ABBREVIATIONS

CFC  chlorofluorocarbon
COPD  chronic obstructive pulmonary disease
COX  cyclo-oxygenase
dx  dual-energy X-ray absorptiometry
ED  emergency department
EIB  exercise-induced bronchoconstriction
FEV1  forced expiratory volume over one second
FEV6  forced expiratory volume over six seconds
FSANZ  Food Standards Australia and New Zealand
FVC  forced vital capacity
GORD  gastro-oesophageal reflux disease
HFA  formulated with hydrofluoroalkane propellant
ICS  inhaled corticosteroids
ICU  intensive care unit
IgE  Immunoglobulin E
IL  interleukin
IU  international units
IV  intravenous
LABA  long-acting β2-adrenergic receptor agonist
LAMA  long-acting muscarinic antagonist
LTRA  leukotriene receptor antagonist
MBS  Medical Benefits Scheme
NHMRC  National Health and Medical Research Council
NIPPV  non-invasive positive pressure ventilation
NSAIDs  nonsteroidal anti-inflammatory drugs
OCS  oral corticosteroids
OSA  obstructive sleep apnoea
PaCO2  carbon dioxide partial pressure on blood gas analysis
PaO2  oxygen partial pressure on blood gas analysis
PBS  Pharmaceutical Benefits Scheme
PEF  peak expiratory flow
pMDI  pressurised metered-dose inhaler or 'puffer'
PPE  personal protective equipment
SABA  short-acting β2-adrenergic receptor agonist
SAMA  short-acting muscarinic antagonist
SaO2  oxygen saturation
SpO2  peripheral capillary oxygen saturation measured by pulse oximetry
TGA  Therapeutic Goods Administration

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Diagnosing asthma in adults

Overview

_A clinical definition of asthma in adults_

Asthma is defined clinically as the combination of variable respiratory symptoms (e.g. wheeze, shortness of breath, cough and chest tightness) and excessive variation in lung function.

See: _A working definition of asthma_

There is no single reliable test ('gold standard') and there are no standardised diagnostic criteria for asthma.

The diagnosis of asthma is based on:

- history
- physical examination
- considering other diagnoses
- documenting variable airflow limitation.

In some patients, observing a response to treatment may help confirm the diagnosis, but lack of response to bronchodilators or to inhaled corticosteroids does not rule out asthma.

_Figure. Steps in the diagnosis of asthma in adults_

Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/4

- The guidance in this section generally also applies to older adolescents.

In this section

*Initial investigations*

History, physical examination and lung function testing in the investigation of asthma-like symptoms in adults and adolescents

http://www.asthmahandbook.org.au/diagnosis/adults/initial-investigations

*Alternative diagnoses*

Considering alternative diagnoses in adults and adolescents


*Making the diagnosis*

Considerations and criteria for the diagnosis of asthma in adults and adolescents


*Starting treatment*

Reviewing the response to treatment to help confirm the diagnosis in adults and adolescents


*Further investigations*

When to consider further investigations, including tests of airway hyperresponsiveness or airway inflammation, allergy tests and imaging, in the investigation of asthma symptoms in adults and adolescents

http://www.asthmahandbook.org.au/diagnosis/adults/further-investigations
Figure. Steps in the diagnosis of asthma in adults

VARIABLE RESPIRATORY SYMPTOMS THAT SUGGEST ASTHMA

HISTORY AND PHYSICAL EXAMINATION

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INVESTIGATIONS FOR SPECIFIC ALTERNATIVE DIAGNOSIS

Alternative diagnosis confirmed?

ALTERNATIVE DIAGNOSIS

SPIROMETRY

FEV₁ before and 10-15 mins after bronchodilator

Reversible airflow limitation? (FEV₁ increase ≥200 mL and ≥12% from baseline)

Expiratory airflow limitation? (FEV₁/FVC < lower limit of normal for age)

NO

YES

FURTHER INVESTIGATIONS

Tests as indicated

Consider bronchial provocation test

Supports asthma diagnosis?

NO

CONSIDER REFERRAL

YES

ASTHMA

Start asthma treatment and review response
# Investigating asthma-like symptoms in adults

## In this section

<table>
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</table>
Taking a history to investigate asthma-like symptoms in adults

Recommendations

Consider asthma in adults with (any of):

- episodic breathlessness
- wheezing
- chest tightness
- cough.

Ask about:

- current symptoms (both daytime and night-time)
- pattern of symptoms (e.g. course over day, week or year)
- precipitating or aggravating factors (e.g. exercise, viral infections, ingested substances, allergens)
- relieving factors (e.g. medicines)
- impact on work and lifestyle
- home and work environment
- smoking history (tobacco or cannabis, exposure to other people's smoke)
- past history of allergies including atopic dermatitis (eczema) or allergic rhinitis ('hay fever')
- family history of asthma and allergies.

When respiratory symptoms are not typical, do not rule out the possibility of asthma without doing spirometry, because symptoms of asthma vary widely from person to person.

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Last reviewed version 2.0
Performing a physical examination to investigate asthma-like symptoms in adults

Recommendations

Perform a physical examination, including chest auscultation and inspection of upper respiratory tract for signs of allergic rhinitis.

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Do not rule out the possibility of asthma without doing spirometry, because physical examination may be normal when symptoms are absent and this does not exclude a diagnosis of asthma.

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Significance of findings on physical examination

Wheeze suggests asthma but does not prove the diagnosis. Widespread wheeze on auscultation of the chest during symptoms increases the probability that the patient has asthma, but this may also occur in patients with COPD, viral or bacterial respiratory infection, tracheomalacia or inhaled foreign body. Obese people who do not have asthma may also report wheezing.\(^1\)

High-pitched stridor is commonly mistaken for wheezing in people with upper airway dysfunction.\(^2\) However, careful auscultation will reveal that the sound is localised to the upper airway (not peripheral airway expiratory wheezing).\(^2\)

Crackles on chest auscultation indicate an alternate or concurrent diagnosis.

References

Assessing lung function to investigate asthma-like symptoms in adults

Recommendations

Perform or arrange spirometry for every patient with suspected asthma.

Note: If reliable equipment and appropriately trained staff are available, spirometry can be performed in primary care. If not, refer to an appropriate provider such as an accredited respiratory function laboratory.

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Measure bronchodilator reversibility by performing spirometry before and after administration of a rapid-onset beta₂ agonist bronchodilator (e.g. 4 puffs of salbutamol 100 microg/actuation via pressurised metered-dose inhaler and spacer).

Notes
Airflow limitation is defined as reversible (i.e. bronchodilator response is clinically important) if FEV₁ increases by ≥ 200 mL and ≥ 12%.
Failure to demonstrate reversible airflow limitation after bronchodilator ('bronchodilator reversibility') does not exclude asthma, and its presence does not prove asthma – the pattern of symptoms and other clinical features must also be considered.

Figure. Steps in the diagnosis of asthma in adults
Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/4

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Record the ratio of FEV₁ to FVC (FEV₁/FVC). Before making the diagnosis of asthma, confirm that FEV₁/FVC is reduced (less than the lower limit of normal for age) at a time when FEV₁ is lower than predicted.

Note: If the spirometer does not provide lower limit of normal for age, use the follow age-based cut-points to indicate expiratory airflow limitation in adults and older adolescents:

• less than 0.85 (up to 19 years)
• less than 0.80 (20–39 years)
• less than 0.75 (40–59 years)
• less than 0.70 (60 years and older).

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

• National Heart Lung and Blood Institute (NHLBI) National Asthma Education and Prevention Program, 2007¹
• Johns and Pierce, 2011²
• Quanjer et al. 2012³
If a patient shows some improvement in FEV₁ after bronchodilator, but does not meet criteria for reversible airflow limitation, consider other investigations. If necessary, repeat spirometry after a treatment trial of 4–6 weeks with regular low-dose inhaled corticosteroid plus short-acting beta₂ agonist as needed, to see if there is a significant improvement in symptoms and lung function.

Note: Airflow limitation can be transient (e.g. when recorded during a severe acute infection of the respiratory tract) and does not necessarily mean that the person has chronic asthma. Ideally, airflow limitation should be confirmed when the patient does not have a respiratory tract infection.

**How this recommendation was developed**

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Hand-held lung function-measuring devices (designed to measure FEV₁ and/or FEV₆, but not FVC) can be used in COPD case-finding and may also be useful in asthma case-finding, but must not be relied on either for ruling out asthma or when making a definitive diagnosis of asthma, because there is not enough evidence and validated protocols have not been developed.

**How this recommendation was developed**

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Do not use peak flow meters in place of spirometry for diagnosing asthma.

**How this recommendation was developed**

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

More information

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**Spirometry in diagnosis and monitoring**

Spirometry is the best lung function test for diagnosing asthma and for measuring lung function when assessing asthma control. Spirometry can:

- detect airflow limitation
- measure the degree of airflow limitation compared with predicted normal airflow (or with personal best)
- demonstrate whether airflow limitation is reversible.

It should be performed by well-trained operators with well-maintained and calibrated equipment.⁴ ⁵

Before performing spirometry, check if the person has any contraindications (e.g. myocardial infarction, angina, aneurysm, recent surgery, suspected pulmonary embolism, suspected pneumothorax, fractured ribs). Advise them to stop if they become dizzy.

Clearly explain and physically demonstrate correct spirometry technique: ²

- Sit upright with legs uncrossed and feet flat on the floor and do not lean forward.
- Breathe in rapidly until lungs feel absolutely full. (Coaching is essential to do this properly.)
- Do not pause for more than 1 second.
- Place mouthpiece in mouth and close lips to form a tight seal.
- Blast air out as hard and fast as possible and for as long as possible, until the lungs are completely empty or you are unable to blow out any longer.
- Remove mouthpiece.

Go to: National Asthma Council Australia’s spirometry technique video, [Performing spirometry in primary care](#)

Repeat the test until you obtain three acceptable tests and these meet repeatability criteria.

**Acceptability of test**

A test is acceptable if all the following apply:
• forced expiration started immediately after full inspiration
• expiration started rapidly
• maximal expiratory effort was maintained throughout the test, with no stops
• the patient did not cough during the test
• the patient did not stop early (before 6 seconds for adults and children over 10 years, or before 3 seconds for children under 10 years).

Record the highest FEV₁ and FVC result from the three acceptable tests, even if they come from separate blows.²

Repeatability criteria

Repeatability criteria for a set of acceptable tests are met if both of the following apply:⁴

• the difference between the highest and second-highest values for FEV₁ is less than 150 mL
• the difference between the highest and second-highest values for FVC is less than 150 mL.

For most people, it is not practical to make more than eight attempts to meet acceptability and repeatability criteria.²

Testing bronchodilator response (reversibility of airflow limitation)

Repeat spirometry 10-15 minutes after giving 4 separate puffs of salbutamol (100 microg/actuation) via a pressurised metered-dose inhaler and spacer.² (For patients who have reported unacceptable side-effects with 400 microg, 2 puffs can be used.)

For adults and adolescents, record a clinically important bronchodilator response if FEV₁ increases by ≥ 200 mL and ≥ 12%.²

For children, record a clinically important bronchodilator response if FEV₁ increases by ≥ 12%.²

Roles of other lung function tests in diagnosing asthma in adults

Peak expiratory flow meters in asthma diagnosis

Occasional measurement of peak expiratory flow rate using a peak flow meter is not as reliable as spirometry in the diagnosis of asthma and should not be used as a substitute.⁶

However, peak expiratory flow monitoring can be used to support the diagnosis of asthma in some patients (e.g. as one of several investigations in the assessment of suspected work-related asthma).

When using peak expiratory flow rate to measure lung function in diagnostic investigation, greater than 10% diurnal variation in peak expiratory flow rate with twice-daily readings (averaged for one week) suggests a diagnosis of asthma:⁷

Hand-held lung function measuring devices

Small hand-held devices that measure FEV₁ and/or FEV₆ could be useful in primary care case-finding to detect patients who need full investigation for COPD.⁶ However, there is not enough evidence to recommend their use in asthma diagnosis at present.⁶

Other lung function tests used in further investigation

Tests of airway hyperresponsiveness, lung volume tests and diffusing capacity tests may have roles within further investigation of respiratory symptoms in some patients.

Definition of variable expiratory airflow limitation

Most of the tests for variable expiratory airflow limitation are based on showing variability in FEV₁. While reduced FEV₁ may be seen with many other lung diseases (or due to poor spirometric technique), a reduced ratio of FEV₁ to FVC indicates airflow limitation.⁸ Normal FEV₁/FVC values derived from population studies vary,¹,³ but are usually greater than:¹

• 0.85 in people aged up to 19 years
• 0.80 in people aged 20–39 years
• 0.75 in people aged 40–59 years
• 0.70 in people aged 60–80 years.

In children, it is less useful to define expiratory airflow limitation according to a specific cut-off for FEV₁/FVC ratio, because normal values in children change considerably with age.³
Some spirometers provide predicted normal values specific to age group. If these are available, a FEV₁/FVC ratio less than the lower limit of normal (i.e. less than the 5th percentile of normal population) indicates airflow limitation.

Variable expiratory airflow limitation (beyond the range seen in healthy populations) can be documented if any of the following are recorded:

- a clinically important increase in FEV₁ (change in FEV₁ of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children) 10–15 minutes after administration of bronchodilator
- clinically important variation in lung function (at least 20% change in FEV₁) when measured repeatedly over time (e.g. spirometry on separate visits)
- a clinically important reduction in lung function (decrease in FEV₁ of at least 200 mL and 12% from baseline on spirometry, or decrease in peak expiratory flow rate by at least 20%) after exercise (formal laboratory-based exercise challenge testing uses different criteria for exercise-induced bronchoconstriction)
- a clinically important increase in lung function (at least 200 mL and 12% from baseline) after a trial of 4 or more weeks of treatment with an inhaled corticosteroid
- clinically important variation in peak expiratory flow (diurnal variability of more than 10%)
- a clinically important reduction in lung function (15–20%, depending on the test) during a test for airway hyperresponsiveness (exercise challenge test or bronchial provocation test) measured by a respiratory function laboratory.

Notes

Patients referred to a respiratory function laboratory may be asked not to take certain medicines within a few hours to days before a spirometry visit. A clinically important increase or decrease in lung function is defined as a change in FEV₁ of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children, or a change in peak expiratory flow rate of at least 20% on the same meter.\(^5\) A clinically important increase in FVC after administering bronchodilator may also indicate reversible airflow limitation, but FVC is a less reliable measure in primary care because FVC may vary due to factors such as variation in inspiratory volume or expiratory time.

The finding of ‘normal’ lung function during symptoms reduces the probability that a patient has asthma, but a clinically important improvement in response to bronchodilator or inhaled corticosteroid can occur in patients whose baseline value is within the predicted normal range.

The greater the variation in lung function, the more certain is the diagnosis of asthma. However, people with longstanding asthma may develop fixed airflow limitation.

Reversibility in airflow limitation may not be detected if the person is already taking a long-acting beta₂ agonist or inhaled corticosteroid.

Airflow limitation can be transient and does not necessarily mean that the person has asthma (e.g. when recorded during a severe acute infection of the respiratory tract). Ideally, airflow limitation should be confirmed when the patient does not have a respiratory tract infection. Reduction in lung function during a respiratory tract infection with improvement in lung function after its resolution, commonly occurs in people with asthma, but can also be seen in patients with COPD or in healthy people without either asthma or COPD.\(^9,10\)

References


Go to: National Asthma Council Australia’s Spirometry Resources
Go to: National Asthma Council Australia and Woolcock Institute Peak Flow Chart
Considering alternative diagnoses in adults

Recommendations

Consider other possible causes of respiratory symptoms, including:

- poor cardiopulmonary fitness
- other respiratory conditions (e.g. bronchiectasis, chronic obstructive pulmonary disease, hyperventilation/dysfunctional breathing, inhaled foreign body, large airway stenosis, pleural effusion, pulmonary fibrosis, rhinitis/rhinosinusitis, upper airway dysfunction)
- cardiovascular disease (e.g. chronic heart failure, pulmonary hypertension)
- comorbid conditions (e.g. obesity, gastro-oesophageal reflux)
- lung cancer.

**Table. Findings that increase or decrease the probability of asthma in adults**

<table>
<thead>
<tr>
<th>Asthma is more likely to explain the symptoms if any of these apply</th>
<th>Asthma is less likely to explain the symptoms if any of these apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than one of these symptoms:</td>
<td>Dizziness, light-headedness, peripheral tingling</td>
</tr>
<tr>
<td>• wheeze</td>
<td>Isolated cough with no other respiratory symptoms</td>
</tr>
<tr>
<td>• breathlessness</td>
<td>Chronic sputum production</td>
</tr>
<tr>
<td>• chest tightness</td>
<td>No abnormalities on physical examination of chest when symptomatic (over several visits)</td>
</tr>
<tr>
<td>• cough</td>
<td>Change in voice</td>
</tr>
<tr>
<td>Symptoms recurrent or seasonal</td>
<td>Symptoms only present during upper respiratory tract infections</td>
</tr>
<tr>
<td>Symptoms worse at night or in the early morning</td>
<td>Heavy smoker (now or in past)</td>
</tr>
<tr>
<td>History of allergies (e.g. allergic rhinitis, atopic dermatitis)</td>
<td>Cardiovascular disease</td>
</tr>
<tr>
<td>Symptoms obviously triggered by exercise, cold air, irritants, medicines (e.g. aspirin or beta blockers), allergies, viral infections, laughter</td>
<td>Normal spirometry or PEF when symptomatic (despite repeated tests)</td>
</tr>
<tr>
<td>Family history of asthma or allergies</td>
<td></td>
</tr>
<tr>
<td>Symptoms began in childhood</td>
<td></td>
</tr>
<tr>
<td>Widespread wheeze audible on chest auscultation</td>
<td></td>
</tr>
<tr>
<td>FEV₁ or PEF lower than predicted, without other explanation</td>
<td></td>
</tr>
<tr>
<td>Eosinophilia or raised blood IgE level, without other explanation</td>
<td></td>
</tr>
<tr>
<td>Symptoms rapidly relieved by a SABA bronchodilator</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from:
Consider the possibility of upper airway dysfunction when FEV₁/FVC ratio on spirometry is normal or when symptoms of breathlessness or wheeze do not improve after taking short acting beta₂ agonist.

*How this recommendation was developed*

**Consensus**
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Benninger *et al.* 2011
- Deckert and Deckert, 2010
- Weinberger and Abu-Hasan, 2007
- Morris and Christopher, 2010
- Kenn and Balkissoon, 2011

Investigate cough thoroughly if there are findings that might indicate a serious alternative or comorbid diagnosis.

*How this recommendation was developed*

**Consensus**
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Gibson *et al.* 2010

If expiratory airflow limitation is not completely reversible, consider the possibility of COPD as an alternative diagnosis or of asthma–COPD overlap, especially in smokers and ex-smokers over 35 years old and in people over 65 years old.

*How this recommendation was developed*

**Consensus**
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Abramson *et al.* 2012

Consider the possibility of adult-onset asthma in people with dyspnoea, wheeze or cough, even if they have no previous diagnosis of asthma.

*How this recommendation was developed*

**Consensus**
Based on clinical experience and expert opinion (informed by evidence, where available).
Upper airway dysfunction

Upper airway dysfunction is intermittent, abnormal adduction of the vocal cords during respiration, resulting in variable upper airway obstruction. It often mimics asthma and is commonly misdiagnosed as asthma. It can cause severe acute episodes of dyspnoea that occur either unpredictably or due to exercise. Inspiratory stridor associated with vocal cord dysfunction is often described as ‘wheezing’, but symptoms do not respond to asthma treatment.

Upper airway dysfunction can coexist with asthma. People with asthma who also have upper airway dysfunction experience more symptoms than those with asthma alone and this can result in over-treatment if vocal cord dysfunction is not identified and managed appropriately.

Upper airway dysfunction probably has multiple causes. In some people it is probably due to hyperresponsiveness of the larynx in response to intrinsic and extrinsic triggers. Triggers can include exercise, psychological conditions, airborne irritants, rhinosinusitis, gastro-esophageal reflux disease, and medicines.

Upper airway dysfunction should be considered when spirometry shows normal FEV₁/FVC ratio in a patient with suspected asthma or symptoms do not respond to short-acting beta₂ agonist reliever. The shape of the maximal respiratory flow loop obtained by spirometry may suggest the diagnosis. Direct observation of the vocal cords is the best method to confirm the diagnosis of upper airway dysfunction.

Asthma–COPD overlap

Distinguishing between typical allergic asthma (childhood-onset allergic asthma) and typical COPD (emphysema in a heavy smoker) is straightforward. However, it can be difficult to distinguish COPD from asthma in adults who have features of both conditions. These people are described as having asthma–COPD overlap.

Asthma–COPD overlap is not a single, well-defined disease entity, but includes a range of airway disease phenotypes with different causal mechanisms. Features of both asthma and COPD have been described in: people with current asthma (allergic or non-allergic) who have had significant exposure to tobacco smoke, people with longstanding asthma or late-onset asthma who have become persistently short of breath over time, people significant smoking history and symptoms consistent with COPD who also have a history of childhood asthma, people who present in middle age or later with shortness of breath, with a history of childhood asthma but no or few symptoms in between, and little smoking history.

Figure. Development of asthma, COPD and asthma–COPD overlap

Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/108

People with asthma–COPD overlap often have poor disease outcomes, including:

- high need for healthcare services
- worse quality of life, more wheezing, dyspnoea, cough and sputum production, and more frequent and severe respiratory exacerbations and hospitalisations, than people with COPD or asthma alone
- worse lung function demonstrated by spirometry than those with COPD alone, despite lower average exposure to tobacco smoke.

Features of asthma, COPD and asthma–COPD overlap

If several features of both asthma and COPD are present and neither condition is strongly favoured, respiratory disease should be managed according to recommendations for asthma–COPD overlap.

Table. Features that, when present, favour asthma or COPD

<table>
<thead>
<tr>
<th>Clinical feature (if measured/relevant)</th>
<th>Asthma more likely</th>
<th>COPD more likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of onset</td>
<td>Before 20</td>
<td>After 40</td>
</tr>
<tr>
<td>Clinical feature (if measured/relevant)</td>
<td>Asthma more likely</td>
<td>COPD more likely</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
</tbody>
</table>
| **Pattern of symptoms**                | Variation in respiratory symptoms:  
- changes over minutes, hours or days  
- worse at night or early morning  
- triggered by exercise, emotions, airborne pollutants or allergens | Persistence of respiratory symptoms despite treatment  
- Symptoms every day, including exertional dyspnoea  
- History of chronic cough and sputum unrelated to specific triggers, before onset of dyspnoea |
| **Lung function**                      | Expiratory airflow limitation* is variable#  
Lung function normal between symptoms | Expiratory airflow limitation* is persistent†  
Lung function abnormal between symptoms |
| **History**                            | Previous diagnosis of asthma  
Family history of asthma and allergies§ (allergic rhinitis or eczema) | Previous diagnosis of COPD, chronic bronchitis or emphysema  
Heavy exposure to tobacco smoke or biomass fuels |
| **Long-term disease trajectory**       | Seasonal or yearly variation in symptoms  
Improvements (spontaneously or in response to medication) last for weeks | Slowly worsens over years  
Relief in response to medication is limited and short term |
| **Chest X-ray**                        | Normal | Severe hyperinflation‡ |

Features that, when present, increase the probability of either typical asthma or typical COPD. None of these features is essential to make the diagnosis of asthma or COPD, with the exception of persistent airflow limitation for making the diagnosis of COPD.

* Expiratory airflow limitation: indicated by a reduced ratio of forced expiratory volume in one second (FEV₁) to forced vital capacity (FVC) on spirometry (FEV₁/FVC less than the lower limit of normal (i.e. less than the 5th percentile of normal population). Typical FEV₁/FVC values derived from population studies are > 0.75 in people aged 40–59 years and > 0.70 in people aged 60–80 years.

# Variable expiratory airflow limitation: variation beyond the range seen in healthy populations. It is indicated in adults by any of the following:
- a clinically important increase in FEV₁ (change in FEV₁ of at least 200 mL and 12% from baseline) 10–15 minutes after administration of bronchodilator
- clinically important variation in lung function (at least 20% change in FEV₁) when measured repeatedly over time (e.g. spirometry on separate visits)
- a clinically important increase in lung function (at least 200 mL and 12% from baseline) after ≥ 4 weeks’ treatment trial with an ICS
- clinically important variation in peak expiratory flow (diurnal variability of more than 10%, calculated over 1–2 weeks as the average of daily amplitude per cent mean)
- a clinically important reduction in lung function (decrease in FEV₁ of at least 200 mL and 12% from baseline on spirometry, or decrease in peak expiratory flow rate by at least 20%) after exercise (formal laboratory-based exercise challenge testing uses different criteria for exercise-induced bronchoconstriction)
- a clinically important reduction in lung function (15–20%, depending on the test) during a test for airway hyperresponsiveness (exercise challenge test or bronchial provocation test) measured by a respiratory function laboratory.

The greater the variations, or the more occasions excess variation is seen, the more confidently the diagnosis of variable expiratory airflow limitation consistent with asthma can be made.
† Persistent expiratory airflow limitation is indicated by reduced post-bronchodilator FEV₁/FVC*.
§ Lack of history of atopy does not exclude non-allergic asthma.
‡ Chest X-ray may be normal in a patient with COPD.

Asset ID: 104

Table. Spirometry findings in asthma, COPD and asthma–COPD overlap

<table>
<thead>
<tr>
<th>Finding</th>
<th>Consistent with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asthma</td>
</tr>
<tr>
<td>Normal FEV₁/FVC before or after bronchodilator</td>
<td>Yes</td>
</tr>
<tr>
<td>Abnormal lung function (post-bronchodilator reduced FEV₁/FVC and FEV₁ &lt; lower limit of normal)</td>
<td>Yes #</td>
</tr>
<tr>
<td>Airflow limitation with greater bronchodilator reversibility than in healthy population (post-bronchodilator FEV₁ increase ≥ 12% and 200mL from baseline)</td>
<td>Yes ‡</td>
</tr>
<tr>
<td>Marked bronchodilator reversibility (FEV₁ increase ≥ 12% and 400mL from baseline)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

FEV₁/FVC: ratio of forced expiratory volume in one second (FEV₁) to forced vital capacity (FVC), either before or after bronchodilator.

* Normal FEV₁/FVC is not consistent with COPD unless there is other evidence of chronic non-reversible expiratory airflow limitation.

# This finding is consistent with asthma that is poorly controlled or measured during a flare-up, or can be seen in some patients with longstanding asthma.

‡ The greater the variation, and the more times variation is seen, the more likely the diagnosis of asthma. However, some patients with longstanding asthma may develop persistent airflow limitation.

† Marked reversibility strongly favours asthma and is generally inconsistent with COPD, but does not rule out asthma–COPD overlap.

§ This finding may be seen in patients with asthma–COPD overlap, or occasionally in COPD, especially when FEV₁ is low.

Sources


Woodruff P, van den Berge M, Boucher R et al. ATS-NHLBI Asthma COPD Overlap (ACO) Workshop Report. Am J Respir Crit Care Med
Treatment for patients with asthma–COPD overlap

Inhaled corticosteroid treatment at low–moderate doses is essential to reduce the risk of potentially life-threatening flare-ups, even if asthma symptoms appear mild or infrequent.10, 21

Most patients also need treatment with a long-acting bronchodilator (either long-acting beta2 agonist or long-acting muscarinic antagonist) in addition to an inhaled corticosteroid. Long-acting beta2 agonists and long-acting muscarinic antagonists should not be used by people with asthma or asthma–COPD overlap unless they are also taking an inhaled corticosteroid (either in combination or separately).

<table>
<thead>
<tr>
<th>Class</th>
<th>Dosing frequency</th>
<th>Agent</th>
<th>Brand name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICS–LABA combinations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Fluticasone furoate + vilanterol</td>
<td>Breo Ellipta 100/25 microg†</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Do not prescribe 200/25 microg formulation#</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Budesonide + formoterol</td>
<td>Symbicort Rapihaler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Symbicort Turbuhaler</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Fluticasone propionate + formoterol</td>
<td>Flutiform</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Fluticasone propionate + salmeterol</td>
<td>Fluticasone and Salmeterol Cipla</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seretide Accuhaler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seretide MDI</td>
</tr>
<tr>
<td><strong>LABAs</strong></td>
<td>Once daily</td>
<td>Indacaterol</td>
<td>Onbrez Breezhaler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Twice daily</td>
<td>Formoterol</td>
<td>Oxis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Foradile</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Salmeterol</td>
<td>Serevent Accuhaler</td>
</tr>
<tr>
<td><strong>LAMAs</strong></td>
<td>Once daily</td>
<td>Glycopyrronium</td>
<td>Seebri Breezhaler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Tiotropium</td>
<td>Spiriva</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Spiriva Respimat</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Umeclidinium</td>
<td>Incruse Ellipta†</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Aclidinium</td>
<td>Bretaris Genuair</td>
</tr>
<tr>
<td>Class</td>
<td>Dosing frequency</td>
<td>Agent</td>
<td>Brand name</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td>-------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>LABA–LAMA combinations*</td>
<td></td>
<td>Indacaterol + glycopyrronium</td>
<td>Ultibro Breezhaler</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Olodaterol + tiotropium</td>
<td>Spiolto Respimat</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Vilanterol + umeclidinium</td>
<td>Anoro Ellipta†</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Formoterol + aclidinium</td>
<td>Brimica Genuair</td>
</tr>
</tbody>
</table>

- * Ensure that patient is also using regular long-term ICS. LABAs and LAMAs should not be used by people with asthma or asthma–COPD overlap unless they are also taking an ICS, in combination or separately.

- Advise patients/carers that inhalers should be stored below 30°C and should not be left in cars.

† The inhaler must be discarded 1 month after opening the package and removing device from tray. When first opened, patients should write the discard date on the label in the space provided. If stored in the refrigerator, inhaler should be taken out and allowed to return to room temperature for at least an hour before use.

‡ The inhaler must be discarded 6 weeks after opening the package and removing device from tray. When first opened, patients should write the discard date on the label in the space provided. If stored in the refrigerator, inhaler should be taken out and allowed to return to room temperature for at least an hour before use.

# Only the 100/25 microg dose of fluticasone furoate/vilanterol is TGA-approved for treatment of COPD. The higher dose (200/25 microg) is not TGA-approved for the treatment of COPD, so it should not be used in people with asthma–COPD overlap.

High doses of ICS (alone or in combination) are not recommended in patients with COPD and should therefore be used with caution in patients with asthma–COPD overlap, because of the risk of pneumonia.

Refer to PBS status before prescribing.

Last reviewed version 2.0
Asset ID: 105

Management should also include smoking cessation, treatment of comorbid conditions, physical activity, pulmonary rehabilitation, vaccinations, self-management (including a regularly updated action plan) and regular follow-up.¹⁰

Go to: Asthma action plans
Go to: COPD action plans

Respiratory tract infections should be monitored carefully because people with asthma–COPD overlap have high morbidity rates and because ICS treatment is associated with increased risk of non-fatal pneumonia in people with COPD.²² Most of the available evidence is from patients treated with fluticasone propionate, particularly at higher doses. Increased pneumonia rates have also been observed in studies of patients with COPD using fluticasone furoate/vilanterol. The higher dose of fluticasone furoate/vilanterol (Breo Ellipta 200/25 microg) is not approved for patients with COPD, so it should also not be used in patients with asthma–COPD overlap.

Specialist referral should be considered for patients with atypical symptoms or symptoms that suggest an alternative diagnosis, persistent symptoms or flare-ups despite treatment, or complex comorbidities.

Go to: National Asthma Council Australia’s Asthma–COPD overlap information paper

For information on diagnosis and management of COPD, refer to the COPD-X Concise Guide for Primary Care.²³

Go to: Lung Foundation Australia’s COPD-X Concise Guide for Primary Care

Last reviewed version 2.0

Cough and asthma in adults

When no other asthma symptoms are present, chronic cough (present for more than 8 weeks) is unlikely to indicate asthma.

Chronic cough may be due to asthma if:⁶

- cough is episodic
- cough with exercise is associated with other symptoms that suggest airflow limitation (expiratory wheeze or breathlessness)
• spirometry confirms reversible airflow limitation.

If cough is due to asthma, it should respond to treatment with an inhaled corticosteroid preventer taken regularly and reliever as needed).6

Findings that suggest a serious alternative or comorbid diagnosis that requires further investigation include:6

• haemoptysis
• smoker with > 20 pack–year smoking history
• smoker aged over 45 years with a new cough, altered cough, or cough with voice disturbance
• prominent dyspnoea, especially at rest or at night
• substantial sputum production
• hoarseness
• fever
• weight loss
• complicated gastro-oesophageal reflux disease
• swallowing disorders with choking or vomiting
• recurrent pneumonia
• swallowing disorders with choking or vomiting
• abnormal clinical respiratory examination.

Go to: Australian Cough Guidelines

**Spirometry in diagnosis and monitoring**

Spirometry is the best lung function test for diagnosing asthma and for measuring lung function when assessing asthma control. Spirometry can:

• detect airflow limitation
• measure the degree of airflow limitation compared with predicted normal airflow (or with personal best)
• demonstrate whether airflow limitation is reversible.

It should be performed by well-trained operators with well-maintained and calibrated equipment.24, 25

Before performing spirometry, check if the person has any contraindications (e.g. myocardial infarction, angina, aneurysm, recent surgery, suspected pulmonary embolism, suspected pneumothorax, fractured ribs). Advise them to stop if they become dizzy.

Clearly explain and physically demonstrate correct spirometry technique: 26

• Sit upright with legs uncrossed and feet flat on the floor and do not lean forward.
• Breathe in rapidly until lungs feel absolutely full. (Coaching is essential to do this properly.)
• Do not pause for more than 1 second.
• Place mouthpiece in mouth and close lips to form a tight seal.
• Blast air out as hard and fast as possible and for as long as possible, until the lungs are completely empty or you are unable to blow out any longer.
• Remove mouthpiece.

Go to: National Asthma Council Australia’s spirometry technique video, Performing spirometry in primary care

Repeat the test until you obtain three acceptable tests and these meet repeatability criteria.

**Acceptability of test**

A test is acceptable if all the following apply:

• forced expiration started immediately after full inspiration
• expiration started rapidly
• maximal expiratory effort was maintained throughout the test, with no stops
• the patient did not cough during the test
• the patient did not stop early (before 6 seconds for adults and children over 10 years, or before 3 seconds for children under 10 years).

Record the highest FEV₁ and FVC result from the three acceptable tests, even if they come from separate blows.26

**Repeatability criteria**

Repeatability criteria for a set of acceptable tests are met if both of the following apply:24

• the difference between the highest and second-highest values for FEV₁ is less than 150 mL
• the difference between the highest and second-highest values for FVC is less than 150 mL.
For most people, it is not practical to make more than eight attempts to meet acceptability and repeatability criteria.26

Testing bronchodilator response (reversibility of airflow limitation)

Repeat spirometry 10-15 minutes after giving 4 separate puffs of salbutamol (100 microg/actuation) via a pressurised metered-dose inhaler and spacer.26 (For patients who have reported unacceptable side-effects with 400 microg, 2 puffs can be used.)

For adults and adolescents, record a clinically important bronchodilator response if FEV1 increases by ≥ 12%.26

For children, record a clinically important bronchodilator response if FEV1 increases by ≥ 12%.26

Go to: National Asthma Council Australia’s Spirometry Resources

Last reviewed version 2.0

References

12. Gibson PG, Simpson JS. The overlap syndrome of asthma and COPD: what are its features and how important is it?. Thorax. 2009; 64: 728-735. Available from: http://thorax.bmj.com/content/64/8/728.full


Making a diagnosis of asthma in adults

Recommendations

Consider features that increase or decrease the probability of asthma.

Table. Findings that increase or decrease the probability of asthma in adults

<table>
<thead>
<tr>
<th>Asthma is more likely to explain the symptoms if any of these apply</th>
<th>Asthma is less likely to explain the symptoms if any of these apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than one of these symptoms:</td>
<td>Dizziness, light-headedness, peripheral tingling</td>
</tr>
<tr>
<td>• wheeze</td>
<td>Isolated cough with no other respiratory symptoms</td>
</tr>
<tr>
<td>• breathlessness</td>
<td>Chronic sputum production</td>
</tr>
<tr>
<td>• chest tightness</td>
<td>No abnormalities on physical examination of chest when symptomatic (over several visits)</td>
</tr>
<tr>
<td>• cough</td>
<td>Change in voice</td>
</tr>
<tr>
<td>Symptoms recurrent or seasonal</td>
<td>Symptoms only present during upper respiratory tract infections</td>
</tr>
<tr>
<td>Symptoms worse at night or in the early morning</td>
<td>Heavy smoker (now or in past)</td>
</tr>
<tr>
<td>History of allergies (e.g. allergic rhinitis, atopic dermatitis)</td>
<td>Cardiovascular disease</td>
</tr>
<tr>
<td>Symptoms obviously triggered by exercise, cold air, irritants, medicines (e.g. aspirin or beta blockers), allergies, viral infections, laughter</td>
<td>Normal spirometry or PEF when symptomatic (despite repeated tests)</td>
</tr>
<tr>
<td>Family history of asthma or allergies</td>
<td></td>
</tr>
<tr>
<td>Symptoms began in childhood</td>
<td></td>
</tr>
<tr>
<td>Widespread wheeze audible on chest auscultation</td>
<td></td>
</tr>
<tr>
<td>FEV\textsubscript{1} or PEF lower than predicted, without other explanation</td>
<td></td>
</tr>
<tr>
<td>Eosinophilia or raised blood IgE level, without other explanation</td>
<td></td>
</tr>
<tr>
<td>Symptoms rapidly relieved by a SABA bronchodilator</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from:


Asset ID: 2
How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Respiratory Expert Group, Therapeutic Guidelines Limited, 2009
- British Thoracic Society, 2012

Make a diagnosis of asthma if all of the following apply:

- The person has a history of variable symptoms (especially cough, chest tightness, wheeze and shortness of breath).
- Expiratory airflow limitation has been demonstrated (FEV₁/FVC less than lower limit of normal for age).
- Expiratory airflow limitation has been shown to be variable.
- There are no findings that suggest an alternative diagnosis.

Note: If the spirometer does not provide lower limit of normal for age, use the follow age-based cut-points to indicate expiratory airflow limitation in adults and older adolescents:

- less than 0.85 (up to 19 years)
- less than 0.80 (20–39 years)
- less than 0.75 (40–59 years)
- less than 0.70 (60 years and older).

Figure. Steps in the diagnosis of asthma in adults

Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/4

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

If a patient’s asthma has been diagnosed elsewhere (e.g. in a new patient reporting the diagnosis of asthma), try to confirm the diagnosis – whether or not the person has current symptoms, and whether or not the person is taking asthma medicines.

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Definition of variable expiratory airflow limitation

Most of the tests for variable expiratory airflow limitation are based on showing variability in FEV₁. While reduced FEV₁ may be seen with many other lung diseases (or due to poor spirometric technique), a reduced ratio of FEV₁ to FVC indicates airflow limitation. Normal FEV₁/FVC values derived from population studies vary, but are usually greater than:

- 0.85 in people aged up to 19 years
- 0.80 in people aged 20–39 years
- 0.75 in people aged 40–59 years
- 0.70 in people aged 60–80 years.

In children, it is less useful to define expiratory airflow limitation according to a specific cut-off for FEV₁/FVC ratio, because normal values in children change considerably with age.

Some spirometers provide predicted normal values specific to age group. If these are available, a FEV₁/FVC ratio less than the lower limit of normal (i.e. less than the 5th percentile of normal population) indicates airflow limitation.
Variable expiratory airflow limitation (beyond the range seen in healthy populations) can be documented if any of the following are recorded:

- A clinically important increase in FEV1 (change in FEV1 of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children) 10–15 minutes after administration of bronchodilator.
- Clinically important variation in lung function (at least 20% change in FEV1) when measured repeatedly over time (e.g., spirometry on separate visits).
- A clinically important reduction in lung function (decrease in FEV1 of at least 200 mL and 12% from baseline on spirometry, or decrease in peak expiratory flow rate by at least 20%) after exercise (formal laboratory-based exercise challenge testing uses different criteria for exercise-induced bronchoconstriction).
- A clinically important increase in lung function (at least 200 mL and 12% from baseline) after a trial of 4 or more weeks of treatment with an inhaled corticosteroid.
- Clinically important variation in peak expiratory flow (diurnal variability of more than 10%).
- A clinically important reduction in lung function (15–20%, depending on the test) during a test for airway hyperresponsiveness (exercise challenge test or bronchial provocation test) measured by a respiratory function laboratory.

Notes

Patients referred to a respiratory function laboratory may be asked not to take certain medicines within a few hours to days before a spirometry visit.

A clinically important increase or decrease in lung function is defined as a change in FEV1 of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children, or a change in peak expiratory flow rate of at least 20% on the same meter. A clinically important increase in FVC after administering bronchodilator may also indicate reversible airflow limitation, but FVC is a less reliable measure in primary care because FVC may vary due to factors such as variation in inspiratory volume or expiratory time.

The finding of ‘normal’ lung function during symptoms reduces the probability that a patient has asthma, but a clinically important improvement in response to bronchodilator or inhaled corticosteroid can occur in patients whose baseline value is within the predicted normal range.

The greater the variation in lung function, the more certain is the diagnosis of asthma. However, people with longstanding asthma may develop fixed airflow limitation. Reversibility in airflow limitation may not be detected if the person is already taking a long-acting beta2 agonist or inhaled corticosteroid.

Airflow limitation can be transient and does not necessarily mean that the person has asthma (e.g., when recorded during a severe acute infection of the respiratory tract). Ideally, airflow limitation should be confirmed when the patient does not have a respiratory tract infection. Reduction in lung function during a respiratory tract infection with improvement in lung function after its resolution, commonly occurs in people with asthma, but can also be seen in patients with COPD or in healthy people without either asthma or COPD.7, 8

Go to: National Asthma Council Australia’s Spirometry Resources
Go to: National Asthma Council Australia and Woolcock Institute’s Peak Flow Chart

Spirometry in diagnosis and monitoring

Spirometry is the best lung function test for diagnosing asthma and for measuring lung function when assessing asthma control. Spirometry can:

- Detect airflow limitation.
- Measure the degree of airflow limitation compared with predicted normal airflow (or with personal best).
- Demonstrate whether airflow limitation is reversible.

It should be performed by well-trained operators with well-maintained and calibrated equipment.9, 6

Before performing spirometry, check if the person has any contraindications (e.g., myocardial infarction, angina, aneurysm, recent surgery, suspected pulmonary embolism, suspected pneumothorax, fractured ribs). Advise them to stop if they become dizzy.

Clearly explain and physically demonstrate correct spirometry technique: 10

- Sit upright with legs uncrossed and feet flat on the floor and do not lean forward.
- Breathe in rapidly until lungs feel absolutely full. (Coaching is essential to do this properly.)
- Do not pause for more than 1 second.
- Place mouthpiece in mouth and close lips to form a tight seal.
- Blast air out as hard and fast as possible and for as long as possible, until the lungs are completely empty or you are unable to blow out any longer.
- Remove mouthpiece.

Go to: National Asthma Council Australia’s spirometry technique video, Performing spirometry in primary care

Repeat the test until you obtain three acceptable tests and these meet repeatability criteria.

Acceptability of test

A test is acceptable if all the following apply:
• forced expiration started immediately after full inspiration
• expiration started rapidly
• maximal expiratory effort was maintained throughout the test, with no stops
• the patient did not cough during the test
• the patient did not stop early (before 6 seconds for adults and children over 10 years, or before 3 seconds for children under 10 years).

Record the highest FEV₁ and FVC result from the three acceptable tests, even if they come from separate blows.¹⁰

**Repeatability criteria**

Repeatability criteria for a set of acceptable tests are met if both of the following apply:⁹
• the difference between the highest and second-highest values for FEV₁ is less than 150 mL
• the difference between the highest and second-highest values for FVC is less than 150 mL.

For most people, it is not practical to make more than eight attempts to meet acceptability and repeatability criteria.¹⁰

**Testing bronchodilator response (reversibility of airflow limitation)**

Repeat spirometry 10-15 minutes after giving 4 separate puffs of salbutamol (100 microg/actuation) via a pressurised metered-dose inhaler and spacer.¹⁰ (For patients who have reported unacceptable side-effects with 400 microg, 2 puffs can be used.)

For adults and adolescents, record a clinically important bronchodilator response if FEV₁ increases by ≥ 200 mL and ≥ 12%.¹⁰

For children, record a clinically important bronchodilator response if FEV₁ increases by ≥ 12%.¹⁰

Go to: National Asthma Council Australia’s Spirometry Resources

Last reviewed version 2.0

**Making the clinical diagnosis of asthma in adults and adolescents**

The clinical diagnosis of asthma is based on the probability that the symptoms are due to asthma rather than another cause, and on the magnitude of deviation from the level of lung function and the variation in lung function that is seen in a healthy population (i.e. demonstrating variable airflow limitation).

**Table. Findings that increase or decrease the probability of asthma in adults**

<table>
<thead>
<tr>
<th>Asthma is more likely to explain the symptoms if any of these apply</th>
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</tr>
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<tbody>
<tr>
<td>More than one of these symptoms:</td>
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<td></td>
</tr>
<tr>
<td>Symptoms began in childhood</td>
<td></td>
</tr>
</tbody>
</table>
Asthma is more likely to explain the symptoms if any of these apply:
- Widespread wheeze audible on chest auscultation
- FEV₁ or PEF lower than predicted, without other explanation
- Eosinophilia or raised blood IgE level, without other explanation
- Symptoms rapidly relieved by a SABA bronchodilator

Asthma is less likely to explain the symptoms if any of these apply:
- Widespread wheeze audible on chest auscultation
- FEV₁ or PEF lower than predicted, without other explanation
- Eosinophilia or raised blood IgE level, without other explanation
- Symptoms rapidly relieved by a SABA bronchodilator

Adapted from:


Although untreated asthma is usually characterised by airway hyperresponsiveness and airway inflammation (eosinophilic and/or neutrophilic), these features are not essential for making the diagnosis of asthma in clinical practice.

The evidence for asthma must be documented at the time of diagnosis, because characteristic clinical, physiological and pathological features may improve spontaneously or with treatment, and because fixed (irreversible or incompletely reversible) airflow limitation may develop over time. It is often difficult to confirm the diagnosis of asthma after a patient has been started on preventer treatment.

References
Starting treatment and reviewing response in adults

Recommendations

After making the diagnosis of asthma, begin treatment for 4–6 weeks with either of the following:

- short-acting beta\(_2\) agonist taken as needed
- regular treatment with an inhaled corticosteroid (plus short-acting beta\(_2\) agonist taken as needed).

<table>
<thead>
<tr>
<th>Clinical situation</th>
<th>Suggested starting regimen †</th>
<th>Alternative options and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms less than twice per month and no flare-up that required oral corticosteroids within previous 12 months</td>
<td>SABA as needed</td>
<td></td>
</tr>
<tr>
<td>Symptoms twice per month or more</td>
<td>Regular ICS starting at a low dose (plus SABA as needed)</td>
<td>Montelukast(\d) Cromones(\s)</td>
</tr>
<tr>
<td>Waking due to asthma symptoms at least once during the past month</td>
<td>Regular ICS starting at a low dose (plus SABA as needed)</td>
<td>If patient also has frequent daytime symptoms consider either of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• medium- to high-dose ICS (plus SABA as needed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• (private prescription) combination low-dose ICS/LABA#</td>
</tr>
<tr>
<td>Oral corticosteroids required for an asthma flare-up within the last 12 months (even if symptoms infrequent, e.g. less than twice per month on average)</td>
<td>Regular ICS starting at a low dose (plus SABA as needed)</td>
<td></td>
</tr>
<tr>
<td>History of artificial ventilation or admission to an intensive care unit due to acute asthma (even if symptoms infrequent, e.g. less than twice per month on average)</td>
<td>Regular ICS starting at a low dose (plus SABA as needed)</td>
<td>• Monitor frequently</td>
</tr>
</tbody>
</table>
### Clinical situation

<table>
<thead>
<tr>
<th>Patient not currently taking a preventer whose symptoms are severely uncontrolled or very troublesome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested starting regimen †</strong></td>
</tr>
<tr>
<td>Regular ICS (plus SABA as needed) For very uncontrolled asthma at presentation (e.g. frequent night waking, low lung function), consider (either of):</td>
</tr>
<tr>
<td>- high-dose ICS (then down-titrate when symptoms improve)</td>
</tr>
<tr>
<td>- a short course of oral corticosteroids in addition to ICS</td>
</tr>
<tr>
<td><strong>Alternative options and notes</strong></td>
</tr>
<tr>
<td>Consider (private prescription) combination ICS/LABA#</td>
</tr>
</tbody>
</table>

† When prescribing inhaled asthma medicines, take into account the person’s preferences, ability to use the device, and cost issues.

§ Requires multiple daily doses and daily maintenance of inhaler.

‡ PBS status as at March 2019: Montelukast treatment is not subsidised by the PBS for people aged 15 years or over. Special Authority is available for Department of Veteran’s Affairs gold card holders or white card holders with approval for asthma treatments.

# PBS status as at March 2019: ICS/LABA combination therapy as first-line preventer treatment is not subsidised by the PBS, except for patients with frequent symptoms while taking oral corticosteroids.

Asset ID: 32

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

### Arrange to check response to treatment after 4–6 weeks. Depending on the severity of initial symptoms, consider also monitoring progress and clinical signs during the treatment trial.

**Table. Steps for conducting a treatment trial**

1. Document baseline lung function.
2. Document baseline asthma control using a validated standardised tool such as the Asthma Score.
3. Discuss treatment goals and potential adverse effects with the person.
4. Run treatment trial for agreed period (e.g. 4–8 weeks, depending on the treatment and clinical circumstances, including urgency).
5. At an agreed interval, measure asthma control and lung function again and document any adverse effects.
6. If asthma control has not improved despite correct inhaler technique and good adherence, resume previous treatment and consider referral for specialist consultation.

See: Asthma Score (Asthma Control Test)

Asset ID: 36

Note: Although response to initial asthma treatment supports the diagnosis of asthma, respiratory symptoms and low lung function may improve spontaneously (e.g. if they were due to a respiratory infection). Conversely, lack of response to treatment does not necessarily rule out asthma.
Also consider a treatment trial if asthma is strongly suspected but spirometry before and after bronchodilator does not demonstrate clinically important reversible airflow limitation (change in FEV₁ of at least 200 mL and 12% from baseline) and other investigations have not confirmed variable airflow limitation.

Figure. Steps in the diagnosis of asthma in adults
Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/4

How this recommendation was developed
Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

If there is no clear response to initial treatment, after confirming correct inhaler technique and good adherence, consider further investigations or referral to confirm or exclude the diagnosis of asthma.

Table. Conditions that can be confused with asthma in adults and adolescents

<table>
<thead>
<tr>
<th>Conditions characterised by cough</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pertussis (whooping cough)</td>
</tr>
<tr>
<td>Gastro-oesophageal reflux</td>
</tr>
<tr>
<td>Rhinosinusitis/upper airway cough syndrome</td>
</tr>
<tr>
<td>Adverse effect of medicines (e.g. ACE inhibitors)</td>
</tr>
<tr>
<td>Bronchiectasis</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>Pulmonary fibrosis</td>
</tr>
<tr>
<td>Large airway stenosis</td>
</tr>
<tr>
<td>Habit-cough syndrome</td>
</tr>
<tr>
<td>Inhaled foreign body</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions characterised by wheezing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory infections</td>
</tr>
<tr>
<td>COPD</td>
</tr>
<tr>
<td>Upper airway dysfunction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions characterised by difficulty breathing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathlessness on exertion due poor cardiopulmonary fitness</td>
</tr>
<tr>
<td>Hyperventilation</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
</tbody>
</table>


**Conditions characterised by cough**

<table>
<thead>
<tr>
<th>Chronic heart failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary hypertension</td>
</tr>
<tr>
<td>Lung cancer</td>
</tr>
</tbody>
</table>

**Sources**


Weinberger M, Abu-Hasan M. *Pseudo-asthma: when cough, wheezing, and dyspnea are not asthma.* *Pediatrics* 2007; 120: 855-64.

Available from: [http://pediatrics.aappublications.org/content/120/4/855](http://pediatrics.aappublications.org/content/120/4/855)

Asset ID: 83

**How this recommendation was developed**

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

**More information**

**Definition of variable expiratory airflow limitation**

Most of the tests for variable expiratory airflow limitation are based on showing variability in FEV₁. While reduced FEV₁ may be seen with many other lung diseases (or due to poor spirometric technique), a reduced ratio of FEV₁ to FVC indicates airflow limitation.¹ Normal FEV₁/FVC values derived from population studies vary,²,³ but are usually greater than:²

- 0.85 in people aged up to 19 years
- 0.80 in people aged 20–39 years
- 0.75 in people aged 40–59 years
- 0.70 in people aged 60–80 years.

In children, it is less useful to define expiratory airflow limitation according to a specific cut-off for FEV₁/FVC ratio, because normal values in children change considerably with age.³

Some spirometers provide predicted normal values specific to age group. If these are available, a FEV₁/FVC ratio less than the lower limit of normal (i.e. less than the 5th percentile of normal population) indicates airflow limitation.

Variable expiratory airflow limitation (beyond the range seen in healthy populations) can be documented if any of the following are recorded:

- a clinically important increase in FEV₁ (change in FEV₁ of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children) 10–15 minutes after administration of bronchodilator
- clinically important variation in lung function (at least 20% change in FEV₁) when measured repeatedly over time (e.g. spirometry on separate visits)
- a clinically important reduction in lung function (decrease in FEV₁ of at least 200 mL and 12% from baseline on spirometry, or decrease in peak expiratory flow rate by at least 20%) after exercise (formal laboratory-based exercise challenge testing uses different criteria for exercise-induced bronchoconstriction)
- a clinically important increase in lung function (at least 200 mL and 12% from baseline) after a trial of 4 or more weeks of treatment with an inhaled corticosteroid
- clinically important variation in peak expiratory flow (diurnal variability of more than 10%)
- a clinically important reduction in lung function (15–20%, depending on the test) during a test for airway hyperresponsiveness (exercise challenge test or bronchial provocation test) measured by a respiratory function laboratory.

**Notes**

Patients referred to a respiratory function laboratory may be asked not to take certain medicines within a few hours to days before a spirometry visit. A clinically important increase or decrease in lung function is defined as a change in FEV₁ of at least 200 mL and 12% from baseline for adults, or at least 12% from baseline for children, or a change in peak expiratory flow rate of at least 20% on the same meter.⁴,¹ A clinically important increase in
FVC after administering bronchodilator may also indicate reversible airflow limitation, but FVC is a less reliable measure in primary care because FVC may vary due to factors such as variation in inspiratory volume or expiratory time.

The finding of ‘normal’ lung function during symptoms reduces the probability that a patient has asthma, but a clinically important improvement in response to bronchodilator or inhaled corticosteroid can occur in patients whose baseline value is within the predicted normal range.

The greater the variation in lung function, the more certain is the diagnosis of asthma. However, people with longstanding asthma may develop fixed airflow limitation.

Reversibility in airflow limitation may not be detected if the person is already taking a long-acting beta2 agonist or inhaled corticosteroid.

Airflow limitation can be transient and does not necessarily mean that the person has asthma (e.g. when recorded during a severe acute infection of the respiratory tract). Ideally, airflow limitation should be confirmed when the patient does not have a respiratory tract infection. Reduction in lung function during a respiratory tract infection with improvement in lung function after its resolution, commonly occurs in people with asthma, but can also be seen in patients with COPD or in healthy people without either asthma or COPD.5,6

► Go to: National Asthma Council Australia’s Spirometry Resources
Go to: National Asthma Council Australia and Woolcock Institute Peak Flow Chart

**Spirometry in diagnosis and monitoring**

Spirometry is the best lung function test for diagnosing asthma and for measuring lung function when assessing asthma control. Spirometry can:

- detect airflow limitation
- measure the degree of airflow limitation compared with predicted normal airflow (or with personal best)
- demonstrate whether airflow limitation is reversible.

It should be performed by well-trained operators with well-maintained and calibrated equipment.7, 4

Before performing spirometry, check if the person has any contraindications (e.g. myocardial infarction, angina, aneurysm, recent surgery, suspected pulmonary embolism, suspected pneumothorax, fractured ribs). Advise them to stop if they become dizzy.

Clearly explain and physically demonstrate correct spirometry technique: 8

- Sit upright with legs uncrossed and feet flat on the floor and do not lean forward.
- Breathe in rapidly until lungs feel absolutely full. (Coaching is essential to do this properly.)
- Do not pause for more than 1 second.
- Place mouthpiece in mouth and close lips to form a tight seal.
- Blast air out as hard and fast as possible and for as long as possible, until the lungs are completely empty or you are unable to blow out any longer.
- Remove mouthpiece.

► Go to: National Asthma Council Australia’s spirometry technique video, Performing spirometry in primary care

Repeat the test until you obtain three acceptable tests and these meet repeatability criteria.

**Acceptability of test**

A test is acceptable if all the following apply:

- forced expiration started immediately after full inspiration
- expiration started rapidly
- maximal expiratory effort was maintained throughout the test, with no stops
- the patient did not cough during the test
- the patient did not stop early (before 6 seconds for adults and children over 10 years, or before 3 seconds for children under 10 years).

Record the highest FEV1 and FVC result from the three acceptable tests, even if they come from separate blows.8

**Repeatability criteria**

Repeatability criteria for a set of acceptable tests are met if both of the following apply:7

- the difference between the highest and second-highest values for FEV1 is less than 150 mL
- the difference between the highest and second-highest values for FVC is less than 150 mL.

For most people, it is not practical to make more than eight attempts to meet acceptability and repeatability criteria.8

**Testing bronchodilator response (reversibility of airflow limitation)**

Repeat spirometry 10-15 minutes after giving 4 separate puffs of salbutamol (100 microg/actuation) via a pressurised metered-dose inhaler and spacer.8 (For patients who have reported unacceptable side-effects with 400 microg, 2 puffs can be used.)
For adults and adolescents, record a clinically important bronchodilator response if FEV₁ increases by ≥ 200 mL and ≥ 12%.8
For children, record a clinically important bronchodilator response if FEV₁ increases by ≥ 12%.8

Confirming the diagnosis of asthma in adults and adolescents

A prior diagnosis of asthma reported by a patient should be corroborated by documentation of how the diagnosis was confirmed at the time, or by current evidence.

Reports from around the world show that 25–35% of people with a diagnosis of asthma in primary care may not actually have asthma.9,10,11,12 Wheezing and other respiratory symptoms do not always mean a person has asthma. Airflow limitation demonstrated on spirometry can be transient and does not necessarily mean that the person has asthma (e.g. when recorded during a severe acute viral infection of the respiratory tract). Ideally, airflow limitation should be confirmed when the patient does not have a respiratory tract infection.

Once a person is already taking regular treatment with a preventer, it may be more difficult to confirm the diagnosis because variability in lung function often decreases with treatment.

Table. Confirming the diagnosis of asthma in a person using preventer treatment

Please view and print this figure separately: http://www.asthmahandbook.org.au/table/show/9

Correct use of inhaler devices

Checking and correcting inhaler technique is essential to effective asthma management.

Most patients with asthma or COPD do not use their inhalers properly,13,14,15,16 and most have not had their technique checked or corrected by a health professional.

Incorrect inhaler technique when using maintenance treatments increases the risk of severe flare-ups and hospitalisation for people with asthma or COPD.13,14,17,18,19,20

Poor asthma symptom control is often due to incorrect inhaler technique.21,22

Incorrect inhaler technique when using inhaled corticosteroids increases the risk of local side effects like dysphonia and oral thrush.

The steps for using an inhaler device correctly differ between brands. Checklists of correct steps for each inhaler type and how-to videos are available from the National Asthma Council website.

References

22. Hardwell, A., Barber, V., Hargadon, T., et al. Technique training does not improve the ability of most patients to use pressurised metered-dose inhalers (pMDIs). Prim Care Respir J. 2011; 20: 92-6. Available from: http://www.nature.com/articles/pcrj201088
## Considerations for investigations
General considerations for further investigations in adults and adolescents
http://www.asthmahandbook.org.au/diagnosis/adults/further-investigations/general-considerations

## Airway hyperresponsiveness tests
The role of airway hyperresponsiveness tests in the investigation of asthma-like symptoms in adults and adolescents

## Airway inflammation tests
The role of airway inflammation tests in the investigation of asthma-like symptoms in adults and adolescents

## Allergy tests
The role of allergy tests in the investigation of asthma-like symptoms in adults and adolescents
http://www.asthmahandbook.org.au/diagnosis/adults/further-investigations/allergy-tests

## Imaging
The role of imaging in the investigation of asthma-like symptoms in adults and adolescents
http://www.asthmahandbook.org.au/diagnosis/adults/further-investigations/imaging
General considerations for further investigations in adults

Recommendations

Consider arranging further investigations and referral to appropriate specialists if the diagnosis cannot be made with confidence from clinical features, spirometry and response to treatment.

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Consider investigation for conditions that may affect or mimic asthma symptoms (e.g. coronary heart disease, obstructive sleep apnoea, gastro-oesophageal reflux disease or aspirin-exacerbated respiratory disease).

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Consider and investigate the possibility of work-related asthma if (any of):

- the timing of asthma symptoms is associated with work activities (especially if symptoms improve when the person is away from the workplace)
- the person is exposed to substances known to cause occupational asthma
- co-workers have respiratory symptoms.

Note: Do not rule out the possibility of work-related asthma if the person's occupation is not among those commonly associated with asthma triggers (e.g. bakers, vehicle spray painters, electronics manufacturing workers who perform soldering, woodworkers, healthcare workers, laboratory animal workers, agriculture workers), because many substances and occupations have been associated with asthma and more are being identified continually.

How this recommendation was developed

Adapted from existing guidance
Based on reliable clinical practice guideline(s) or position statement(s):

- Dykewics, 2009 ¹
- Henneberger et al. 2011 ²
- Hoy et al. 2010 ³
- Tarlo et al. 2008 ⁴

Consider referral in the following circumstances:

- if the diagnosis is uncertain (consider referral for diagnostic assessment and further investigation by a respiratory physician or general physician)
- if signs and symptoms do not respond to a treatment trial (consider further investigations or referral to an appropriate specialist)
- if work-related asthma is suspected (consider referral to a respiratory physician, occupational physician and/or allergist, or allergist with experience in work-related asthma, if possible. Investigation is complex and involves a very detailed history, detailed lung function testing, site visits and sometimes challenge testing).

How this recommendation was developed
Spirometry in diagnosis and monitoring

Spirometry is the best lung function test for diagnosing asthma and for measuring lung function when assessing asthma control. Spirometry can:

- detect airflow limitation
- measure the degree of airflow limitation compared with predicted normal airflow (or with personal best)
- demonstrate whether airflow limitation is reversible.

It should be performed by well-trained operators with well-maintained and calibrated equipment. Before performing spirometry, check if the person has any contraindications (e.g. myocardial infarction, angina, aneurysm, recent surgery, suspected pulmonary embolism, suspected pneumothorax, fractured ribs). Advise them to stop if they become dizzy.

Clearly explain and physically demonstrate correct spirometry technique:

- Sit upright with legs uncrossed and feet flat on the floor and do not lean forward.
- Breathe in rapidly until lungs feel absolutely full. (Coaching is essential to do this properly.)
- Do not pause for more than 1 second.
- Place mouthpiece in mouth and close lips to form a tight seal.
- Blast air out as hard and fast as possible and for as long as possible, until the lungs are completely empty or you are unable to blow out any longer.
- Remove mouthpiece.

Repeat the test until you obtain three acceptable tests and these meet repeatability criteria. Acceptability of test

A test is acceptable if all the following apply:

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- expiration started rapidly
- maximal expiratory effort was maintained throughout the test, with no stops
- the patient did not cough during the test
- the patient did not stop early (before 6 seconds for adults and children over 10 years, or before 3 seconds for children under 10 years).

Record the highest FEV₁ and FVC result from the three acceptable tests, even if they come from separate blows.

Repeatability criteria

Repeatability criteria for a set of acceptable tests are met if both of the following apply:

- the difference between the highest and second-highest values for FEV₁ is less than 150 mL
- the difference between the highest and second-highest values for FVC is less than 150 mL.

For most people, it is not practical to make more than eight attempts to meet acceptability and repeatability criteria.

Testing bronchodilator response (reversibility of airflow limitation)

Repeat spirometry 10-15 minutes after giving 4 separate puffs of salbutamol (100 microg/actuation) via a pressurised metered-dose inhaler and spacer. (For patients who have reported unacceptable side-effects with 400 microg, 2 puffs can be used.) For adults and adolescents, record a clinically important bronchodilator response if FEV₁ increases by ≥ 200 mL and ≥ 12%. For children, record a clinically important bronchodilator response if FEV₁ increases by ≥ 12%. Go to: National Asthma Council Australia’s Spirometry Resources

Last reviewed version 2.0
Cough and asthma in adults

When no other asthma symptoms are present, chronic cough (present for more than 8 weeks) is unlikely to indicate asthma.

Chronic cough may be due to asthma if:8

- cough is episodic
- cough with exercise is associated with other symptoms that suggest airflow limitation (expiratory wheeze or breathlessness)
- spirometry confirms reversible airflow limitation.

If cough is due to asthma, it should respond to treatment with an inhaled corticosteroid preventer taken regularly and reliever as needed.8

Findings that suggest a serious alternative or comorbid diagnosis that requires further investigation include:8

- haemoptysis
- smoker with > 20 pack–year smoking history
- smoker aged over 45 years with a new cough, altered cough, or cough with voice disturbance
- prominent dyspnoea, especially at rest or at night
- substantial sputum production
- hoarseness
- fever
- weight loss
- complicated gastro-oesophageal reflux disease
- swallowing disorders with choking or vomiting
- recurrent pneumonia
- abnormal clinical respiratory examination.

Go to: Australian Cough Guidelines

Asthma–COPD overlap

Distinguishing between typical allergic asthma (childhood-onset allergic asthma) and typical COPD (emphysema in a heavy smoker) is straightforward.9 However, it can be difficult to distinguish COPD from asthma in adults who have features of both conditions.10, 11 These people are described as having asthma–COPD overlap.10, 9, 12

Asthma–COPD overlap is not a single, well-defined disease entity, but includes a range of airway disease phenotypes with different causal mechanisms.10, 13 Features of both asthma and COPD have been described in:12, 14, 15, 16

- people with current asthma (allergic or non-allergic) who have had significant exposure to tobacco smoke
- people with longstanding asthma or late-onset asthma who have become persistently short of breath over time
- people significant smoking history and symptoms consistent with COPD who also have a history of childhood asthma
- people who present in middle age or later with shortness of breath, with a history of childhood asthma but no or few symptoms in between, and little smoking history.

Figure. Development of asthma, COPD and asthma–COPD overlap

Please view and print this figure separately: http://www.asthmahandbook.org.au/figure/show/108

People with asthma–COPD overlap often have poor disease outcomes, including:10, 17, 18, 19, 20

- high need for healthcare services
- worse quality of life, more wheezing, dyspnoea, cough and sputum production, and more frequent and severe respiratory exacerbations and hospitalisations, than people with COPD or asthma alone
- worse lung function demonstrated by spirometry than those with COPD alone, despite lower average exposure to tobacco smoke.

Features of asthma, COPD and asthma–COPD overlap

If several features of both asthma and COPD are present and neither condition is strongly favoured, respiratory disease should be managed according to recommendations for asthma–COPD overlap.

Table. Features that, when present, favour asthma or COPD

<table>
<thead>
<tr>
<th>Clinical feature (if measured/relevant)</th>
<th>Asthma more likely</th>
<th>COPD more likely</th>
</tr>
</thead>
</table>

Go to: Australian Cough Guidelines
<table>
<thead>
<tr>
<th>Clinical feature (if measured/relevant)</th>
<th>Asthma more likely</th>
<th>COPD more likely</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of onset</strong></td>
<td>Before 20</td>
<td>After 40</td>
</tr>
</tbody>
</table>
| **Pattern of symptoms**                | Variation in respiratory symptoms:  
  - changes over minutes, hours or days  
  - worse at night or early morning  
  - triggered by exercise, emotions, airborne pollutants or allergens | Persistence of respiratory symptoms despite treatment  
  Symptoms every day, including exertional dyspnoea  
  History of chronic cough and sputum unrelated to specific triggers, before onset of dyspnoea |
| **Lung function**                      | Expiratory airflow limitation* is variable#  
  Lung function normal between symptoms | Expiratory airflow limitation* is persistent†  
  Lung function abnormal between symptoms |
| **History**                            | Previous diagnosis of asthma  
  Family history of asthma and allergies§ (allergic rhinitis or eczema) | Previous diagnosis of COPD, chronic bronchitis or emphysema  
  Heavy exposure to tobacco smoke or biomass fuels |
| **Long-term disease trajectory**       | Seasonal or yearly variation in symptoms  
  Improvements (spontaneously or in response to medication) last for weeks | Slowly worsens over years  
  Relief in response to medication is limited and short term |
| **Chest X-ray**                        | Normal             | Severe hyperinflation‡ |

Features that, when present, increase the probability of either typical asthma or typical COPD. None of these features is essential to make the diagnosis of asthma or COPD, with the exception of persistent airflow limitation for making the diagnosis of COPD.

* Expiratory airflow limitation: indicated by a reduced ratio of forced expiratory volume in one second (FEV₁) to forced vital capacity (FVC) on spirometry (FEV₁/FVC less than the lower limit of normal (i.e. less than the 5th percentile of normal population). Typical FEV₁/FVC values derived from population studies are > 0.75 in people aged 40–59 years and > 0.70 in people aged 60–80 years.

# Variable expiratory airflow limitation: variation beyond the range seen in healthy populations. It is indicated in adults by any of the following:
- a clinically important increase in FEV₁ (change in FEV₁ of at least 200 mL and 12% from baseline) 10–15 minutes after administration of bronchodilator
- clinically important variation in lung function (at least 20% change in FEV₁) when measured repeatedly over time (e.g. spirometry on separate visits)
- a clinically important increase in lung function (at least 200 mL and 12% from baseline) after ≥ 4 weeks’ treatment trial with an ICS
- clinically important variation in peak expiratory flow (diurnal variability of more than 10%, calculated over 1–2 weeks as the average of daily amplitude per cent mean)
- a clinically important reduction in lung function (decrease in FEV₁ of at least 200 mL and 12% from baseline on spirometry, or decrease in peak expiratory flow rate by at least 20%) after exercise (formal laboratory-based exercise challenge testing uses different criteria for exercise-induced bronchoconstriction)
- a clinically important reduction in lung function (15–20%, depending on the test) during a test for airway hyperresponsiveness (exercise challenge test or bronchial provocation test) measured by a respiratory function laboratory.
The greater the variations, or the more occasions excess variation is seen, the more confidently the diagnosis of variable expiratory airflow limitation consistent with asthma can be made.

† Persistent expiratory airflow limitation is indicated by reduced post-bronchodilator FEV₁/FVC*

§ Lack of history of atopy does not exclude non-allergic asthma.

‡ Chest X-ray may be normal in a patient with COPD

Adapted from

Asset ID: 104

Table. Spirometry findings in asthma, COPD and asthma–COPD overlap

<table>
<thead>
<tr>
<th>Finding</th>
<th>Consistent with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asthma</td>
</tr>
</tbody>
</table>
| Normal FEV₁/FVC before or after bronchodilator | Yes | No | No *
| Abnormal lung function (post-bronchodilator reduced FEV₁/FVC and FEV₁ < lower limit of normal) | Yes † | Yes | Yes |
| Airflow limitation with greater bronchodilator reversibility than in healthy population (post-bronchodilator FEV₁ increase ≥ 12% and 200mL from baseline) | Yes ‡ | Yes | Yes |
| Marked bronchodilator reversibility (FEV₁ increase ≥ 12% and 400mL from baseline) | Yes | Possible but unusual † | Possible § |

FEV₁/FVC: ratio of forced expiratory volume in one second (FEV₁) to forced vital capacity (FVC), either before or after bronchodilator

* Normal FEV₁/FVC is not consistent with COPD unless there is other evidence of chronic non-reversible expiratory airflow limitation.

† This finding is consistent with asthma that is poorly controlled or measured during a flare-up, or can be seen in some patients with longstanding asthma.

‡ The greater the variation, and the more times variation is seen, the more likely the diagnosis of asthma. However, some patients with longstanding asthma may develop persistent airflow limitation.

† Marked reversibility strongly favours asthma and is generally inconsistent with COPD, but does not rule out asthma–COPD overlap.

§ This finding may be seen in patients with asthma–COPD overlap, or occasionally in COPD, especially when FEV₁ is low.

Sources
Treatment for patients with asthma–COPD overlap

Inhaled corticosteroid treatment at low–moderate doses is essential to reduce the risk of potentially life-threatening flare-ups, even if asthma symptoms appear mild or infrequent.10, 21

Most patients also need treatment with a long-acting bronchodilator (either long-acting beta2 agonist or long-acting muscarinic antagonist) in addition to an inhaled corticosteroid. Long-acting beta2 agonists and long-acting muscarinic antagonists should not be used by people with asthma or asthma–COPD overlap unless they are also taking an inhaled corticosteroid (either in combination or separately).

<table>
<thead>
<tr>
<th>Class</th>
<th>Dosing frequency</th>
<th>Agent</th>
<th>Brand name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICS–LABA combinations</strong></td>
<td>Once daily</td>
<td>Fluticasone furoate + vilanterol</td>
<td>Breo Ellipta 100/25 microg† † Do not prescribe 200/25 microg formulation#</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Budesonide + formoterol</td>
<td>Symbicort Rapihaler Symbicort Turbuhaler</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Fluticasone propionate + formoterol</td>
<td>Flutiform</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Fluticasone propionate + salmeterol</td>
<td>Fluticasone and Salmeterol Cipla Seretide Accuhaler Seretide MDI</td>
</tr>
<tr>
<td><strong>LABAs</strong></td>
<td>Once daily</td>
<td>Indacaterol</td>
<td>Onbrez Breezhaler</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Formoterol</td>
<td>Oxis Foradil</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Salmeterol</td>
<td>Serevent Accuhaler</td>
</tr>
<tr>
<td><strong>LAMAs</strong></td>
<td>Once daily</td>
<td>Glycopyrronium</td>
<td>Seebri Breezhaler</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Tiotropium</td>
<td>Spiriva Spiriva Respimat</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Umeclidinium</td>
<td>Incruse Ellipta†</td>
</tr>
<tr>
<td>Class</td>
<td>Dosing frequency</td>
<td>Agent</td>
<td>Brand name</td>
</tr>
<tr>
<td>----------------------</td>
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</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Aclidinium</td>
<td>Bretaris Genuair</td>
</tr>
<tr>
<td>LABA–LAMA combinations*</td>
<td>Once daily</td>
<td>Indacaterol + glycopyrronium</td>
<td>Ultibro Breezhaler</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Olodaterol + tiotropium</td>
<td>Spiolto Respimat</td>
</tr>
<tr>
<td></td>
<td>Once daily</td>
<td>Vilanterol + umeclidinium</td>
<td>Anoro Ellipta‡</td>
</tr>
<tr>
<td></td>
<td>Twice daily</td>
<td>Formoterol + aclidinium</td>
<td>Brimica Genuair</td>
</tr>
</tbody>
</table>

* Ensure that patient is also using regular long-term ICS. LABAs and LAMAs should not be used by people with asthma or asthma–COPD overlap unless they are also taking an ICS, in combination or separately.

Advise patients/carers that inhalers should be stored below 30°C and should not be left in cars.

† The inhaler must be discarded 1 month after opening the package and removing device from tray. When first opened, patients should write the discard date on the label in the space provided. If stored in the refrigerator, inhaler should be taken out and allowed to return to room temperature for at least an hour before use.

‡ The inhaler must be discarded 6 weeks after opening the package and removing device from tray. When first opened, patients should write the discard date on the label in the space provided. If stored in the refrigerator, inhaler should be taken out and allowed to return to room temperature for at least an hour before use.

# Only the 100/25 microg dose of fluticasone furoate/vilanterol is TGA-approved for treatment of COPD. The higher dose (200/25 microg) is not TGA-approved for the treatment of COPD, so it should not be used in people with asthma–COPD overlap.

High doses of ICS (alone or in combination) are not recommended in patients with COPD and should therefore be used with caution in patients with asthma–COPD overlap, because of the risk of pneumonia.

Refer to PBS status before prescribing.

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Asset ID: 105

Management should also include smoking cessation, treatment of comorbid conditions, physical activity, pulmonary rehabilitation, vaccinations, self-management (including a regularly updated action plan) and regular follow-up.¹⁰

Go to: Asthma action plans
Go to: COPD action plans

Respiratory tract infections should be monitored carefully because people with asthma–COPD overlap have high morbidity rates and because ICS treatment is associated with increased risk of non-fatal pneumonia in people with COPD.²² Most of the available evidence is from patients treated with fluticasone propionate, particularly at higher doses. Increased pneumonia rates have also been observed in studies of patients with COPD using fluticasone furoate/vilanterol. The higher dose of fluticasone furoate/vilanterol (Breo Ellipta 200/25 microg) is not approved for patients with COPD, so it should also not be used in patients with asthma–COPD overlap.

Specialist referral should be considered for patients with atypical symptoms or symptoms that suggest an alternative diagnosis, persistent symptoms or flare-ups despite treatment, or complex comorbidities.

Go to: National Asthma Council Australia’s Asthma–COPD overlap information paper

For information on diagnosis and management of COPD, refer to the COPD-X Concise Guide for Primary Care.²³

Go to: Lung Foundation Australia’s COPD-X Concise Guide for Primary Care

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Other diagnostic tests in adults

For patients with incompletely reversible airflow limitation, a careful history will often clarify which investigation is most appropriate. Lung volume tests and diffusing capacity tests may be helpful to identify emphysema or pulmonary fibrosis. High-resolution computed
tomography is useful if bronchiectasis is suspected.

References

12. Gibson PG, Simpson JS. The overlap syndrome of asthma and COPD: what are its features and how important is it?. Thorax. 2009; 64: 728-735. Available from: http://thorax.bmj.com/content/64/8/728.full
Airway hyperresponsiveness tests for diagnosis in adults

Recommendations

Consider arranging bronchial provocation (challenge) tests for airway hyperresponsiveness if asthma is suspected but initial spirometry does not demonstrate reversible airflow limitation.

Notes:

- If challenge testing is needed, consider referring to a respiratory physician for investigation, or discussing with a respiratory physician before selecting which test to order.
- Don't test during a respiratory infection, or initiate inhaled corticosteroid treatment in the few weeks before challenge testing, because these could invalidate the result.

More information

**Bronchial provocation (challenge) tests in adults and older adolescents**

The main roles of bronchial provocation tests of airway hyperresponsiveness (airway hyperreactivity) in adults are to exclude asthma as the cause of current symptoms, and to confirm the presence of exercise-induced bronchoconstriction.1, 2, 3

Bronchial provocation tests for hyperresponsiveness are performed in accredited lung function testing laboratories. These tests involve repeated spirometry tests.

Bronchial provocation tests of airway hyperresponsiveness include:

- direct challenge tests (e.g. methacholine challenge test)3
- indirect challenge tests (e.g. exercise challenge test, eucapnic voluntary hyperpnea, hypertonic (4.5%) saline, mannitol challenge test)4
Challenge tests for exercise-induced bronchoconstriction

Role of challenge tests
Self-reported symptoms are not sensitive enough to detect exercise-induced bronchoconstriction reliably or specific enough to rule out other conditions, particularly in elite athletes.5, 6, 7 Single office FEV₁ readings or peak expiratory flow measurement are not adequate to demonstrate exercise-induced bronchoconstriction.8

Standardised, objective bronchial provocation (challenge) tests using spirometry are necessary for the investigation of suspected exercise-induced bronchoconstriction in elite athletes. These tests involve serial spirometry measurements after challenge with exercise (or exercise surrogates e.g. dry powder mannitol, eucapnic voluntary hyperpnoea or hyperventilation, or hyperosmolar aerosols such as 4.5% saline).5, 8, 9, 10 Severity of exercise-induced bronchoconstriction is assessed by percentage fall in FEV₁ after challenge.8

Challenge testing is mandated by sports governing bodies before the athlete is given permission to use some asthma medicines, and the required testing protocol varies between specific sports. The latest information is available from the Australian Sports Anti-Doping Authority (ASADA) and the World Anti-Doping Agency (WADA).

Challenge tests are also used in the investigation of exercise-related symptoms in recreational and non-athletes, when objective demonstration of exercise-induced bronchoconstriction is needed to guide management decisions.

Choice of challenge test
There is no single challenge test that will identify all individuals with exercise-induced bronchoconstriction.5 The most appropriate test or tests for an individual depend on clinical and individual factors:

- The eucapnic voluntary hyperpnoea test can provoke a severe response.5 For safety reasons, the eucapnic voluntary hyperpnoea test should only be used in adults who regularly exercise at high intensity (e.g. elite athletes).5 It should not be used in children.
- When an exercise challenge test is used, inhalation of dry air is recommended to diagnose or exclude exercise-induced bronchoconstriction because it increases the sensitivity of the test.2
- Mannitol challenge can be used as an alternative to exercise provocation testing to investigate suspected exercise-induced bronchoconstriction,5, 11, 12 including in children.13, 14
- For safety reasons, exercise challenge in dry air should be avoided in patients with FEV₁ <70% predicted5

Referral
If challenge testing is needed, consider referring to a respiratory physician for investigation, or discussing with a respiratory physician before selecting which test to order. Do not test during a respiratory infection, or initiate inhaled corticosteroid treatment in the few weeks before challenge testing, because these could invalidate the result.

A list of accredited respiratory function laboratories is available from the Australian and New Zealand Society of Respiratory Science.

References


Airway inflammation tests for diagnosis in adults

Recommendations

Do not routinely order induced sputum eosinophil count for all patients with suspected asthma. It is not necessary to demonstrate airway inflammation if the patient shows clinical features of asthma and there is a low probability that these are due to another cause.

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Measurement of exhaled nitric oxide is not recommended as a diagnostic test for asthma in routine clinical practice.

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

1. Dweik et al. 2011

More information

Induced sputum test for eosinophilia in adults and adolescents

Patients with untreated asthma usually have airway inflammation (eosinophilic and/or neutrophilic), but testing for this is not essential for making the diagnosis of asthma in clinical practice. Some types of asthma are not associated with eosinophilic airway inflammation. The induced sputum test is not a standard microbiology test. It is provided by specialised laboratories.

Peripheral blood eosinophil count in adults and adolescents

White cell differential count on a peripheral blood sample is not currently recommended routinely in the investigation and management of asthma.

Two studies in severe asthma found that blood eosinophils correlated modestly with sputum eosinophil counts. In severe asthma, higher blood eosinophil counts are associated with greater risk of poor symptom control and more frequent exacerbations. In patients with severe asthma, peripheral blood eosinophil count is important for predicting response to monoclonal antibody therapy and is a requirement for eligibility for some therapies.

See: Monoclonal antibody therapy

Exhaled nitric oxide (NO) testing in adults and adolescents

Measurement of the fraction of exhaled nitric oxide is not routinely used in Australian clinical practice, but is often used by respiratory physicians, severe asthma clinics and clinical asthma trials in both primary and secondary care to provide additional information about asthma phenotype that may help to inform treatment decisions.

The exhaled nitric oxide test is easy for patients to perform.

Roles in diagnostic investigation
In patients with symptoms that suggest asthma (e.g. wheeze, shortness of breath, variable cough), the finding of increased exhaled nitric oxide provides supportive evidence for an asthma diagnosis, but is not conclusive for several reasons:¹

- Some types of asthma (i.e. asthma without eosinophilic airway inflammation) are not associated with increased exhaled nitric oxide.
- Patients treated with inhaled corticosteroids may have a normal exhaled nitric oxide level.
- Exhaled nitric oxide may be elevated in other conditions (e.g. eosinophilic bronchitis, acute viral infection).
- Exhaled nitric oxide may be suppressed by other factors (cigarette smoke).

The predictive value of exhaled nitric oxide as a diagnostic test for asthma is higher than for peak expiratory flow and spirometry, and similar to that of bronchial challenge tests.¹

Increased exhaled nitric oxide fraction not accurate as a single surrogate marker for airway eosinophilia in patients with asthma.⁵

There are several inflammatory phenotypes in asthma: eosinophilic, neutrophilic, mixed, and asthma with sputum cell counts within normal range (‘paucigranulocytic’). The exhaled nitric oxide fraction is commonly, but not always, associated with eosinophilic airway inflammation, but not with neutrophilic or paucigranulocytic asthma.⁵

### Role in clinical management of asthma

In people with a clinical diagnosis of asthma, the exhaled nitric oxide test is useful for identifying those with asthma who are likely to experience a short-term symptomatic response to inhaled corticosteroids. However, there is no evidence at present that it is safe (with regard to risk of exacerbations) to withhold inhaled corticosteroids if exhaled nitric oxide is not elevated.

There is evidence from several studies in children with a diagnosis of asthma that exhaled nitric oxide can be used to adjust the dose of inhaled corticosteroids, leading to a reduction in exacerbation risk compared with guidelines-based adjustment, though not an improvement in symptom control.⁶ However, in adults, there was no significant difference in exacerbation risk with FeNO-based treatment adjustment compared with guidelines-based adjustment.⁷

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**Impulse oscillometry in adults and adolescents**

Impulse oscillometry is a noninvasive and rapid technique for measuring pulmonary function. Unlike spirometry, the test is easy to do and requires only passive cooperation by the patient, so it is suitable for small children. It is not used routinely in clinical practice, but is currently available in some tertiary referral centres.

Low-frequency impulse oscillometry (resistance at 5 Hz) measurements taken before and after administration of a bronchodilator correlate with spirometry (FEV1) in people with asthma and without asthma.⁸ Impulse oscillometry may be useful in identifying patients with asthma, and might possibly identify obstruction in the peripheral airways.⁹

This test is not used routinely in clinical practice because diagnostic cut-points are not well established yet.⁹ Australian normal values for adults without asthma have been developed.¹⁰

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### References


9. Galant SP, Nickerson B. Lung function measurement in the assessment of childhood asthma: recent important developments. *Curr
Allergy tests for diagnosis in adults

Recommendations

Consider allergy testing as part of diagnostic investigations if you suspect allergic triggers, or to guide management.

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

To investigate allergies in a person with severe or unstable asthma, or a history of anaphylaxis, refer to a specialist allergist for investigation to minimise risk.

How this recommendation was developed

Adapted from existing guidance

Based on reliable clinical practice guideline(s) or position statement(s):

- Australasian Society of Clinical Immunology and Allergy, 2013

If allergy testing is needed, refer to an appropriate provider for skin prick testing for common aeroallergens.

Notes

If staff are trained in the skin prick test procedure and its interpretation, skin prick testing can be performed in primary care. If not, refer to an appropriate provider.

When performing skin prick testing, follow Australasian Society of Clinical Immunology and Allergy (ASCIA) guidance: Skin prick testing for the diagnosis of allergic disease. A manual for practitioners

How this recommendation was developed

Adapted from existing guidance

Based on reliable clinical practice guideline(s) or position statement(s):

- Australasian Society of Clinical Immunology and Allergy, 2013

Blood test (immunoassay for allergen-specific immunoglobulin E) can be used if skin prick testing is (any of):

- unavailable
- impractical (e.g. a patient who is unable to cooperate with test procedure, a patient taking antihistamines when these cannot be withdrawn, or a patient taking tricyclic antidepressants or pizotifen)
- contraindicated (e.g. patients with severe dermatographism, extensive skin rash, or those at risk of anaphylaxis including patients with occupational asthma due to latex sensitivity).

How this recommendation was developed

Adapted from existing guidance

Based on reliable clinical practice guideline(s) or position statement(s):

- Australasian Society of Clinical Immunology and Allergy, 2013
More information

**Allergy tests in diagnostic investigation in adults and adolescents**

Not all asthma is allergic, so negative allergy tests cannot exclude asthma. The probability that respiratory symptoms are due to allergic asthma is increased if a person has a history of allergy, or a family history of allergic rhinitis or atopic dermatitis.

The Australasian Society of Clinical Immunology (ASCIA) recommends skin prick testing as the first-choice method for investigating allergies in a person with asthma. ASCIA cautions that non-specialist practices should not perform skin prick testing in patients with persistent severe or unstable asthma due to potential adverse effects.

► See: [Allergies and asthma](#)

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**References**

Recommendations

Consider arranging chest X-ray if there are respiratory symptoms that are not explained by asthma or as otherwise indicated to investigate the possibility of other conditions (e.g. pneumonia, cancer).

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

Do not routinely order chest X-ray in all patients with suspected asthma, because it is not a diagnostic test for ruling asthma in or out.

How this recommendation was developed

Consensus
Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Other diagnostic tests in adults

For patients with incompletely reversible airflow limitation, a careful history will often clarify which investigation is most appropriate. Lung volume tests and diffusing capacity tests may be helpful to identify emphysema or pulmonary fibrosis. High-resolution computed tomography is useful if bronchiectasis is suspected.