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Asthma in adults

A quick reference guide for primary care health professionals

National Asthma Council AUSTRALIA | Australian Asthma Handbook

Published 2024 based on Australian Asthma Handbook website (last focused update 2022).

National Asthma Council AUSTRALIA | Australian Asthma Handbook

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The Australian Asthma Handbook has been officially endorsed by:

Australasian College for Emergency Medicine (ACEM)

Australian Primary Health Care Nurses Association (APNA)

Pharmaceutical Society of Australia (PSA)

Royal Australian College of General Practitioners (RACGP)

Advanced Pharmacy Australia (AdPha)

About this guide

This guide is a summary of key recommendations and information on asthma in adults from the Australian Asthma Handbook (last updated April 2022).

The Handbook is undergoing review with a target publication date in 2025.

For detailed guidance on asthma care, visit asthmahandbook.org.au

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Check for the latest asthma resources at
nationalasthma.org.au/health-professionals

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Abbreviations

ACE	Angiotensin-converting enzyme	**IgE**	Immunoglobulin E
COPD	Chronic obstructive pulmonary disease	**LABA**	Long-acting beta$_2$ agonist
DPI	Dry powder inhaler	**OCS**	Oral corticosteroids
ED	Emergency department	**PBS**	Pharmaceutical Benefits Scheme
FEV$_1$	Forced expiratory volume in one second	**PEF**	Peak expiratory flow
FVC	Forced vital capacity	**pMDI**	Pressurised metered-dose inhaler
ICS	Inhaled corticosteroid	**SABA**	Short-acting beta$_2$ agonist
ICU	Intensive care unit	**TGA**	Therapeutic Goods Administration

Introduction

Asthma is a chronic inflammatory lung condition affecting 1 in 9 Australians. Asthma accounted for 2.5% of total disease burden and 35% of disease burden for respiratory conditions in Australia in 2023. In 2021–22 there were 56,600 emergency department presentations for asthma (230 presentations per 100,000 population) and 25,500 hospitalisations with a principal diagnosis of asthma (99 hospitalisations per 100,000 population). There were 467 asthma-related deaths recorded in Australia in 2022. Women over 75 years are most at risk, with almost half (45%) of all asthma deaths occurring within this group.*

Asthma is characterised by a history of respiratory symptoms, including wheeze, shortness of breath, chest tightness and cough, that vary over time and in intensity, together with variable expiratory airflow limitation. Asthma is a heterogenous disease, usually associated with airway hyperresponsiveness to direct or indirect stimuli, and with chronic airway inflammation. Asthma may be triggered by factors such as exercise, allergen, or irritant exposure, change in weather, or viral respiratory infections. Patients can experience episodic flare-ups or exacerbations of asthma that may be life-threatening.

The aims of asthma management are to achieve good symptom control and to minimise the risk of future asthma exacerbations. The mainstay of asthma treatment is the use of inhaled corticosteroids (ICS), either (1) as needed in response to symptoms, in combination with formoterol, or (2) as a regular maintenance treatment, alone or in combination with a long-acting $beta_2$ agonist (LABA). Maintenance-and-reliever therapy with ICS-formoterol is an option for some patients. This approach has been shown to reduce exacerbations, compared with regular ICS or ICS-LABA plus as-needed short-acting $beta_2$ agonist (SABA), in clinical trials. Over-reliance on SABA treatment for control of symptoms is associated with an increased risk of hospitalisation for severe exacerbations, and of death.

Self-management of asthma is important, and patients should have a written asthma action plan. Once the most appropriate medication or class has been identified, patients should be involved in choosing the right inhaler, taking into account individual preferences, ease of use and the environmental impact of the inhaler. Adherence to therapy and inhaler technique must be assessed regularly.

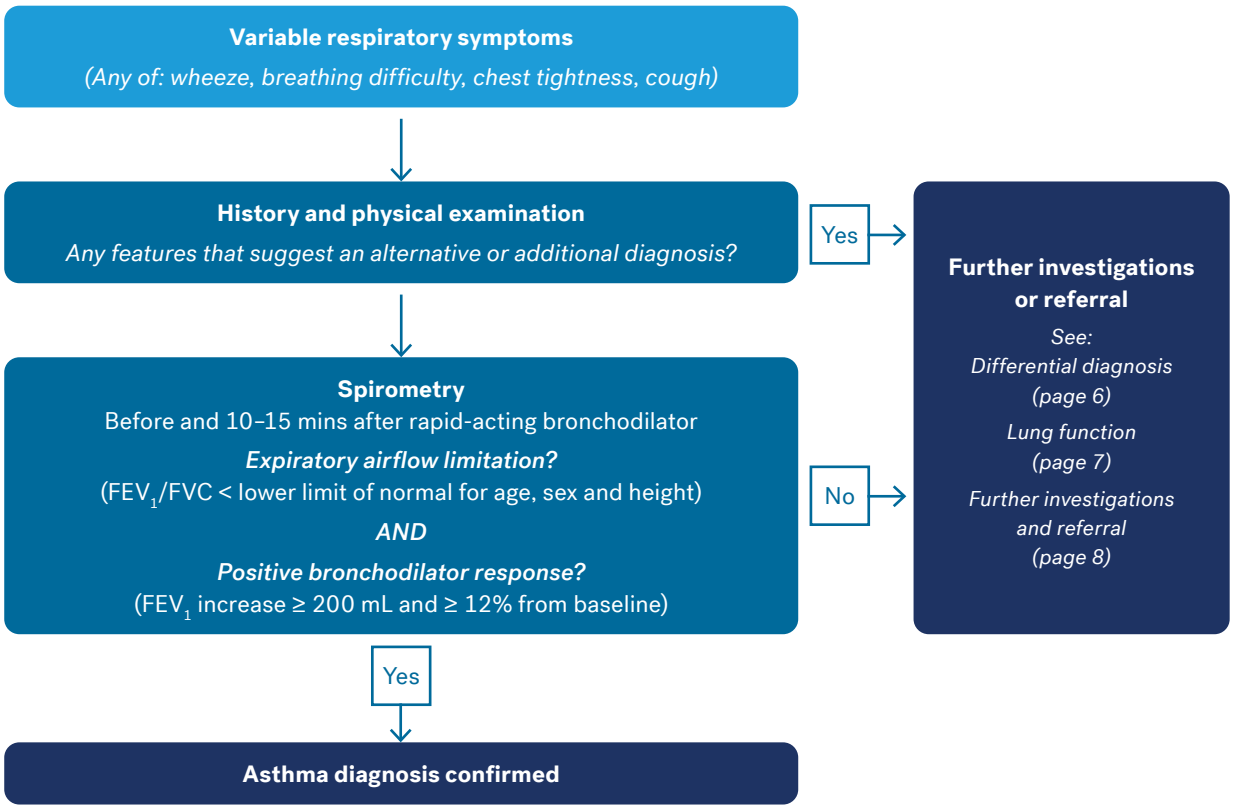
** Data source: Australian Institute of Health and Welfare. Chronic respiratory conditions: asthma [web page] Updated 14 December 2023: aihw.gov.au/reports/chronic-respiratory-conditions/asthma.*

Diagnosis

The diagnosis of asthma in adults is based on (Figure 1):

- a history of typical symptoms (one or more of these: wheeze, breathlessness, chest tightness, cough) that vary over time in frequency and severity
- absence of findings on history and physical examination that suggest an alternative diagnosis
- documentation of variable expiratory airflow limitation.

Figure 1. Diagnosis of asthma in adults



FEV_1: forced expiratory volume in one second; FVC: forced vital capacity

Notes: 1: If possible, bronchodilators should be withheld before performing spirometry for diagnosis of asthma (see Notes on spirometry, page 7). 2: This guidance applies to people not currently using inhaled corticosteroids. Other strategies may be needed to confirm variable expiratory airflow limitation in people using inhaled corticosteroids.

An increase in FEV_1 ≥ 200 mL and ≥ 12% from baseline is consistent with asthma. Normal spirometry, especially when asymptomatic, does not exclude asthma.

History

Ask about current symptoms (daytime and night-time), pattern of symptoms over day/week/year, triggers (e.g. exercise, viral infections, cold air, foods, medicines, allergens), home and work environment, smoking/vaping/exposure to smoke, history of allergies (including atopic dermatitis or allergic rhinitis), and family history of asthma and allergies. Wheeze and dyspnoea are the symptoms most reliably associated with asthma. Exercise-induced symptoms that worsen after stopping strongly suggest asthma, whereas breathlessness due to other conditions, such as deconditioning, cardiac failure, chronic obstructive pulmonary disease (COPD), and inducible laryngeal obstruction (also called vocal cord dysfunction), is usually maximal at peak exercise. Other features that suggest asthma include symptoms that are recurrent or seasonal (not isolated), worsening of symptoms at night or in the early morning, triggering of symptoms by exercise, cold air, medicines (e.g. aspirin or beta blockers), allergies, viral infections, or laughter, and a family history of asthma or allergies.

Physical examination

Absence of detected abnormalities does not exclude a diagnosis of asthma. Widespread wheeze on auscultation of the chest, when symptoms are present, suggests asthma but is nonspecific.

Differential diagnosis

Consider alternative/contributing causes of symptoms, including:

- **inducible laryngeal obstruction** – consider if dry cough or breathing difficulty triggered by strong smells, irritants or exercise, symptoms worse when talking on the phone, symptoms associated with throat tightness or voice change, or when breathlessness is worse at peak exercise. Inspiratory wheezing (stridor) strongly suggests a laryngeal or upper airway abnormality
- **hyperventilation** – consider as a cause of breathlessness if dizziness, light-headedness, or tingling fingers
- **panic attacks** – consider as a cause of breathlessness or chest tightness at rest or on minor exertion accompanied by anxiety
- **chronic upper airway cough syndrome** (also called post-nasal drip) – consider when cough is the dominant symptom, if throat-clearing or symptoms and signs of allergic rhinitis or chronic rhinosinusitis are present
- **gastro-oesophageal reflux disease** – consider as a cause of cough or chest tightness in patients with symptomatic reflux
- **poor cardiopulmonary fitness** – consider as a cause of breathlessness
- **ACE inhibitor-related cough** – consider when cough is the dominant symptom
- **respiratory infections**
- **COPD** – consider if onset of dyspnoea/cough/wheeze at age >40 years, history of smoking or exposure to smoke/dust, history of recurrent chest infections, persistent breathlessness, or family history of emphysema
- **rhinosinusitis** – consider as a cause of cough
- **bronchiectasis** – consider as a cause of wheeze or productive cough in a patient with recurrent infections
- **large airway stenosis** – consider as a cause of breathlessness or wheeze
- **pulmonary fibrosis** – consider as a cause of breathlessness or dry cough
- **cardiac disease** – consider as a cause of chest tightness or breathlessness on exertion
- **heart failure** – consider as a cause of dyspnoea on exertion or when lying flat, or basal crepitations
- **pulmonary embolism** – consider as a cause of sudden-onset dyspnoea
- **lung cancer**.

Lung function

The diagnosis of asthma requires a history of variable respiratory symptoms (such as cough, wheeze, shortness of breath, chest tightness), plus demonstration of variable expiratory airflow limitation.

Perform spirometry, or refer to an accredited respiratory function laboratory. Reduced ratio of forced expiratory volume in one second (FEV_1) to forced vital capacity (FVC) indicates expiratory airflow limitation. Normal spirometry does not exclude asthma, especially when patient is asymptomatic.

Bronchodilator responsiveness (whether respiratory airflow limitation is 'reversible') should be tested by measuring FEV_1 before and 10–15 minutes after administration of a rapid-acting bronchodilator (e.g. salbutamol), with at least three spirometry manoeuvres each time.*

Variable airflow limitation can be demonstrated several ways, including:

- positive bronchodilator responsiveness test (clinically important increase in FEV_1 and/or FVC 10–15 minutes after administration of bronchodilator, e.g. FEV_1 increase of ≥ 200 mL and 12% from baseline)
- clinically important variation in FEV_1 measured repeatedly over time
- airway hyperresponsiveness demonstrated by bronchial provocation ('challenge') testing conducted in a respiratory function laboratory.

For more information, refer to the *Australian Asthma Handbook*.

* *Spirometry is strongly recommended for assessing bronchodilator responsiveness. If high-quality spirometry is not available measurement of peak expiratory flow can be considered, using at least three readings before and 15–20 minutes after administration of a rapid-acting bronchodilator. A large (e.g. >20%) increase in peak expiratory flow supports the diagnosis of asthma, but this method is not as accurate or reliable as spirometry.*

Notes on spirometry

Decreased FEV_1 alone is a nonspecific finding and does not confirm asthma. A bronchodilator response that does not meet criteria for a positive test does not rule out asthma.

When spirometry is performed as a diagnostic test, inhaled bronchodilators should be withheld before the test: 4 hours for salbutamol and terbutaline, 12 hours for ipratropium, 24 hours for formoterol and salmeterol, 36 hours for indacaterol, olodaterol, vilanterol, aclidinium, glycopyrronium, tiotropium, and umeclidinium.

Spirometry should be performed by a trained operator using a calibrated or self-calibrating spirometer. The National Asthma Council provides spirometry resources to support spirometry in primary care.

Follow infection control guidelines to avoid transmission of respiratory infections.

Further investigations and referral

Challenge testing: Bronchial provocation (challenge) tests for airway hyperresponsiveness are not required for asthma diagnosis, but can be considered if bronchodilator responsiveness test is negative on initial spirometry. Bronchial provocation tests should be performed only in accredited respiratory function laboratories. Check requirements for withholding of bronchodilators before the test.

Tests for airway inflammation: Fractional exhaled nitric oxide (FeNO) can be performed in lung function laboratories. It is elevated in allergic and eosinophilic inflammation associated with asthma. Together with spirometry it may assist in asthma diagnosis and assessing asthma severity. Blood eosinophil count is not required for asthma diagnosis but, as with FeNO, is useful to guide treatment in severe asthma.

Allergy testing: Consider skin-prick testing (or allergen-specific blood immunoglobulin E [IgE] assay) for common aeroallergens to guide management if allergic triggers are suspected.

Imaging: Chest X-ray and/or high-resolution computed tomography are not required to diagnose asthma, but may be indicated to exclude alternative or comorbid conditions.

Referral: Consider specialist referral if the diagnosis is uncertain, or signs and symptoms do not respond to initial treatment. If work-related asthma (work-exacerbated asthma or occupational asthma) is suspected refer immediately, where possible.

Treatment

Asthma management in adults is based on inhaled medication:

1. ICS to reduce airway inflammation and prevent flare-ups
2. rapid-acting bronchodilators to manage symptoms.

Both these functions can be performed by a single inhaler, or the patient can have a separate inhaler for each function.

ICSs can be administered:

- by an inhaler containing a combination of ICS and formoterol, taken as needed to relieve symptoms, with or without daily maintenance doses
- by an inhaler containing ICS alone, or ICS in combination with a LABA, taken as daily maintenance treatment (with a separate as-needed SABA inhaler for symptom relief).

Rapid-acting bronchodilators for relief of symptoms can be administered:

- using an inhaler containing a combination of ICS and formoterol
- using an inhaler containing a SABA.

Check that the person is able to use the inhaler device correctly. Repeatedly check technique.

Asthma is continually monitored, and medication is adjusted to maintain symptom control, prevent flare-ups (exacerbations, attacks), and manage other risk (Figure 2).

Before starting treatment

Confirm the diagnosis of asthma before starting ICS treatment if possible (unless symptoms are severe and treatment urgent, or no access to spirometry) – obtain records confirming variable expiratory airflow limitation or arrange diagnostic spirometry.

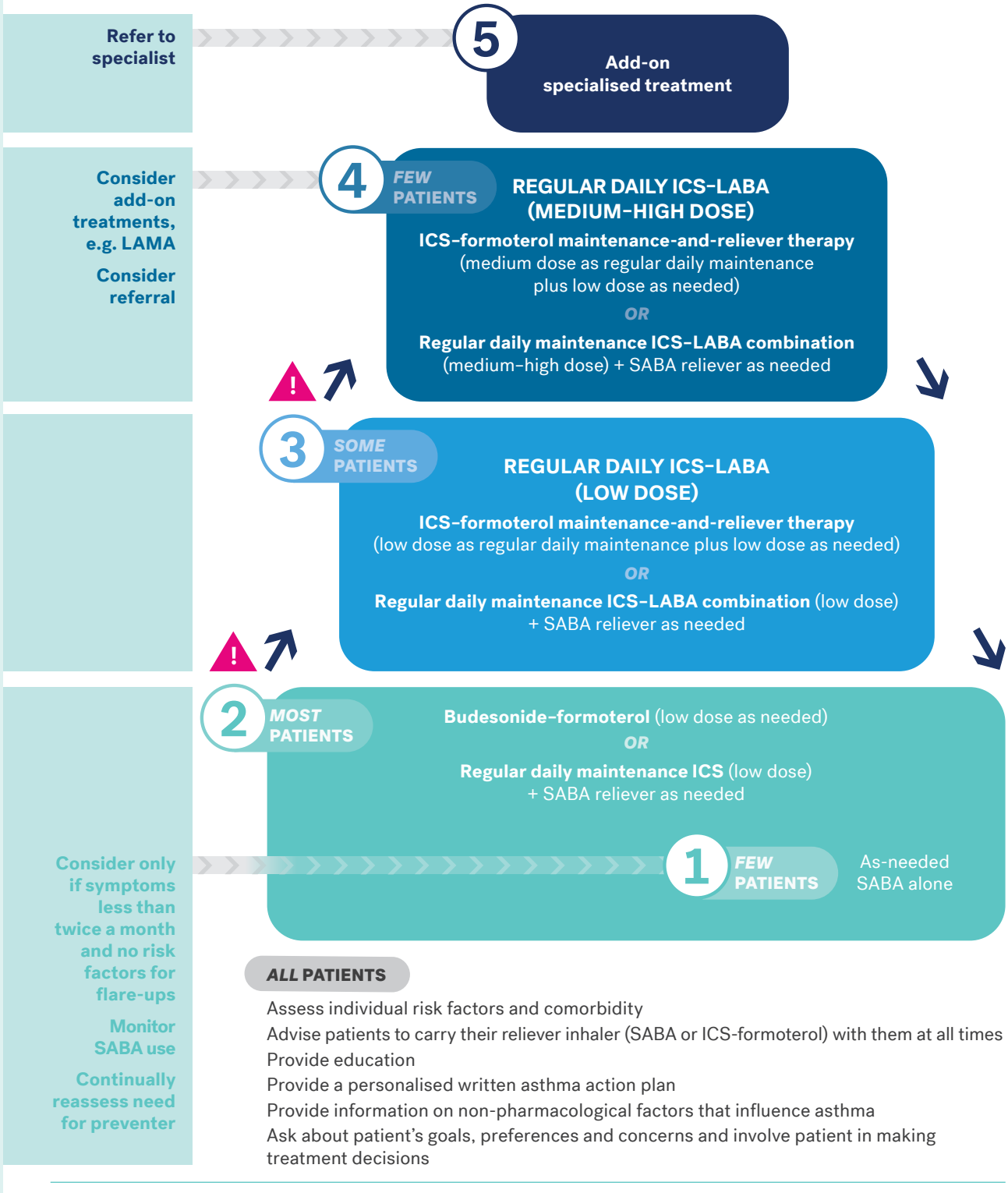
Record baseline lung function, level of recent asthma symptom control (Table 1), and risk factors (Table 2).

Table 1. Classification of recent asthma symptom control (over past 4 weeks)

Good	Partial	Poor
All of:	**One or two of:**	**Three or more of:**
— Daytime symptoms ≤2 days per week	— Daytime symptoms >2 days per week	— Daytime symptoms >2 days per week
— Need for SABA reliever ≤2 days per week*	— Need for SABA reliever >2 days per week*	— Need for SABA reliever >2 days per week*
— No limitation of activities	— Any limitation of activities	— Any limitation of activities
— No symptoms during night or on waking	— Any symptoms during night or on waking	— Any symptoms during night or on waking

** Do not include SABA doses taken prophylactically before exercise. Do not count reliever use for patients using anti-inflammatory reliever (low-dose ICS–formoterol as reliever).*

Figure 2. Selecting and adjusting asthma medication for adults



ICS: *inhaled corticosteroids*
LABA: *long-acting beta$_2$ agonist*
LAMA: *long-acting muscarinic antagonist (added to ICS-based treatment either in separate inhaler or in combination with ICS and LABA)*
SABA: *short-acting beta$_2$ agonist*

↑ *Consider stepping up if good control of symptoms and flare-ups is not achieved despite good adherence and correct inhaler technique.*

! *Before stepping up, check that symptoms are due to asthma, inhaler technique is correct (including use of spacer if indicated) and adherence is adequate.*

↓ *When asthma is stable and well controlled, consider stepping down.*

A large version of this table with medications at each level is available at nationalasthma.org.au/living-with-asthma/resources/health-professionals/charts/selecting-and-adjusting-asthma-medications

Table 2. Risk factors in adults

Factors associated with increased risk of flare-ups

- Poor asthma symptom control
- Any asthma flare-up during the previous 12 months
- High SABA use (3 or more salbutamol canisters in a year, i.e. average of 1.6 actuations per day/ 11 actuations per week)
- Other concurrent chronic lung disease
- Poor lung function (even if few symptoms)
- Difficulty perceiving airflow limitation or the severity of flare-ups
- Eosinophilic airway inflammation (blood eosinophil count ≥300/μL despite maintenance treatment with medium-dose ICS)
- Exposure to cigarette smoke/vapes, smoke from fires
- Socioeconomic disadvantage
- Mental illness

Factors associated with increased risk of life-threatening asthma

- History of severe flare-ups (intubation/ICU admission due to asthma [ever], 2 or more hospitalisations for asthma in past year, 3 or more ED visits for asthma in the past year, or hospitalisation or ED visit for asthma in the past month)
- History of sudden-onset acute asthma
- History of delayed presentation to acute care during moderate–severe flare-up
- High SABA use (particularly if 12 or more salbutamol canisters/year, i.e. average 6.6 actuations per day)
- Comorbid cardiovascular disease
- Sensitivity and exposure to an unavoidable allergen (e.g. mould)
- Lack of written asthma action plan
- Social isolation
- Socioeconomic disadvantage
- Mental illness

Factors associated with thunderstorm asthma

- Springtime allergic rhinitis or confirmed ryegrass pollen allergy (if exposed to high grass pollen levels during spring and early summer)

Factors associated with accelerated decline in lung function

- Chronic hypersecretion of mucus
- Severe asthma flare-up when not taking ICS
- Poor lung function
- Eosinophilic airway inflammation (blood eosinophil count ≥300/μL despite maintenance treatment with medium-dose ICS)
- Exposure to cigarette smoke
- Occupational asthma

Factors associated with adverse effects of treatment

- Long-term high-dose ICS
- Frequent use of OCS

ED: emergency department; ICS: inhaled corticosteroids; ICU: intensive care unit; SABA: short-acting beta$_2$ agonist; OCS: oral corticosteroids

Initial treatment

Either of the following treatment approaches are suitable for most patients with newly diagnosed asthma:

- anti-inflammatory reliever (low-dose budesonide–formoterol) taken as needed when symptoms occur, without daily maintenance treatment (Table 3)
- regular daily maintenance treatment with low-dose ICS (Table 4), plus as-needed SABA (salbutamol or terbutaline) taken when symptoms occur.

Review response within 4–8 weeks and adjust as necessary.

If symptoms are severe at initial presentation, consider one of the following:

- low-dose or medium-dose budesonide–formoterol maintenance-and-reliever therapy (Table 3)
- regular daily maintenance treatment with low-dose ICS–LABA combination (plus as-needed SABA)
- a short initial period of regular daily maintenance treatment high-dose ICS (plus as-needed SABA) then step down.

In addition to one of these options, a short course of oral corticosteroids (e.g. prednisone/prednisolone up to 50 mg/day for 5–10 days) may be needed.

Advise patients to carry their reliever at all times and use it when they experience difficulty breathing, or before exercise or anticipated allergen exposure.

Manage comorbid conditions likely to affect asthma control (e.g. allergic rhinitis, chronic rhinosinusitis, symptomatic gastro-oesophageal reflux disease, obstructive sleep apnoea, obesity, deconditioning, anxiety, depression).

Prescribing notes

Check indications approved by Therapeutic Goods Administration (TGA) and PBS restrictions before prescribing.

⚠ LABAs should only be used when an inhaled corticosteroid is taken concurrently – never as monotherapy for asthma.

Inhaler types for asthma medicines include pressurised metered-dose inhalers (pMDIs; 'puffers') plus spacer (see also *Written asthma action plans and Flare-ups*, page 16), breath-actuated pMDIs, multi-dose or capsule dry powder inhalers (DPIs), and soft mist inhalers. Choose a type of inhaler that the individual can use correctly. Train the patient how to use their inhaler correctly and check technique regularly. Video demonstrations are available at nationalasthma.org.au/health-professionals/how-to-videos.

Hoarseness (dysphonia) and candidiasis (thrush) are common local adverse effects of ICSs. A valved spacer should be used when ICSs are taken via manually-actuated pMDIs. Patients using regular daily maintenance inhaled corticosteroids should rinse their mouth with water and spit after each dose, if possible (unnecessary with as-needed doses of low-dose budesonide–formoterol).

Systemic adverse effects of high-dose ICSs include reduced bone mineral density, cataracts, and diabetes.

⚠ Nebulisers should not be used unless unavoidable. Nebulisers generate aerosols and risk transmission of respiratory infections. The use of a pMDI with spacer delivers inhaled asthma medicines to the lungs at least as effectively as a nebuliser except in life-threatening asthma. If nebulisation is required in a patient with suspected or confirmed acute respiratory viral illness (including COVID-19), follow infection control guidelines for aerosol-generating procedures.

Table 3. Summary of asthma treatment approaches in adults

Regimen	Suitable medications	
Anti-inflammatory reliever-only therapy ICS–formoterol (single inhaler taken as needed, no maintenance treatment)	Budesonide–formoterol 200/6 microg via **DPI**: 1 inhalation as needed for symptom relief Budesonide–formoterol 100/3 microg via **pMDI**: 2 inhalations as needed for symptom relief	
Maintenance-and-reliever therapy ICS-formoterol (single inhaler used for regular daily maintenance plus extra doses as needed for symptoms)	**Low dose (low daily maintenance dose + low reliever doses)** Beclometasone–formoterol 100/6 microg via **pMDI**: daily maintenance dose (1 inhalation twice daily) plus 1 inhalation as needed for symptom relief Budesonide–formoterol 100/3 microg via **pMDI**:† daily maintenance dose (4 inhalations per day) plus 2 inhalations as needed for symptom relief Budesonide–formoterol 200/6 microg via **DPI**:† daily maintenance dose (2 inhalations per day) plus 1 inhalation as needed for symptom relief Budesonide–formoterol 50/3 microg via **pMDI**: daily maintenance dose (4 inhalations per day) plus 2 inhalations as needed for symptom relief Budesonide–formoterol 100/6 microg via **DPI**: daily maintenance dose (2 inhalations per day) plus 1 inhalation as needed for symptom relief	
	Medium dose (medium daily maintenance dose + low reliever doses) Budesonide–formoterol 100/3 microg via **pMDI**:† daily maintenance dose (4 inhalations twice daily) plus 2 inhalations as needed for symptom relief Budesonide–formoterol 200/6 microg via **DPI**:† daily maintenance dose (2 inhalations twice daily) plus 1 inhalation as needed for symptom relief	
Maintenance ICS (plus as-needed SABA)	Beclometasone dipropionate‡ Budesonide‡ Ciclesonide‡ Fluticasone furoate‡ Fluticasone propionate‡	Plus SABA reliever:§ Salbutamol 100 microg via **pMDI**: 1–2 inhalations as needed for symptom relief ***or*** Terbutaline 500 microg via **DPI**: 1 inhalation as needed for symptom relief
Maintenance ICS–LABA (plus as-needed SABA)	Beclometasone–formoterol‡ Budesonide–formoterol‡ Fluticasone furoate–vilanterol‡ Fluticasone propionate–salmeterol‡ Fluticasone propionate–formoterol‡ Mometasone–indacaterol‡	

For more information on medications, see Quick reference tables pages 21 and 22).

DPI: dry powder inhaler; ICS: inhaled corticosteroid; LABA: long-acting beta$_2$ agonist; pMDI: pressurised metered-dose inhaler; SABA: short-acting beta$_2$ agonist

† For budesonide-formoterol inhalers approved for maintenance-and-reliever therapy, strengths with more evidence are listed first. A greater volume of evidence supports the use of budesonide–formoterol 200/6 microg as the total reliever dose (delivered as 1 inhalation of 200/6 microg via DPI or 2 inhalations of 100/3 microg via pMDI), compared with lower reliever doses of budesonide–formoterol.

‡ Refer to approved product information for strengths and dosage.

§ SABA alone (without concomitant ICS treatment) is rarely adequate for adults with asthma. It can be considered only for patients with symptoms less than twice a month and no risk factors for flare-ups.

Table 4. Definition of low, medium, and high ICS doses

	Total daily dose (microg)		
	Low	**Medium**	**High**
Beclometasone dipropionate	100–200	250–400	>400
Budesonide	200–400	500–800	>800
Ciclesonide	80–160	240–320	>320
Fluticasone furoate	–	100	200
Fluticasone propionate	100–200	250–500	>500
Mometasone furoate in combination with indacaterol via capsule inhaler	62.5*	127.5*	260*
Mometasone furoate in combination with indacaterol and glycopyrronium via capsule inhaler	–	68*	136*

The table shows options for low, medium, and high doses of each available inhaled corticosteroid (with or without LABA and LAMA) – it does not indicate dose equivalence.

** Doses of mometasone furoate are shown as delivered dose (not metered dose) in line with inhaler labels. For all other products in this table, the inhaler label and table show the metered dose.*

Monitoring and adjusting treatment

Review: Review symptom control (Table 1) and risk factors (Table 2) periodically, including after changing treatment, after flare-ups, every 4 weeks during pregnancy, and routinely at least once per year.

Adherence and inhaler technique: Check at every opportunity.

Spirometry: Perform or arrange spirometry at baseline and after symptoms stabilise (3–6 months) to establish the patient's personal best as the basis for future comparison. Spirometry should be repeated for patients with worsening asthma control or flare-ups, and routinely every 1–2 years (at every visit for patients with severe or difficult-to-treat asthma) to identify accelerated decline in lung function, which requires prompt investigation. If spirometry findings are markedly discordant with symptoms (e.g. normal spirometry in a patient with frequent symptoms, or FEV_1 <70% predicted in a patient with no symptoms), consider referral to an accredited respiratory laboratory for spirometry (see Thoracic Society of Australia and New Zealand directory), alternative diagnoses, and referral for specialist assessment.

Stepping down

If good asthma control is maintained for 2–3 months and the patient is at low risk of flare-ups, consider stepping down by one step (Figure 2), unless already on low-dose ICS or as-needed low-dose budesonide–formoterol. Do not attempt dose reduction or step-down if the person is pregnant, travelling, or exposed to triggers (e.g. respiratory infections, relevant allergens). Update the written asthma action plan, reduce ICS dose gradually, and review 4–8 weeks after each dose reduction.

Stepping up

Before stepping up, document the person's current level of asthma symptom control (Table 1) and risk factors (Table 2), and check adherence, inhaler technique, exposure to triggers, and the possibility that symptoms are due to comorbid or alternative diagnoses (e.g. allergic rhinitis or rhinosinusitis, de-conditioning, obesity, cardiac disease, or inducible laryngeal obstruction).

⚠ High doses of ICS should be used for short periods only. If a patient needs high-dose ICS to control asthma symptoms or has frequent oral corticosteroid courses for flare-ups, refer to a specialist for assessment.

⚠ Bone mineral density and blood glucose should be monitored in patients using high-dose ICS long term and those with frequent oral corticosteroid courses for severe flare-ups.

Written asthma action plans

Develop an individualised written asthma action plan for every patient that states their usual asthma medicines (and intranasal corticosteroid, if clinically significant allergic rhinitis, and anaphylaxis medicines, if relevant) and provides clear instructions on what to do when asthma symptoms worsen, including how to adjust inhaled medications (see Flare-ups), when to start a course of oral corticosteroids, and when to get urgent medical care. Action plan templates adapted for different treatment regimens are available from National Asthma Council Australia's Action plan library.

Patients should take their reliever whenever they experience asthma symptoms. Patients using reliever delivered by pMDI should use a spacer during a flare-up (and whenever symptoms are not immediately resolved after using the inhaler on its own), to increase the amount of medicine deposited within the airways.

For people at risk of thunderstorm asthma (springtime allergic rhinitis symptoms/confirmed ryegrass pollen allergy exposed to high airborne pollen concentrations during spring thunderstorms), include preventive advice:

- Use ICS (either daily maintenance ICS or ICS-LABA, or as-needed budesonide-formoterol).
- On days with high grass pollen counts, avoid exposure to outdoor air when a thunderstorm is approaching, especially during wind gusts just before the rain front hits (e.g. by going indoors with windows closed and air conditioner off or on recirculation mode, or shutting car windows and recirculating air).
- Always have reliever available and follow written asthma action plan if symptoms worsen.

Flare-ups (exacerbations, attacks)

During a flare-up patients will need to use their reliever more often. Those using pMDIs (e.g. salbutamol, or budesonide-formoterol pMDI) should add a spacer during flare-ups.

For patients using maintenance ICS or ICS–LABA plus as-needed SABA, prescribe an increase in maintenance ICS dose if asthma symptoms recur within 3 hours of using SABA reliever, breathing difficulty worsens over one or more days, night-time asthma symptoms interfere with sleep over more than one night in a row, or peak expiratory flow (PEF) falls below a pre-defined level (for those monitoring PEF each day; level determined based on individual's personal best and history of PEF levels before and during flare-ups).

For patients using as-needed low-dose budesonide–formoterol only, or ICS-formoterol as maintenance-and-reliever therapy, extra doses should be taken as needed when symptoms worsen, to reduce the risk of progression to a severe exacerbation.

Also consider a course of oral corticosteroids: 37.5–50 mg for 5–10 days (tapering not necessary if used for less than 2 weeks).

Difficult-to-treat and severe asthma

Early referral for suspected severe asthma is recommended to facilitate access to monoclonal antibody therapy for eligible patients.

Definitions

- **Difficult-to-treat asthma** remains uncontrolled (e.g. poor symptom control, frequent/severe flare-ups, or persistent airflow limitation) despite prescription of high-dose ICS–LABA. Includes asthma that is uncontrolled due to suboptimal adherence, inappropriate or incorrect use of medicines, environmental triggers, or comorbidities. Eliminate common causes before labelling as severe asthma.
- **Severe asthma** remains uncontrolled (e.g. poor symptom control, frequent/severe flare-ups or persistent airflow limitation) despite maintenance treatment with high-dose ICS–LABA (with correct inhaler technique and good adherence) or maintenance oral corticosteroids, or patient requires high-dose ICS–LABA to prevent asthma becoming uncontrolled. Refer patients with severe asthma for specialist investigations for assessment of inflammatory phenotype and eligibility for monoclonal antibody therapy.

Assessing poorly controlled asthma

If a patient continues to experience poor control of asthma symptoms, frequent flare-ups, or poor quality of life due to asthma, despite regular treatment with high-dose ICS–LABA, make a full assessment to rule out common problems before applying the label of severe asthma.

The most common reasons for experiencing poorly controlled asthma are:

- not using ICS at a therapeutic dose and/or frequency (e.g. suboptimal adherence)
- incorrect inhaler technique (e.g. poor training, device unsuitable due to poor dexterity, impaired cognition, poor inspiratory effort)
- other medical conditions affecting asthma symptoms or risk of flare-ups
- psychosocial factors that affect asthma self-management (e.g. life events, financial problems, or mental health conditions).

Reassess inhaler technique and adherence: Watch patient using inhalers. Ask about actual ICS use.

Confirm diagnosis: Review documentation of demonstrated variable expiratory airflow limitation and identify and investigate any signs and symptoms that could suggest an alternative diagnosis or comorbidity (e.g. bronchiectasis, cardiac disease, de-conditioning, inducible laryngeal obstruction).

Check for SABA overuse: Ask how many actuations taken per day, and how long reliever inhaler lasts. Check prescribing records and ask whether patient also uses non-prescription ('over-the counter') reliever. Dispensing of 3 or more salbutamol canisters in a year (average 1.6 actuations per day) is associated with increased risk of flare-ups. Dispensing 12 or more canisters in a year (average 6.6 actuations per day) is associated with increased risk of asthma death. Patients with habitual SABA over-use may need supervised weaning off – consider specialist referral.

Assess comorbidity: Consider conditions that could be contributing to respiratory symptoms, poor quality of life or flare-ups, or compromising self-management (e.g. allergic rhinitis, chronic rhinosinusitis, symptomatic gastro-oesophageal reflux disease, obstructive sleep apnoea, obesity, deconditioning, anxiety, depression).

Assess and manage triggers: Check exposures at home or work (e.g. cigarette smoke, allergens, irritants, infections, moulds/dampness, indoor/outdoor air pollution). If aspirin-exacerbated respiratory disease is suspected, refer to a specialist for assessment.

Referral

Refer patients with severe asthma or asthma that remains difficult to control after assessing and managing common causes (see page 17).

Arrange referral for specialist assessment without delay (after checking inhaler technique and adherence).

Also refer those who might benefit from monoclonal antibody (biologic) therapy added to optimised ICS-based treatment:*

- Omalizumab is indicated for moderate-to-severe allergic asthma with raised IgE.
- Benralizumab and mepolizumab are indicated for severe eosinophilic asthma.
- Dupilumab is indicated for moderate–severe asthma with type 2 inflammation (elevated eosinophils or elevated FeNO).

When to consider referral

Refer a patient for specialist assessment if:

- prolonged high-dose ICS is needed to control asthma
- maintenance oral corticosteroid treatment or frequent courses are needed
- they continue to use SABA reliever frequently despite appropriate maintenance ICS treatment
- they experience frequent or sudden flare-ups
- food allergy is present or suspected
- occupational asthma is suspected
- asthma remains difficult to control after assessing and managing common reasons for poor asthma control
- they may benefit from and be eligible for biologic treatment.

Refer to TGA-approved indications and PBS restrictions.

Acute asthma emergencies in adults in primary care

Manage with high doses of salbutamol via pMDI and spacer (with a tightly fitting face mask, if required, e.g. for people who cannot seal lips tightly around the mouthpiece) or nebuliser (if unavoidable or for life-threatening acute asthma). The use of nebulisers is associated with more adverse effects and a high risk of viral transmission than the use of pMDIs.

Start oxygen therapy if SpO_2 <92% and titrate to target SpO_2 93–95%.

See the *Australian Asthma Handbook* for information on managing acute asthma in emergency departments.

Primary assessment and immediate treatment:

Rapidly assess severity (clinical examination and pulse oximetry) and immediately start bronchodilator treatment (Table 5).

Start oxygen therapy if SpO_2 <92% and titrate to target SpO_2 93–95%. Avoid over-oxygenation (SpO_2 >95%) in adults because this increases the risk of hypercapnoea.

When feasible, complete a brief history, including:

- reliever taken for this episode (dose, number of doses, time of last dose)
- current asthma medicines (regular medicines and as-needed medicines, including type of devices used)
- assessment of adherence to preventer (if prescribed)
- what triggered this episode, if known (e.g. allergies, immediate hypersensitivity, medicines, respiratory infections)
- coexisting heart or lung disease, including COPD
- smoking status and exposure to second-hand smoke.

Anti-inflammatory treatment: Start systemic corticosteroids within 1 hour of presentation (unless contraindicated), regardless of severity at initial assessment: starting dose prednisone/prednisolone 37.5–50 mg, then repeat each morning on second and subsequent days (total 5–10 days).

Assessment of response: If dyspnoea/increased work of breathing is not relieved within 5 minutes, repeat bronchodilator dose, and arrange transfer to acute care facility.

After symptoms have resolved: Arrange follow-up within 3–5 days and comprehensive asthma review 2 weeks later. Ensure person has an ICS inhaler (ICS or ICS–LABA) and is using it correctly. Ensure person has a reliever and knows how to use it. If reliever administered by pMDI, ensure they have and can use a spacer.

Table 5. Initial treatment of acute asthma in adults in primary care

	Mild/Moderate	Severe *(any feature present)*	Life-threatening *(any feature present)*
Description	Can walk, speak whole sentences in one breath Oxygen saturation >94%	Use of accessory muscles of neck or intercostal muscles or 'tracheal tug' during inspiration or subcostal recession Unable to complete sentences in one breath due to dyspnoea Obvious respiratory distress Oxygen saturation 90–94%	Reduced consciousness or collapse Exhaustion Cyanosis Oxygen saturation <90% Poor respiratory effort, soft/absent breath sound
Immediate treatment	**Give salbutamol 4–12 actuations (100 microg per actuation) via pMDI and spacer** Give one actuation at a time followed by 4 breaths Repeat every 20–30 minutes for the first hour if required (sooner, if needed to relieve breathlessness)	**Arrange transfer to acute care facility** **Give salbutamol** **Salbutamol: 12 actuations (100 microg per actuation) via pMDI and spacer** Give one actuation at a time followed by 4 breaths If patient unable to breathe through a spacer, give 5 mg nebule via nebuliser **Start oxygen therapy if oxygen saturation <92% Titrate to target 93–95%** Repeat salbutamol as needed. Give at least every 20 minutes for first hour (3 doses)	**Arrange transfer to acute care facility** **Give salbutamol** **Salbutamol: 2 x 5 mg nebules via continuous nebulisation driven by oxygen** **Maintain oxygen saturations to target** **Arrange immediate transfer to higher-level care** When dyspnoea improves, consider changing to salbutamol via pMDI plus spacer or intermittent nebuliser (doses as for severe acute asthma)

Initial assessment and immediate bronchodilator treatment in primary care. Table does not include treatments used in emergency departments.

Quick reference tables

Table 6. Budesonide-formoterol combinations approved as anti-inflammatory relievers without maintenance treatment in adults

Brand name	Inhaler device	Strength (microg)	Reliever dose*	Maximum dose†
Symbicort	*Rapihaler*	100/3	2 inhalations	12 inhalations/occasion 16 inhalations/day 24 inhalations/day temporarily
Rilast	*Rapihaler*	100/3	2 inhalations	12 inhalations/occasion 16 inhalations/day 24 inhalations/day temporarily
Symbicort	*Turbuhaler*	200/6	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Rilast	*Turbuhaler*	200/6	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
DuoResp	*Spiromax*	200/6	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Bufomix	*Easyhaler*	200/6	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily

** Number of inhalations taken when needed for symptom relief. If relief not obtained or symptoms recur, the dose can be repeated a few minutes later.*

† Daily maximums as stated in TGA-approved product information (rarely needed in practice)

*Products approved by the Therapeutic Goods Administration for use as anti-inflammatory relievers for asthma in patients **not** using maintenance inhaled corticosteroid-based treatment. The anti-inflammatory reliever is taken as needed for the relief of asthma symptoms when they occur, and as preventive treatment of symptoms in those circumstances recognised by the patient to precipitate asthma symptoms (e.g. exercise, allergen). Patients should be advised to always have their anti-inflammatory reliever available for relief of symptoms. If the patient experiences a 3-day period of deteriorating symptoms after taking additional as-needed inhalations, the patient should be reassessed for alternative explanations of persisting symptoms. Patient must not be using a concomitant single agent long-acting-beta$_2$ agonist.*

Table 7. ICS-formoterol combinations approved for maintenance-and-reliever therapy in adults

Active ingredients: Budesonide plus formoterol					
Brand name	**Inhaler device**	**Strength (microg)**	**Maintenance dose**	**Reliever dose***	**Maximum dose†**
Symbicort	*Rapihaler*	100/3†	2 inhalations twice daily (may increase to 4 inhalations twice daily)	2 inhalations	12 inhalations/occasion 16 inhalations/day 24 inhalations/day temporarily
Rilast	*Rapihaler*	100/3†	2 inhalations twice daily (may increase to 4 inhalations twice daily)	2 inhalations	12 inhalations/occasion 16 inhalations/day 24 inhalations/day temporarily
Symbicort	*Turbuhaler*	100/6	2 inhalations/day in 1–2 divided doses	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Symbicort	*Turbuhaler*	200/6†	2 inhalations/day in 1–2 divided doses (may increase to 2 inhalations twice daily if necessary)	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Rilast	*Turbuhaler*	200/6†	2 inhalations/day in 1–2 divided doses (may increase to 2 inhalations twice daily if necessary)	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
DuoResp	*Spiromax*	200/6†	2 inhalations/day in 1–2 divided doses (may increase to 2 inhalations twice daily if necessary)	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Bufomix	*Easyhaler*	200/6†	2 inhalations/day in 1–2 divided doses (may increase to 2 inhalations twice daily if necessary)	1 inhalation	6 inhalations/occasion 8 inhalations/day 12 inhalations/day temporarily
Active ingredients: Beclometasone dipropionate plus formoterol					
Brand name	**Inhaler device**	**Strength (microg)**	**Maintenance dose**	**Reliever dose***	**Maximum dose**
Fostair	*pMDI*	100/6	1 inhalation twice daily	1 inhalation	6 inhalations/occasion 8 inhalations/day

Products approved by the Therapeutic Goods Administration for use in maintenance-and-reliever therapy. The patient uses the same inhaler as their regular daily maintenance treatment, and also takes extra doses as anti-inflammatory reliever as needed to manage symptoms. Other combinations of an inhaled corticosteroid and a long-acting beta$_2$ agonist cannot be used this way.

** Daily maximums as stated in TGA-approved product information*

† For budesonide-formoterol inhalers approved for maintenance-and-reliever therapy, strengths with more evidence are listed first. A greater volume of evidence supports the use of budesonide–formoterol 200/6 microg as the total reliever dose (delivered as 1 inhalation of 200/6 microg via DPI or 2 inhalations of 100/3 microg via pMDI), compared with lower reliever doses of budesonide–formoterol.

Health professional resources

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