. A clinical study of COPD severity assessment by primary care physicians and their patients compared with spirometry. Am J Med. 2015;128(6):629-37.

[10] Gershon A, Mecredy G, Croxford R, To T, Stanbrook MB, Aaron SD, et al. Outcomes of patients with chronic obstructive pulmonary disease diagnosed with or without pulmonary function testing. Cmaj. 2017;189(14):E530-E8.

[11] Selvanathan J, Aaron SD, Sykes JR, Vandemheen KL, FitzGerald JM, Ainslie M, et al. Performance Characteristics of Spirometry With Negative Bronchodilator Response and Methacholine Challenge Testing and Implications for Asthma Diagnosis. Chest. 2020;158(2):479-90.

[12] Gupta S, Moosa D, MacPherson A, Allen C, Tamari IE. Effects of a 12-month multi-faceted mentoring intervention on knowledge, quality, and usage of spirometry in primary care: a before-and-after study. BMC Pulmonary Medicine. 2016;16(1):56.

[13] The Lung Association. Moving the dial on the diagnosis and treatment of asthma. 2019. Available at: https://www.lung.ca/sites/default/files/MovingtheDial_WhitePaper.pdf