Spirometry in asthma diagnosis

National Asthma Council | Australian Asthma Handbook

Spirometry is a recommended diagnostic test for asthma.

The National Asthma Council's Australian Asthma Handbook recommends spirometry, including a bronchodilator responsiveness test, for patients aged 6 years and over with signs and symptoms suggesting asthma.

Spirometry is an established lung function test for confirming the presence of variable expiratory airflow limitation in the diagnosis of asthma. Lung function testing is essential to distinguish asthma from other conditions, such as inducible laryngeal obstruction and chronic obstructive pulmonary disease.

Spirometry should be performed by well-trained operators with well-maintained and calibrated equipment.*

What does spirometry measure?

Spirometry measures the volume and flow rate of air forcefully exhaled from a single lungful. Key diagnostic indices are forced expiratory volume in 1 second (FEV_1), forced vital capacity (FVC), and their ratio (FEV_1/FVC). Spirometry detects expiratory airflow limitation compared with normal range (matched for age, sex, height and racial group), and whether airflow limitation is responsive to a bronchodilator.

Who provides spirometry?

Spirometry can be performed in primary care if reliable equipment and appropriately trained staff are available. If not, refer patients to an accredited respiratory function laboratory (directory available from the Thoracic Society of Australia and New Zealand: thoracic.org.au).

What is a bronchodilator responsiveness test?

Spirometry is performed with at least 3 acceptable manoeuvres* and the highest FEV_1 reading recorded, then repeated 10–15 minutes after administering a rapid-acting bronchodilator (e.g. 400 microg salbutamol). The spirometer software calculates the absolute and percentage increase in FEV_1.

Adults and adolescents ≥12 years: The test is positive if FEV_1 increase by ≥12%, with absolute increase ≥ 200 mL, compared with pre-bronchodilator FEV_1.
In children 6–11 years: The test is positive if the absolute increase in FEV_1 >10% of the predicted FEV_1 value for the individual.

Alternative bronchodilator response criteria are used in some spirometry software and testing centres.[1]

How is spirometry interpreted in asthma diagnosis?

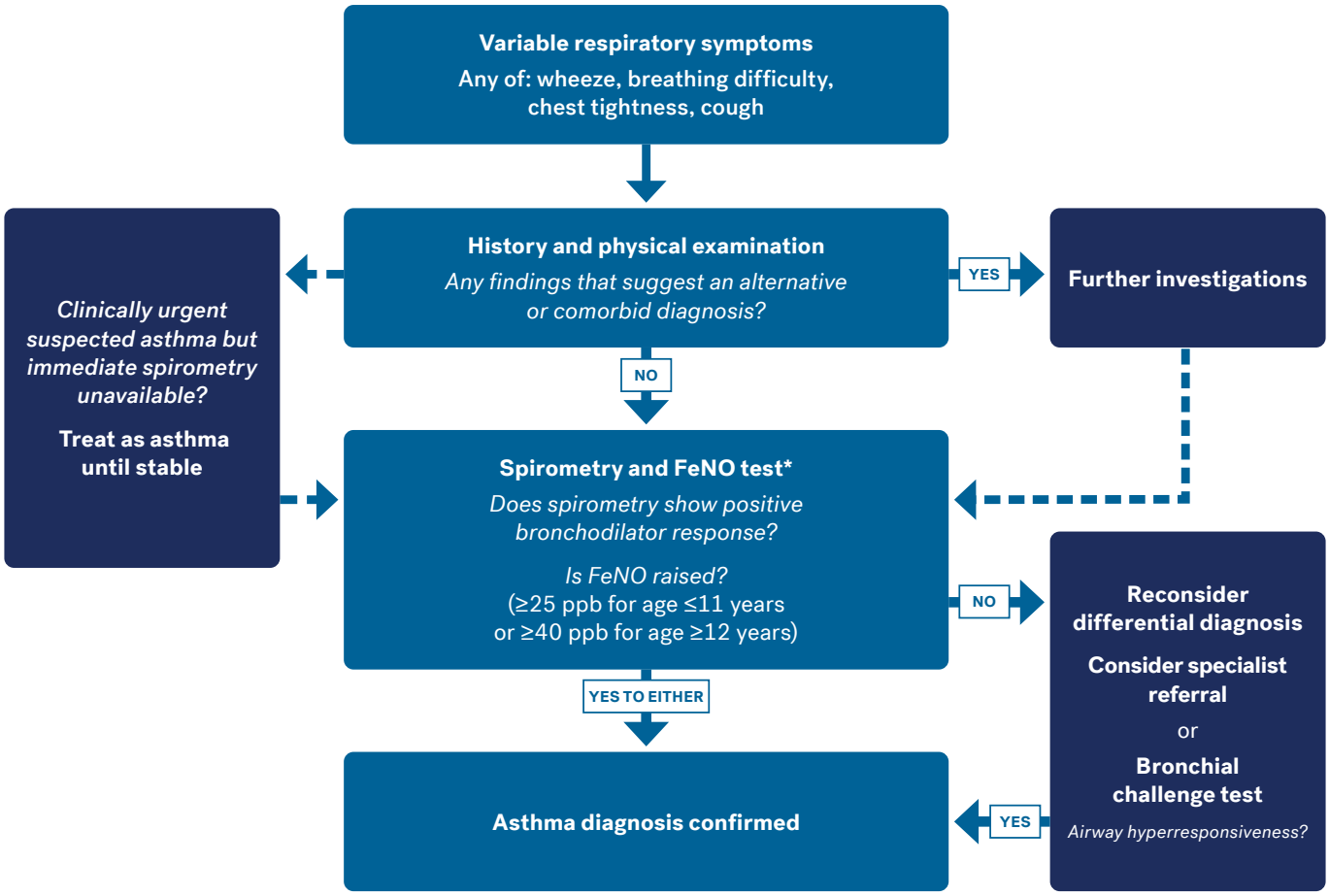
FEV_1 below lower limit of normal indicates abnormal lung function. Reduced FEV_1/FVC indicates expiratory airflow limitation, but does not prove asthma. A positive bronchodilator responsiveness test confirms asthma in a patient with typical symptoms. A negative bronchodilator responsiveness test does not rule out asthma.

Patients with asthma using anti-inflammatory treatment or bronchodilators may show normal FEV_1 and a negative bronchodilator responsiveness test. Patients with longstanding asthma may develop persistent expiratory airflow limitation (FEV_1/FVC <0.7 or <lower limit of normal), sometimes with a negative bronchodilator responsiveness test.[2]

Notes: Contraindicated in patients at risk of complications due to high thoracic, abdominal, intracranial and intraocular pressures.[3] Relative contraindications* include acute respiratory tract infection, chest/abdominal pain, nausea, diarrhoea, and dementia.[3] Inhaled bronchodilators should be withheld before diagnostic spirometry.*

** For more information see Spirometry Handbook for primary care[3] available at nationalasthma.org.au*

Figure 1. Diagnosis of asthma in patients 6 years and over



FeNO: fractional exhaled nitric oxide; FEV_1: forced expiratory volume in 1 second

** If available when spirometry conducted in an accredited respiratory function laboratory.*

REFERENCES: 1. Stanojevic S, et al. Eur Respir J 2022; 60: 2101499. **2.** Rutting S, et al. Front Physiol 2022; 13: 898208. **3.** National Asthma Council Australia. The Spirometry Handbook for primary care: nationalasthma.org.au/resources/spirometry-handbook-for-primary-care

For more information, refer to the National Asthma Council's Australian Asthma Handbook: asthmahandbook.org.au

National Asthma Council's spirometry training and tools: nationalasthma.org.au/health-professionals/spirometry-tools-resources

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