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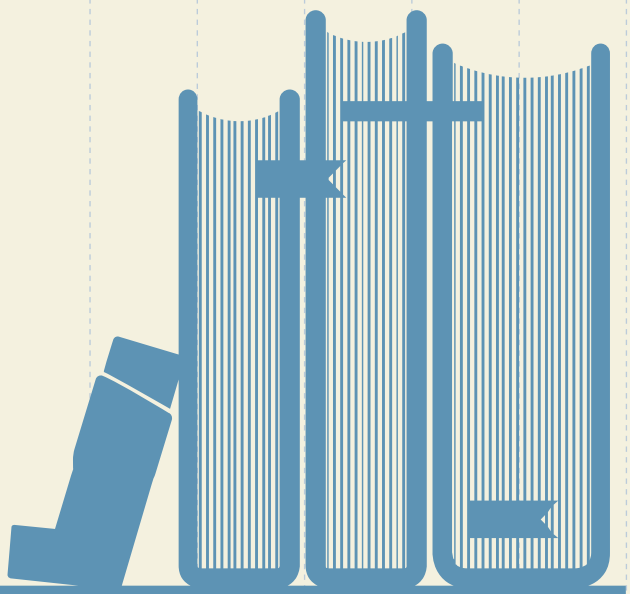
National Asthma Council Australia

AUSTRALIAN ASTHMA HANDBOOK

QUICK REFERENCE GUIDE



VERSION 1.1

ENDORSEMENT

The *Australian Asthma Handbook* has been officially endorsed by:

The Royal Australian College of General Practitioners (RACGP)

The Australian Primary Health Care Nurses Association (APNA)

The Thoracic Society of Australia and New Zealand (TSANZ)

NATIONAL ASTHMA COUNCIL AUSTRALIA

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DISCLAIMER

The *Australian Asthma Handbook* has been compiled by the National Asthma Council Australia for use by general practitioners, pharmacists, asthma educators, nurses and other health professionals and healthcare students. The information and treatment protocols contained in the *Australian Asthma Handbook* are based on current evidence and medical knowledge and practice as at the date of publication and to the best of our knowledge. Although reasonable care has been taken in the preparation of the *Australian Asthma Handbook*, the National Asthma Council Australia makes no representation or warranty as to the accuracy, completeness, currency or reliability of its contents.

The information and treatment protocols contained in the *Australian Asthma Handbook* are intended as a general guide only and are not intended to avoid the necessity for the individual examination and assessment of appropriate courses of treatment on a case-by-case basis. To the maximum extent permitted by law, acknowledging that provisions of the Australia Consumer Law may have application and cannot be excluded, the National Asthma Council Australia, and its employees, directors, officers, agents and affiliates exclude liability (including but not limited to liability for any loss, damage or personal injury resulting from negligence) which may arise from use of the *Australian Asthma Handbook* or from treating asthma according to the guidelines therein.

AUSTRALIAN ASTHMA HANDBOOK

QUICK REFERENCE GUIDE
VERSION 1.1, 2015

Contents

Complete online version of the *Australian Asthma Handbook* available at: asthmahandbook.org.au

Key tables

Key figures

ABOUT THE HANDBOOK

QUICK REFERENCE GUIDE

This Guide is a companion to the complete *Australian Asthma Handbook*, the national clinical practice guidelines for asthma management in primary care, developed by the National Asthma Council Australia.

This Guide features key figures and tables from the Handbook, alongside selected section overviews to provide context. It is not a standalone summary of the guidelines.

If possible, we strongly encourage readers to refer to the full Handbook at **asthmahandbook.org.au**

VERSION 1.1

Version 1.1 (April 2015) is a minor update and features new medications and some small clarifications and corrections based on user feedback. For more detail on v1.1 amendments, please visit **asthmahandbook.org.au/about/updates/version1_1**

OBJECTIVE

Australia has one of the highest prevalence rates of asthma in the world; around 1 in 10 adults and children has asthma. Since publication of the first national asthma guidelines in 1989, asthma management has improved. Deaths have declined, along with hospitalisations and urgent general practice visits. Most asthma is now managed in primary care.

The *Australian Asthma Handbook* aims to improve health outcomes and quality of life for people with asthma by providing clear guidance for the primary care health professionals involved in their care. It establishes a benchmark for the standard of care for people with asthma.

SCOPE

The Handbook provides evidence-based, practical guidance to primary care health professionals on the most effective strategies in the diagnosis and management of asthma in adults and children.

Using a patient-centred approach, the Handbook includes all aspects of the diagnosis and management of asthma within a primary care chronic disease management framework, with a particular emphasis on practicality and accessibility.

In addition, recognising the limited access to high-level acute care services in rural and remote areas, we also included detailed guidance on management of acute asthma applicable to a range of clinical settings.

USERS

Effective asthma management involves the whole primary care team, working with the person and also their family or carer where appropriate.

We developed the Handbook for use by general practitioners, community pharmacists, asthma and respiratory educators, primary healthcare/practice nurses, and Aboriginal and Torres Strait Islander health workers and practitioners.

The Handbook is also intended as a practical reference for other related health professionals, healthcare administrators and healthcare students, whom we encourage to use the Handbook as their guide to current best-practice asthma care in Australia.

DEVELOPMENT

The *Australian Asthma Handbook* is the seventh edition of Australia's asthma guidelines, previously published as the *Asthma Management Handbook*.

As with previous editions, we adopted a multidisciplinary approach in developing the Handbook to ensure the advice remained relevant and implementable by the target users. More than 80 primary care and specialist contributors formed the working groups and overarching Guidelines Committee, chaired by a general practitioner.

We used a structured and transparent methodology to formulate the recommendations, focusing on practical and evidenced-based advice. We wrote the recommendations and supporting commentary in plain language so that the guidance would be comprehensive yet clear.

WEBSITE

We have published the complete Handbook as a purpose-built website rather than a printed document. The unique, interactive site has a clear content hierarchy, putting key recommendations to the fore while allowing readers to explore deeper layers for supporting commentary with hyperlinks to cited references and external resources.

This change in emphasis will enable more frequent updates to the Handbook to ensure it remains at the forefront of asthma management, not only in Australia, but also globally.

WEBSITE FEATURES

Clear-cut recommendations

The *Australian Asthma Handbook*'s webpages put recommendations centre stage, clearly distinguishing actions from supporting evidence and other information so health professionals can focus on the vital tasks of accurate diagnosis and effective management of asthma.

Methodology and evidence: 'How this recommendation was developed'

Setting a new standard in transparency, the Handbook uses a unique and innovative icon system that provides an immediate visual cue on the methodology behind each recommendation. Clicking on these icons reveals more detail on the type and scope of evidence and links through to the referenced studies if available.

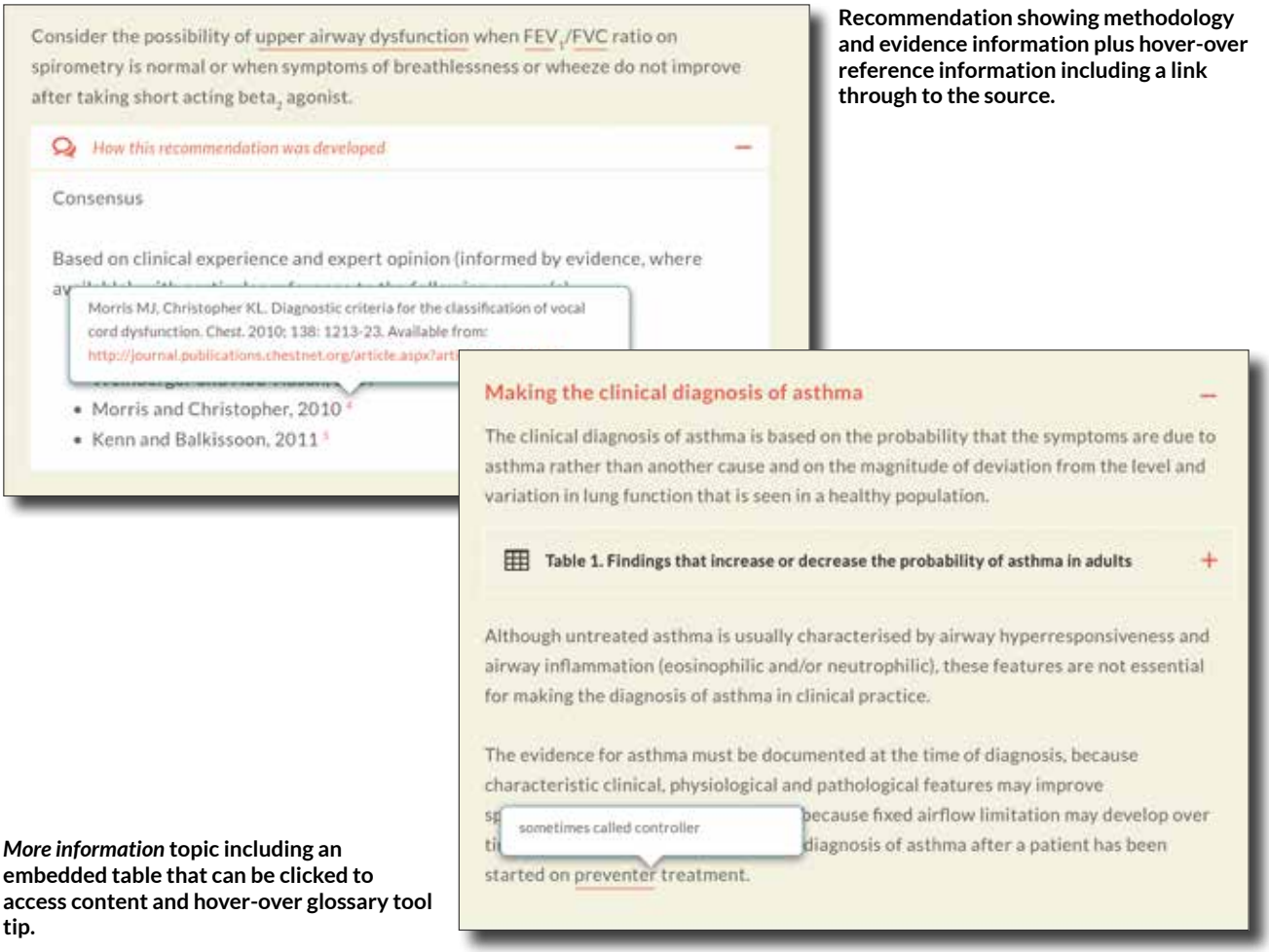
These icons do not necessarily imply the clinical importance of the recommendation; some of our consensus recommendations are just as important as those arising from systematic review results.

The recommendations were developed using standardised methods, including systematic review (for five key clinical questions), consideration of selected evidence, adaptation of existing guidance, and consensus based on best-available evidence and clinical experience.

For more information on the Handbook's methodology, recommendation types and the unique icon system, see the Handbook's Methodology section: **asthmahandbook.org.au/about/methodology**

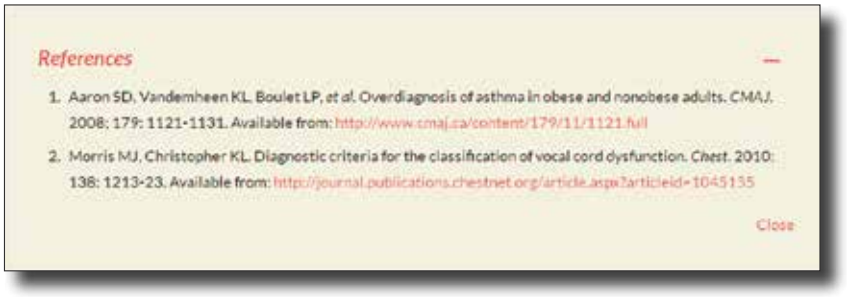
References

The more than 1500 references informing the Handbook are listed by page. The reference details can be accessed directly by hovering over the citation number or from the list at the bottom of each page. Both provide links direct to the source document – often full text versions of journal articles – if publicly available.

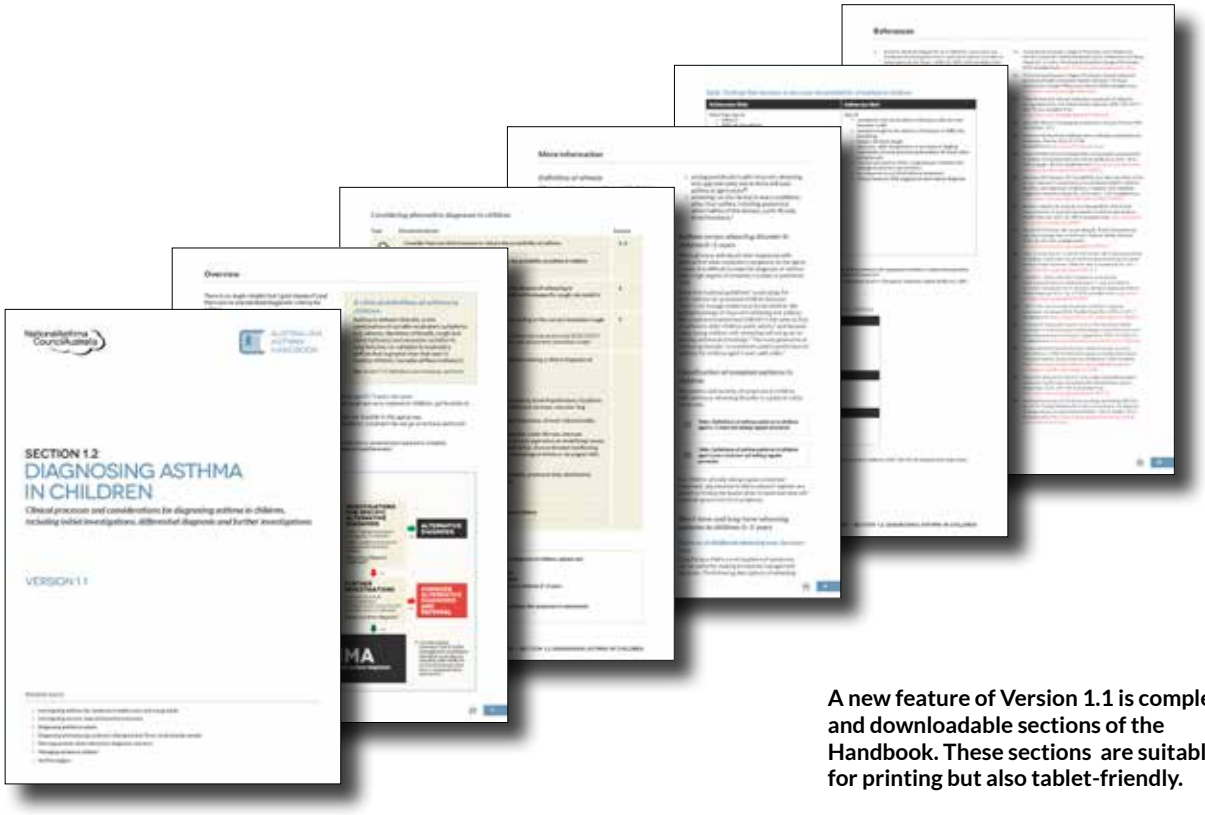


Recommendation showing methodology and evidence information plus hover-over reference information including a link through to the source.

More information **topic including an embedded table that can be clicked to access content and hover-over glossary tool tip.**



Included references are listed at the bottom of each webpage and include a link throughh to the source.



A new feature of Version 1.1 is complete and downloadable sections of the Handbook. These sections are suitable for printing but also tablet-friendly.

More information

Want to find out more?

The Handbook's *More information* topics provide a summary of the best evidence, any other supplementary material and links to references and related resources.

These summaries automatically appear on any page with recommendations about that topic, meaning consistent and comprehensive supporting information is always on hand.

Figures and tables

Much of the Handbook's key advice is laid out in easy-to-read tables and figures that are used regularly around the site. These figures and tables have been designed so they can be copied and/or printed as re-useable and standalone content.

Glossary

Throughout the Handbook, a red underline indicates commonly used terms and acronyms that are explained in hover-over tool tips. A full list of definitions and special terms can also be accessed through the Handbook's Resources section: **asthmahandbook.org.au/resources**

Downloadable section PDFs

For users who prefer a more traditional format, a new feature of Version 1.1 is downloadable PDFs of each Handbook section.

These PDFs can be printed and read like a hard-copy Handbook, but the PDFs are also interactive and fully navigable on a tablet or other portable device, a great option for users who prefer their own copy or have issues accessing the internet.

DEFINITIONS

A WORKING DEFINITION OF ASTHMA

Asthma is a chronic lung disease, which can be controlled but not cured.

In clinical practice, asthma is defined by the presence of both the following:

- excessive variation in lung function ('variable airflow limitation', i.e. variation in expiratory airflow that is greater than that seen in healthy people)
- respiratory symptoms (e.g. wheeze, shortness of breath, cough, chest tightness) that vary over time and may be present or absent at any point in time.

In young children in whom lung function testing is not feasible, including most preschool children, asthma is defined by the presence of variable respiratory symptoms.

Untreated asthma is usually characterised by chronic inflammation involving many cells and cellular elements,[1] airway hyperresponsiveness,[1] and intermittent airway narrowing (due to bronchoconstriction, congestion or oedema of bronchial mucosa, mucus, or a combination of these).

Asthma probably represents a spectrum of conditions with different pathophysiological mechanisms.[2] In older patients, there may be substantial overlap with the features of chronic obstructive pulmonary disease (COPD).

The diagnosis of allergic asthma is more likely when the person also has allergy and a family history of asthma.

Notes

To confirm the diagnosis asthma, it is necessary to demonstrate excessive variation in lung function, i.e. variation in expiratory airflow that is greater than that seen in healthy people (variable airflow limitation) – e.g. by spirometry in adults and in children old enough to perform the test – but it is not necessary to demonstrate airway hyperresponsiveness in a laboratory test or to demonstrate the presence of inflammatory cells in the airway. Respiratory symptoms may be due to many conditions other than asthma, so:

- the diagnosis of asthma is based on the probability that symptoms and clinical findings are due to asthma
- to confirm the diagnosis, lung function testing must be done at a time when the person does not have a respiratory tract infection[3]
- the evidence for variable airflow limitation must be documented at the time of diagnosis
- in young children, especially pre-schoolers (who cannot perform spirometry), it can be difficult to diagnose asthma with certainty.

Sources

1. Global Initiative for Asthma. *Global strategy for asthma management and prevention*. Global Initiative for Asthma, 2012.
2. Anderson GP. Endotyping asthma: new insights into key pathogenic mechanisms in a complex, heterogeneous disease. *Lancet*. 2008; 372: 1107-19.
3. Melbye H, Kongerud J, Vorland L. Reversible airflow limitation in adults with respiratory infection. *Eur Respir J*. 1994; 7: 1239-1245.

ABBREVIATIONS

CFC	chlorofluorocarbon
COPD	chronic obstructive pulmonary disease
ED	emergency department
EIB	exercise-induced bronchoconstriction
FEV_1	forced expiratory volume over one second
FVC	forced vital capacity
ICS	inhaled corticosteroid
ICU	intensive care unit
IgE	Immunoglobulin E
IV	intravenous
LABA	long-acting $beta_2$-adrenergic receptor agonist
NSAIDs	nonsteroidal anti-inflammatory drugs
OCS	oral corticosteroids
PBS	Pharmaceutical Benefits Scheme
PEF	peak expiratory flow
pMDI	pressurised metered-dose inhaler or 'puffer'
SABA	short-acting $beta_2$-adrenergic receptor agonist
TGA	Therapeutic Goods Administration

DEFINITION OF VARIABLE EXPIRATORY 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 FEV_1 (change in FEV_1 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 FEV_1) when measured repeatedly over time (e.g. spirometry on separate visits)
- a clinically important reduction in lung function (decrease in FEV_1 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 FEV_1 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.[1,2] 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 false positives can occur 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 $beta_2$ 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 COPD or in healthy people without either asthma or COPD.[3,4]

Sources

1. Levy ML, Quanjer PH, Booker R, et al. Diagnostic Spirometry in Primary Care: Proposed standards for general practice compliant with American Thoracic Society and European Respiratory Society recommendations. *Prim Care Respir J*. 2009; 18: 130-147.
2. Pellegrino R, Viegi G, Brusasco V, et al. Interpretative strategies for lung function tests. *Eur Respir J*. 2005; 26: 948-968.
3. Collier AM, Pimmel RL, Hasselblad V, et al. Spirometric changes in normal children with upper respiratory infections. *Am Rev Respir Dis*. 1978; 117: 47-53.
4. Melbye H, Kongerud J, Vorland L. Reversible airflow limitation in adults with respiratory infection. *Eur Respir J*. 1994; 7: 1239-1245.

Table. Definitions of ICS dose levels in adults

Inhaled corticosteroids	*Daily dose (mcg)*		
	Low	*Medium*	*High*
Beclomethasone 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

† Dose equivalents for *Qvar* (TGA-registered CFC-free formulation of beclomethasone dipropionate).

*Fluticasone furoate is not available as a low dose. TGA-registered formulations of fluticasone furoate contain a medium or high dose of fluticasone furoate in combination with vilanterol (a long-acting $beta_2$ agonist) and should only be prescribed as one inhalation once daily.

Note: The potency of generic formulations may differ from that of original formulations. Check TGA-approved product information for details

Sources

Respiratory Expert Group, Therapeutic Guidelines Limited. *Therapeutic Guidelines: Respiratory, Version 4*. Therapeutic Guidelines Limited, West Melbourne, 2009.

GlaxoSmithKline Australia Pty Ltd. Product Information: Breo (fluticasone furoate; vilanterol) Ellipta. Therapeutic Goods Administration, Canberra, 2014. Available from: https://www.ebs.tga.gov.au/

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Table. Definitions of ICS dose levels in children

Inhaled corticosteroids	*Daily dose (mcg)*	
	Low	*High*
Beclomethasone dipropionate †	100–200	>200 (up to 400)
Budesonide	200–400	>400 (up to 800)
Ciclesonide ‡	80–160	>160 (up to 320)
Fluticasone propionate	100–200	>200 (up to 500)

† Dose equivalents for *Qvar* (TGA-registered CFC-free formulation of beclomethasone dipropionate).

‡ Ciclesonide is registered for use in children aged 6 and over

Source

van Asperen PP, Mellis CM, Sly PD, Robertson C. *The role of corticosteroids in the management of childhood asthma*. The Thoracic Society of Australia and New Zealand, 2010.

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DIAGNOSIS

DIAGNOSING ASTHMA IN ADULTS

For detailed guidance and information, see asthmahandbook.org.au/diagnosis/adults

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

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.

The diagnosis of asthma in adults is based on:

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

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

Asthma is more likely to explain the symptoms if any of these apply	*Asthma is less likely to explain the symptoms if any of these apply*
More than one of these symptoms: • wheeze • breathlessness • chest tightness • cough	Dizziness, light-headedness, peripheral tingling
Symptoms recurrent or seasonal	Isolated cough with no other respiratory symptoms
Symptoms worse at night or in the early morning	Chronic sputum production
History of allergies (e.g. allergic rhinitis, atopic dermatitis)	No abnormalities on physical examination of chest when symptomatic (over several visits)
Symptoms obviously triggered by exercise, cold air, irritants, medicines (e.g. aspirin or beta blockers), allergies, viral infections, laughter	Change in voice
Family history of asthma or allergies	Symptoms only present during upper respiratory tract infections
Symptoms began in childhood	Heavy smoker (now or in past)
Widespread wheeze audible on chest auscultation	Cardiovascular disease
FEV_1 or PEF lower than predicted, without other explanation	Normal spirometry or PEF when symptomatic (despite repeated tests)
Eosinophilia or raised blood IgE level, without other explanation	
Symptoms rapidly relieved by a SABA bronchodilator	

Adapted from:

Respiratory Expert Group, Therapeutic Guidelines Limited. *Therapeutic Guidelines: Respiratory, Version 4*. Therapeutic Guidelines Limited, Melbourne, 2009.

British Thoracic Society (BTS) Scottish Intercollegiate Guidelines Network (SIGN). *British Guideline on the Management of Asthma. A national clinical guideline.* BTS, SIGN, Edinburgh; 2012.

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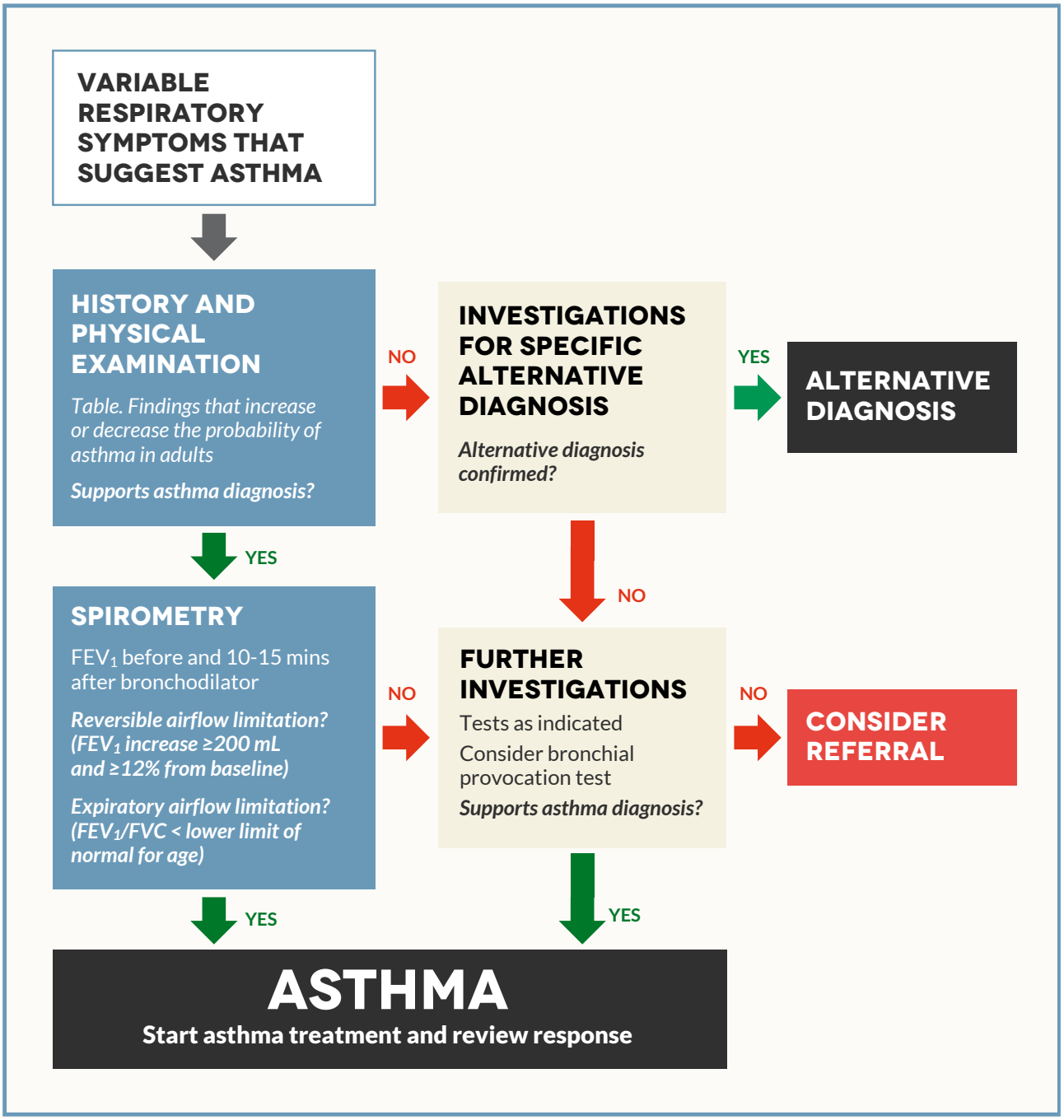
Figure. Steps in the diagnosis of asthma in adults



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DIAGNOSING ASTHMA IN CHILDREN

For detailed guidance and information, see asthmahandbook.org.au/diagnosis/children

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

The clinical diagnosis of asthma in children involves the consideration of:

- history of recurrent or persistent wheeze
- presence of allergies or family history of asthma and allergies
- absence of physical findings that suggest an alternative diagnosis
- tests that support the diagnosis (e.g. spirometry in children able to perform the test)
- a consistent clinical response to an inhaled bronchodilator or preventer.

It can be difficult to diagnose asthma with certainty in children aged 0–5 years, because:

- episodic respiratory symptoms such as wheezing and cough are very common in children, particularly in children under 3 years
- objective lung function testing by spirometry is usually not feasible in this age group
- a high proportion of children who respond to bronchodilator treatment do not go on to have asthma in later childhood (e.g. by primary school age).

⚠ **A diagnosis of asthma should not be made if cough is the only or predominant respiratory symptom and there are no signs of airflow limitation (e.g. wheeze or breathlessness).**

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

Asthma more likely	*Asthma less likely*
More than one of: • wheeze • difficulty breathing • feeling of tightness in the chest • cough	Any of: • symptoms only occur when child has a cold, but not between colds • isolated cough in the absence of wheeze or difficulty breathing • history of moist cough • dizziness, light-headedness or peripheral tingling • repeatedly normal physical examination of chest when symptomatic • normal spirometry when symptomatic (children old enough to perform spirometry) • no response to a trial of asthma treatment • clinical features that suggest an alternative diagnosis
AND	
Any of: • symptoms recur frequently • symptoms worse at night and in the early morning • symptoms triggered by exercise, exposure to pets, cold air, damp air, emotions, laughing • symptoms occur when child doesn't have a cold • history of allergies (e.g. allergic rhinitis, atopic dermatitis) • family history of allergies • family history of asthma • widespread wheeze heard on auscultation • symptoms respond to treatment trial of reliever, with or without a preventer • lung function measured by spirometry increases in response to rapid-acting bronchodilator • lung function measured by spirometry increases in response to a treatment trial with inhaled corticosteroid (where indicated)	

Sources

British Thoracic Society (BTS), Scottish Intercollegiate Guidelines Network (SIGN). *British Guideline on the management of Asthma. A national clinical guideline.* BTS, SIGN, Edinburgh, 2012.

Respiratory Expert Group, Therapeutic Guidelines Limited. *Therapeutic Guidelines: Respiratory, Version 4.* Therapeutic Guidelines Limited, Melbourne, 2009.

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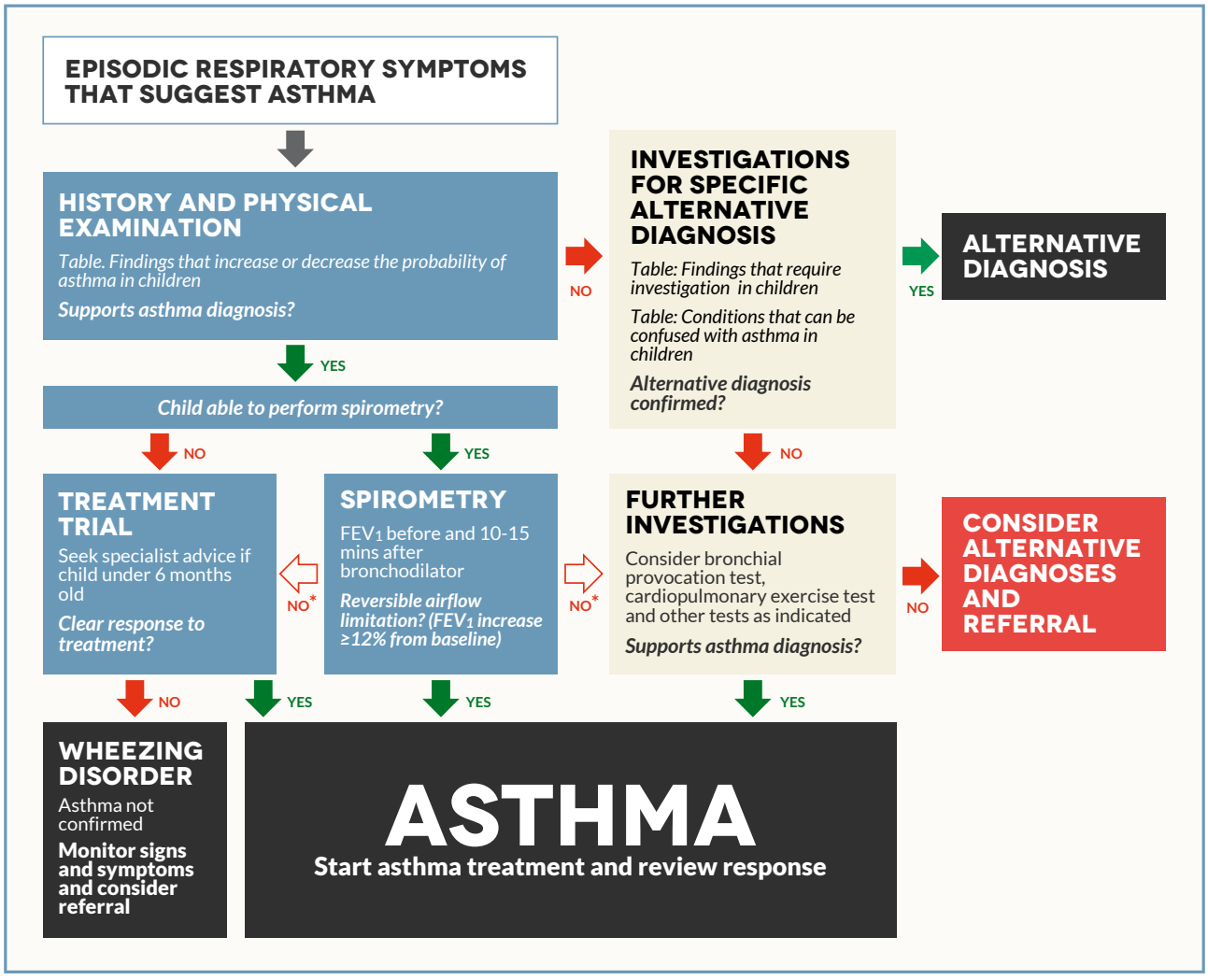
Figure. Steps in the diagnosis of asthma in children



* Consider options (treatment trial or further investigations) according to individual circumstances, including child's ability to do bronchial provocation test or cardiopulmonary exercise test.

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Table. Findings that require investigation in children

Finding	*Notes*
Persistent cough that is not associated with wheeze/breathlessness or systemic disease	Unlikely to be due to asthma
Onset of signs from birth or very early in life	Suggests cystic fibrosis, chronic lung disease of prematurity, primary ciliary dyskinesia, bronchopulmonary dysplasia, congenital abnormality
Family history of unusual chest disease	Should be enquired about before attributing all the signs and symptoms to asthma
Severe upper respiratory tract disease (e.g. severe rhinitis, enlarged tonsils and adenoids or nasal polyps)	Specialist assessment should be considered
Crepitations on chest auscultation that do not clear on coughing	Suggest a serious lower respiratory tract condition such as pneumonia, atelectasis, bronchiectasis
Unilateral wheeze	Suggests inhaled foreign body
Systemic symptoms (e.g. fever, weight loss, failure to thrive)	Suggest an alternative systemic disorder
Feeding difficulties, including choking or vomiting	Suggests aspiration – specialist assessment should be considered
Inspiratory upper airway noises (e.g. stridor, snoring)	Acute stridor suggests tracheobronchitis (croup)
Persistent voice abnormality	Suggests upper airway disorder
Finger clubbing	Suggests cystic fibrosis, bronchiectasis
Chronic (>4 weeks) wet or productive cough	Suggests cystic fibrosis, bronchiectasis, chronic bronchitis, recurrent aspiration, immune abnormality, ciliary dyskinesia
Focal (localised) lung signs	Suggests pneumonia
Nasal polyps in child under 5 years old	Suggests cystic fibrosis
Severe chest deformity	Harrison's Sulcus and Pectus Carinatum can be due to uncontrolled asthma, but severe deformity suggests an alternative diagnosis
Obvious breathing difficulty, especially at rest or at night	Specialist assessment should be considered
Recurrent pneumonia	Specialist assessment should be considered

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Table. Conditions that can be confused with asthma in children

Conditions characterised by cough
Pertussis (whooping cough) Cystic fibrosis Airway abnormalities (e.g. tracheomalacia, bronchomalacia) Protracted bacterial bronchitis in young children Habit-cough syndrome
Conditions characterised by wheezing
Upper airway dysfunction Inhaled foreign body causing partial airway obstruction Tracheomalacia
Conditions characterised by difficulty breathing
Hyperventilation Anxiety Breathlessness on exertion due to poor cardiopulmonary fitness

Source

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

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MANAGEMENT

MANAGING ASTHMA IN ADULTS

For detailed guidance and information, see asthmahandbook.org.au/management/adults

Asthma management in adults is based on:

- confirming the diagnosis
- assessing asthma control (recent asthma symptom control and risk factors)
- identifying management goals in collaboration with the patient
- choosing initial treatment appropriate to recent asthma symptom control, risk factors and patient preference
- reviewing and adjusting drug treatment periodically (see *Figure: Stepped approach to adjusting asthma medication in adults*)
- providing information, skills and tools for self-management, including:
  - training in correct inhaler technique
  - information and support to maximise adherence
  - a written asthma action plan
  - information about avoiding triggers, where appropriate
- managing flare-ups when they occur
- managing comorbid conditions that affect asthma or contribute to respiratory symptoms
- providing advice about smoking, healthy eating, physical activity, healthy weight and immunisation.

Classification of asthma severity and recent asthma symptom control in adults

Recent asthma symptom control

Recent asthma symptom control in adults is defined by frequency of symptoms, the degree to which symptoms affect sleep and activity, and the need for reliever medication over the previous 4 weeks.

Recent asthma symptom control is a component of overall asthma control. The other component is the risk of future events (e.g. flare-ups, life-threatening asthma, accelerated decline in lung function, or adverse effects of treatment).

Any experience of flare-ups or night-time waking due to asthma symptoms, even if infrequent, usually indicates that the person needs regular preventer treatment.

Severity

Severity of asthma in adults is defined by the type and amount of treatment needed to maintain good control, not by the severity of acute flare-ups.

For patients prescribed a preventer, asthma severity can only be determined after using a preventer for at least 8 weeks and after checking adherence and inhaler technique.

Table. Definition of levels of recent asthma symptom control in adults and adolescents (regardless of current treatment regimen)

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

† Not including SABA taken prophylactically before exercise. (Record this separately and take into account when assessing management.)

Note: Recent asthma symptom control is based on symptoms over the previous 4 weeks.

Source

Adapted from Global Initiative for Asthma (GINA). *Global strategy for asthma management and prevention*. GINA; 2012.

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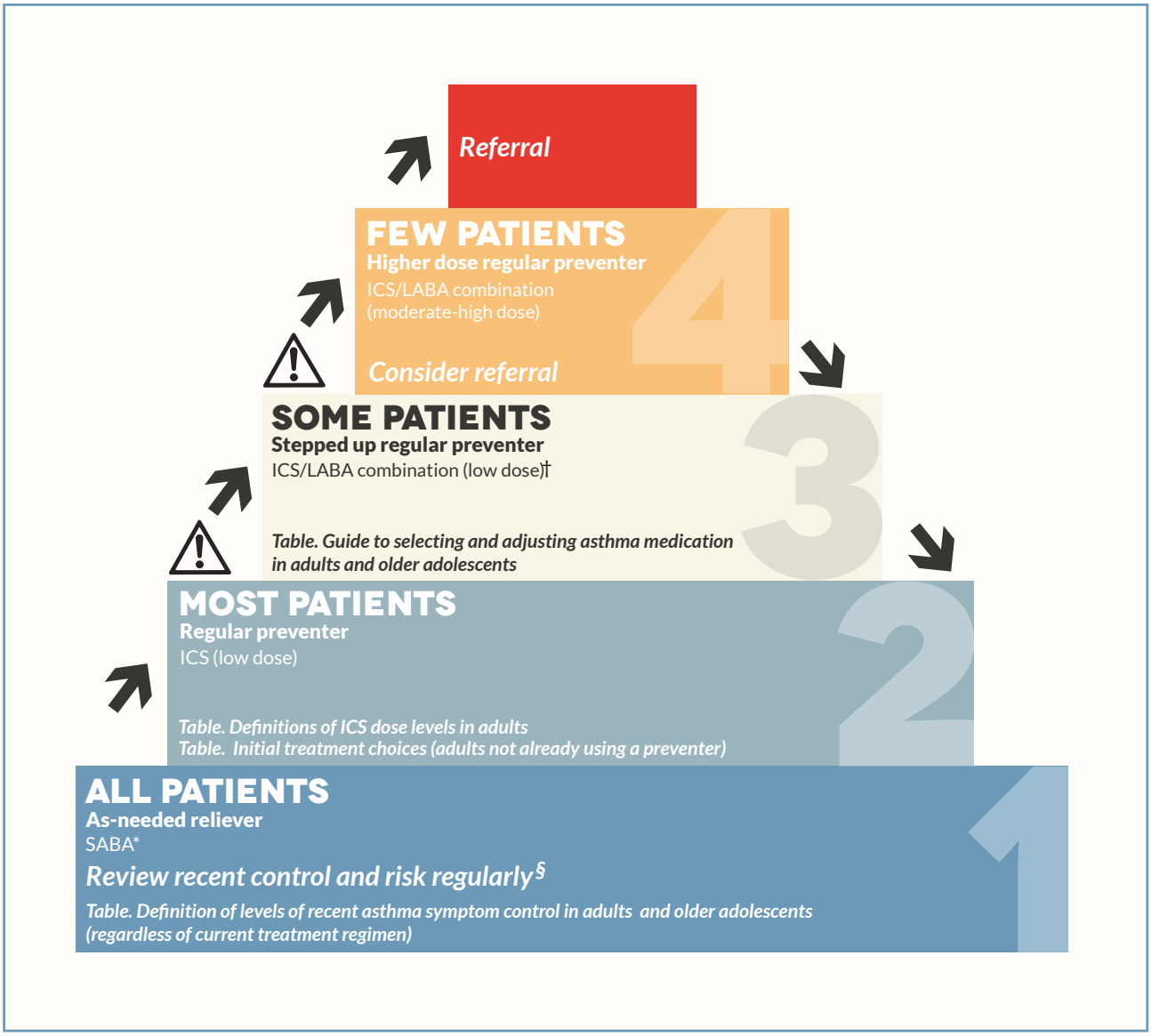
Figure. Stepped approach to adjusting asthma medication in adults



⚠	Before considering stepping up, check symptoms are due to asthma, inhaler technique is correct, and adherence is adequate
↗	Consider stepping up if good control is not achieved.
↘	When asthma is stable and well controlled for 2–3 months, consider stepping down (e.g. reducing inhaled corticosteroid dose, or stopping long-acting beta$_2$ agonist if inhaled corticosteroid dose is already low).

* Or low-dose budesonide/eformoterol combination for patients using this combination as both maintenance and reliever.

§ In addition, manage flare-ups with extra treatment when they occur, and manage exercise-related asthma symptoms as indicated.

† Montelukast can be added to inhaled corticosteroid as an alternative to switching to ICS/LABA, but is less effective.

Note: Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.

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Table. Initial treatment choices (adults not already using a preventer)

Clinical situation	*Suggested starting regimen †*	*Alternative options and notes*
Symptoms less than twice per month and no flare-up that required oral corticosteroids within previous 12 months	SABA as needed	
Symptoms twice per month or more	Regular ICS starting at a low dose (plus SABA as needed)	Montelukast‡ Cromones§
Waking due to asthma symptoms at least once during the past month	Regular ICS starting at a low dose (plus SABA as needed)	If patient also has frequent daytime symptoms consider either of: • medium- to high-dose ICS (plus SABA as needed) • (private prescription) combination ICS/LABA‡
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)	Regular ICS starting at a low dose (plus SABA as needed)	
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)	Regular ICS starting at a low dose (plus SABA as needed) ⚠ Monitor frequently	
Patient not currently taking a preventer whose symptoms are severely uncontrolled or very troublesome	Regular ICS (plus SABA as needed) For very uncontrolled asthma at presentation (e.g. frequent night waking, low lung function), consider (either of): • high-dose ICS (then down-titrate when symptoms improve) • a short course of oral corticosteroids in addition to ICS	Consider (private prescription) combination ICS/LABA‡

† 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; ‡ Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.

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Table. Guide to selecting and adjusting asthma medication for adults and older adolescents

Clinical situation	*Action*
Newly diagnosed asthma	Consider low-dose ICS (plus SABA as needed) If symptoms severe at initial presentation, consider one of: • ICS plus a short course of oral corticosteroids • a short initial period of high-dose ICS then step down • (private prescription) combination ICS/LABA†
Good recent asthma symptom control	If maintained 2–3 months, no flare-up in previous 12 months and low risk for flare-ups, step down where possible (unless already on low-dose ICS).
Partial recent asthma symptom control	Review inhaler technique and adherence – correct if suboptimal If no improvement, consider increasing treatment by one step and reviewing (if still no improvement, return to previous step, review diagnosis and consider referral)
Poor recent asthma symptom control	Review inhaler technique and adherence – correct if suboptimal Confirm that symptoms are likely to be due to asthma Consider increasing treatment until good asthma control is achieved, then step down again when possible
Difficult-to-treat asthma ‡	Consider referral for assessment or add-on options
Patient with risk factors §	Tailor treatment to reduce individual risk factors

† Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications; ‡ Poor recent asthma symptom control despite ICS/LABA combination at high–medium dose with good adherence and inhaler technique; § Risk factors for asthma events or adverse treatment effects, irrespective of level of recent asthma symptom control.

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Table. Risk factors for adverse asthma outcomes in adults and adolescents

	Medical history	*Investigation findings*	*Other factors*
Factors associated with increased risk of flare-ups	Poor asthma control Any asthma flare-up during the previous 12 months Other concurrent chronic lung disease	Poor lung function (even if few symptoms) Peripheral blood eosinophilia (suggests eosinophilic airway inflammation) Difficulty perceiving airflow limitation or the severity of exacerbations	Exposure to cigarette smoke (smoking or environmental exposure) Socioeconomic disadvantage Use of illegal substances Major psychosocial problems Mental illness
Factors associated with increased risk of life-threatening asthma	Intubation or admission to intensive care unit due to asthma (ever) 2 or more hospitalisations for asthma in past year 3 or more ED visits for asthma in the past year Hospitalisation or ED visit for asthma in the past month High short-acting $beta_2$ agonist use (>2 canisters per month) History of delayed presentation to hospital during flare-ups History of sudden-onset acute asthma Cardiovascular disease	Sensitivity to unavoidable allergens (e.g. *Alternaria* species of common moulds)	Inadequate treatment Experience of side-effects of OCS use (may contribute to under-treatment or delayed presentation to hospital during flare-ups) Lack of written asthma action plan Socioeconomic disadvantage Living alone Mental illness Use of alcohol or illegal substances Poor access to health care (e.g. rural/remote region)
Factors associated with accelerated decline in lung function	Chronic mucus hypersecretion Severe asthma flare-up in a patient not taking ICS	Poor lung function Peripheral blood eosinophilia (suggests eosinophilic airway inflammation)	Exposure to cigarette smoke (smoking or environmental exposure) Occupational asthma
Factors associated with treatment-related adverse events	Long-term high-dose ICS Frequent use of OCS		Anxiety disorder (due to increased sensitivity to asthma symptoms and reluctance to reduce ICS dose when asthma well controlled) Euphoria with OCS use

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Table. Management of risk factors for adverse asthma outcomes in adults

Risk factor	*Clinical action †*
Any risk factor for flare-ups	Check patient has an appropriate action plan Carefully check inhaler technique and adherence, and identify any barriers to good adherence Review frequently (e.g. every 3 months)
Hospitalisation or ED visit for asthma or any asthma flare-up during the previous 12 months	Ask about triggers for flare-ups, and lead time
History of intubation or intensive care unit admission for asthma	Ensure action plan recommends early medical review when asthma worsens
Hospitalisation or ED visit for asthma in the past month	Emphasise importance of maintaining regular ICS use after symptoms improve Confirm that patient has resumed using SABA only when needed for symptoms
High SABA use (>2 canisters per month)	Check lung function If SABA use appears to be habitual, investigate causes and consider alternative strategies, e.g. short-term substitution of ipratropium for SABA
Long-term high-dose ICS	Consider gradual reduction of ICS dose if symptoms stable Monitor regularly (e.g. assessment of bone density, regular eye examinations) For local side-effects, ensure inhaler technique is appropriate
Poor lung function (even if few symptoms)	Consider 3-month trial of higher ICS dose, then recheck lung function Consider referral for detailed specialist investigation
Sensitivity to unavoidable allergens (e.g.* Alternaria *species of common moulds)	Refer for further investigation and management
Exposure to cigarette smoke (smoking or environmental exposure)	Emphasise the importance of avoiding smoke Provide quitting strategies Consider increasing ICS dose (higher dose of ICS likely to be necessary to control asthma) Refer for assessment of asthma–COPD overlap
Difficulty perceiving airflow limitation or the severity of exacerbations	Regular PEF monitoring Action plan should recommend early review and measurement of lung function
No current written asthma action plan	Provide and explain written asthma action plan

† In addition to actions applicable to all risk factors

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Table. Options for adjusting medicines in a written asthma action plan for adults

Usual treatment		*Options for adjustments when asthma worsening*	
		Option 1	*Option 2 **
Any treatment (applies to all regimens)		Increase reliever as needed in response to symptoms	N/A
Short-acting beta$_2$ agonist reliever only (no preventer)		If symptoms continue to worsen, start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days)	Start regular ICS-containing preventer treatment, and continue for at least 2–4 weeks Ensure patient knows how to use the inhaler correctly
ICS-only preventer		Increase dose early (e.g. multiply dose by 4) for 7–14 days §	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual dose of ICS
ICS/LABA combination	*Budesonide/eformoterol* (Symbicort) *maintenance-and-reliever regimen*	Take extra doses of budesonide/eformoterol as needed to relieve symptoms, up to a maximum of 72 mcg eformoterol per day (12 actuations of 100/6 mcg or 200/6 mcg via dry-powder inhaler or 24 actuations of 50/3 mcg or 100/3 mcg via pressurised metered-dose inhaler per day) No more than 6 actuations at one time	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual budesonide/eformoterol regimen
	Budesonide/eformoterol (Symbicort) *conventional maintenance regimen*	Increase dose of budesonide/eformoterol up to a maximum of 72 mcg eformoterol daily for 7–14 days	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual dose of budesonide/eformoterol
	Fluticasone furoate/vilanterol (Breo)	If using medium dose (100/25 mcg): Replace with highest strength formulation of same medicine (fluticasone furoate/vilanterol 200/25 mcg one inhalation once daily) for 7–14 days	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual dose of fluticasone furoate/vilanterol
	Fluticasone propionate/eformoterol (Flutiform)	If using 50/5 mcg: Replace with highest strength formulation of same medicine (fluticasone propionate/eformoterol 250/10 mcg) for 7–14 days If using 125/5 mcg: Increase dose (e.g. multiply dose by 2) to achieve equivalent of highest strength formulation of same medicine (fluticasone propionate/eformoterol 250/10 mcg) for 7–14 days If using 250/10 mcg: Increase ICS dose (e.g. multiply ICS dose by 4) by adding a separate fluticasone propionate inhaler for 7–14 days §	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual dose of fluticasone propionate/eformoterol
	Fluticasone propionate/salmeterol (Seretide)	Increase ICS dose (e.g. multiply ICS dose by 4 †) by adding a separate fluticasone propionate inhaler for 7–14 days § Increase fluticasone propionate/salmeterol if necessary to achieve total daily dose of salmeterol 100 mcg	Start short course prednisone (e.g. 37.5–50 mg each morning for 5–10 days) in addition to usual dose of fluticasone propionate/salmeterol

* Second-line options for clinicians to consider when writing instructions for patients. The individual's written asthma action plan should contain only one clear action for each situation.

† Increase only the fluticasone propionate dose (e.g. by prescribing a separate fluticasone propionate inhaler for 7–14 days in addition to the combination inhaler). The salmeterol dose should not be increased above 100 mcg/day.

§ This option may be preferred over oral corticosteroids for patients who experience significant mood effects or other significant side-effects (e.g. hyperglycaemia) with oral corticosteroids. It is unsuitable for patients who cannot tolerate increased risk of dysphonia (e.g. singers, actors, teachers) or who cannot afford an additional inhaler.

Notes

The table provides options for adjustments the patient can make when asthma is getting worse (needing more reliever than usual, waking up with asthma, more symptoms than usual, asthma is interfering with usual activities, or when the use of reliever is not achieving rapid relief from symptoms). After choosing the most suitable strategies for the individual, the clinician should translate these into clear, easy-to-follow instructions in the person's written asthma action plan.

For some preventer formulations, the suggested option may result in doses above those recommended in TGA-approved product information. If high doses are needed, they should be continued for only 7–14 days then reduced.

Templates for written asthma action plans (including templates designed for people using various preventer regimens) are available from the National Asthma Council Australia.

Sources

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MANAGING ASTHMA IN CHILDREN

For detailed guidance and information, see asthmahandbook.org.au/management/children

The management of asthma and wheezing disorders in children is based on:

- confirming the diagnosis
- assessing the pattern of symptoms (including frequency of episodes and pattern of symptoms between episodes)
- assessing triggers
- discussing the goals of management with the child's parents and the child (depending on age)
- choosing initial treatment based on the child's age and pattern of symptoms
- reviewing and adjusting treatment periodically based on recent asthma symptom control and risk factors (see *Figure. Stepped approach to adjusting asthma medication in children*)
- managing comorbid conditions that affect asthma (e.g. allergic rhinitis)
- providing parents and children with information and skills to manage their asthma, including:
  - a written asthma action plan
  - information about avoiding triggers, where appropriate
  - training in correct use of medicines, including inhaler technique
  - information and support to maximise adherence
- managing flare-ups when they occur
- providing advice about avoidance of tobacco smoke, healthy eating, physical activity, healthy weight and immunisation.

In children, initial treatment after making the diagnosis of asthma is guided by the pattern and severity of asthma symptoms. The aims of asthma management are to ensure that the child's asthma has been correctly diagnosed, and to enable the child to maintain a normal quality of life without interference from asthma or the side effects of asthma treatment.

For children already taking regular preventer treatment, adjustments to the treatment regimen are based on finding the lowest dose of medicines that will maintain good control of symptoms and prevent flare-ups.

Classification of recent asthma symptom control in children

Ongoing review of asthma involves both assessing recent asthma symptom control and assessing risks for poor asthma outcomes (e.g. flare-ups, adverse effects of medicines).

Recent asthma symptom control is assessed according to the frequency of asthma symptoms over the previous 4 weeks.

Table. Definition of levels of recent asthma symptom control in children (regardless of current treatment regimen)

Good control	*Partial control*	*Poor control*
All of: • Daytime symptoms† ≤2 days per week (lasting only a few minutes and rapidly relieved by rapid-acting bronchodilator) • No limitation of activities‡ • No symptoms§ during night or when wakes up • Need for reliever# ≤2 days per week	Any of: • Daytime symptoms† >2 days per week (lasting only a few minutes and rapidly relieved by rapid-acting bronchodilator) • Any limitation of activities* • Any symptoms during night or when wakes up†† • Need for reliever# >2 days per week	Either of: • Daytime symptoms† >2 days per week (lasting from minutes to hours or recurring, and partially or fully relieved by rapid-acting bronchodilator) • ≥3 features of partial control within the same week

† E.g. wheezing or breathing problems; ‡ Child is fully active; runs and plays without symptoms; § Including no coughing during sleep; # Not including short-acting beta$_2$ agonist taken prophylactically before exercise. (Record this separately and take into account when assessing management.); * E.g. wheeze or breathlessness during exercise, vigorous play or laughing; †† E.g. waking with symptoms of wheezing or breathing problems

Note: Recent asthma control is based on symptoms over the previous 4 weeks. Each child's risk factors for future asthma outcomes should also be assessed and taken into account in management..

Adapted from: Global Initiative for Asthma (GINA), *Global strategy for the diagnosis and management of asthma in children 5 years and younger*. GINA; 2009

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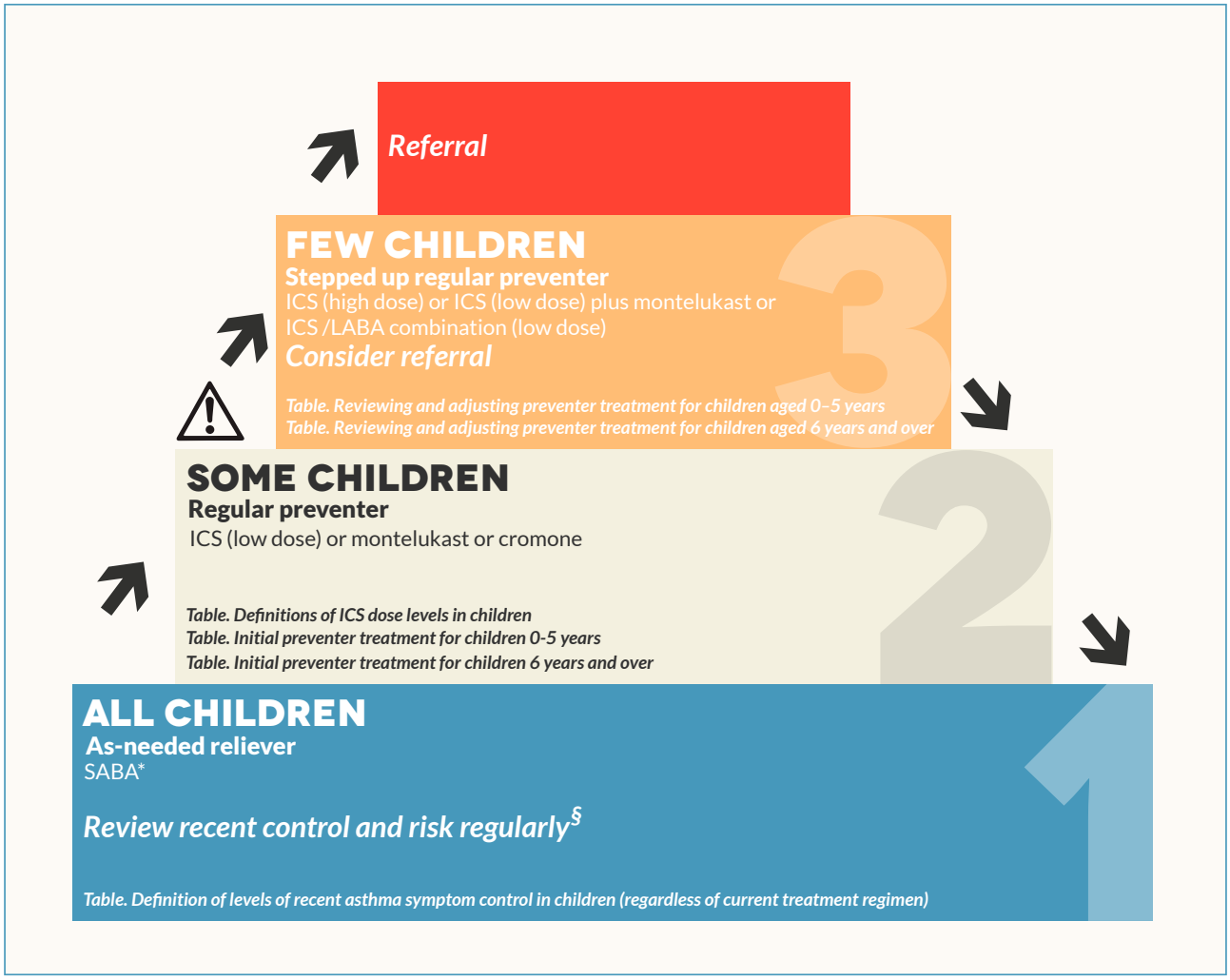
Figure. Stepped approach to adjusting asthma medication in children



⚠	Before considering stepping up, check symptoms are due to asthma, inhaler technique is correct, and adherence is adequate.
↗	Consider stepping up if good control is not achieved.
↘	When asthma is stable and well controlled for more than 3 months, consider stepping down (e.g. reducing inhaled corticosteroid dose to low).

*Or low-dose budesonide/eformoterol combination, only for children aged 12 years or over who are using this combination as both maintenance and reliever.

§ In addition, manage flare-ups with extra treatment when they occur, and manage exercise-related asthma symptoms as indicated.

Note: Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.
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Table. Definitions of asthma patterns in children aged 0–5 years not taking regular preventer

Category		*Pattern and intensity of symptoms (when not taking regular treatment)*
Infrequent intermittent asthma		Symptom-free for at least 6 weeks at a time (flare-ups up to once every 6 weeks on average but no symptoms between flare-ups)
Frequent intermittent asthma		Flare-ups more than once every 6 weeks on average but no symptoms between flare-ups
Persistent asthma	*Mild*	At least one of: • Daytime symptoms† more than once per week but not every day • Night-time symptoms† more than twice per month but not every week
	Moderate	Any of: • Daytime symptoms† daily • Night-time symptoms† more than once per week • Symptoms sometimes restrict activity or sleep
	Severe	Any of: • Daytime symptoms† continual • Night-time symptoms† frequent • Flare-ups frequent • Symptoms frequently restrict activity or sleep

† Symptoms between flare-ups. A flare-up is defined as a period of worsening asthma symptoms, from mild (e.g. symptoms that are just outside the normal range of variation for the child, documented when well) to severe (e.g. events that require urgent action by parents and health professionals to prevent a serious outcome such as hospitalisation or death from asthma).

Note: Use this table when the diagnosis of asthma can be made with reasonable confidence (e.g. a child with wheezing accompanied by persistent cough or breathing difficulty, no signs or symptoms that suggest a potentially serious alternative diagnosis, and the presence of other factors that increase the probability of asthma such as family history of allergies or asthma).

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Table. Definitions of asthma patterns in children aged 6 years and over not taking regular preventer

Category		*Pattern and intensity of symptoms (when not taking regular treatment)*
Infrequent intermittent asthma †		Symptom-free for at least 6 weeks at a time (flare-ups up to once every 6 weeks on average but no symptoms between flare-ups)
Frequent intermittent asthma		Flare-ups more than once every 6 weeks on average but no symptoms between flare-ups
Persistent asthma	*Mild*	FEV_1 ≥80% predicted and at least one of: • Daytime symptoms‡ more than once per week but not every day • Night-time symptoms‡ more than twice per month but not every week
	Moderate	Any of: • FEV_1 <80% predicted‡ • Daytime symptoms‡ daily • Night-time symptoms‡ more than once per week • Symptoms sometimes restrict activity or sleep
	Severe	Any of: • FEV_1 ≤60% predicted‡ • Daytime symptoms‡ continual • Night-time symptoms‡ frequent • Flare-ups frequent • Symptoms frequently restrict activity or sleep

† It may not be appropriate to make the diagnosis of asthma in children aged 6 or older who wheeze only during upper respiratory tract infections. These children can be considered to have episodic (viral) wheeze.

‡ Symptoms between flare-ups. A flare-up is defined as a period of worsening asthma symptoms, from mild (e.g. symptoms that are just outside the normal range of variation for the child, documented when well) to severe (e.g. events that require urgent action by parents and health professionals to prevent a serious outcome such as hospitalisation or death from asthma).

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Table. Initial preventer treatment for children aged 0–5 years

Age	Pattern of symptoms	Management options and notes*
0–12 months	*Intermittent asthma* OR *Viral-induced wheeze*	Regular preventer treatment is not recommended
	Multiple-trigger wheeze	Refer for specialist assessment or obtain specialist advice before prescribing
1–2 years	*Intermittent asthma* OR *Viral-induced wheeze*	Regular preventer treatment is not recommended
	Persistent asthma OR *Multiple-trigger wheeze*	Consider a treatment trial with sodium cromoglycate 10 mg three times daily and review response in 2–4 weeks† Consider a treatment trial of low-dose inhaled corticosteroids only if wheezing symptoms are disrupting child's sleeping or play; review response in 4 weeks
2–5 years	*Infrequent intermittent asthma* OR *Viral-induced wheeze*	Regular preventer treatment is not recommended
	Frequent intermittent asthma OR *Mild persistent asthma* OR *Episodic (viral) wheeze with frequent symptoms* OR *Multiple-trigger wheeze*	Consider regular treatment with montelukast 4 mg once daily and review response in 2–4 weeks If symptoms do not respond, consider regular treatment with a low dose of an inhaled corticosteroid and review response in 4 weeks
	Moderate–severe persistent asthma OR *Moderate–severe multiple-trigger wheeze*	Consider regular treatment with a low dose of an inhaled corticosteroid and review response in 4 weeks

* In addition to use of rapid-onset inhaled beta$_2$ agonist when child experiences difficulty breathing; † Starting dose sodium cromoglycate 10 mg (two inhalations of 5 mg/actuation inhaler) three times daily. If good response, reduce to 10 mg twice daily when stable. Note: Cromone inhaler device mouthpieces require daily washing to avoid blocking.

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Table. Initial preventer treatment for children aged 6 years and over

Pattern of symptoms*	Management options and notes †
Infrequent intermittent asthma ‡	Regular preventer treatment is not recommended
Frequent intermittent asthma	Consider a treatment trial with montelukast 5 mg once daily; assess response after 2–4 weeks **Note**: a cromone (sodium cromoglycate or nedocromil) can be trialled as an alternative §
Mild persistent asthma	Consider a treatment trial with montelukast 5 mg once daily; assess response after 2–4 weeks If inadequate response after checking adherence, consider treatment trial with inhaled corticosteroid (low dose) **Note**: a cromone (sodium cromoglycate or nedocromil) can be trialled as an alternative§
Moderate-to-severe persistent asthma	Consider a treatment trial with regular inhaled corticosteroid (low dose); assess response after 4 weeks

* Pattern of symptoms when not taking regular preventer treatment; † In addition to use of rapid-onset inhaled beta$_2$ agonist when child experiences difficulty breathing; ‡ Also applies to children who wheeze only during upper respiratory tract infections and do not have a diagnosis of asthma; § E.g. sodium cromoglycate 5 mg/actuation; 10 mg (two inhalations) three times daily, then 10 mg twice daily when stable. Note: Cromone inhaler device mouthpieces require daily washing to avoid blocking

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Table. Reviewing and adjusting preventer treatment for children aged 0–5 years

Initial treatment	*When to schedule review*	*Management options and notes*	
		Treatment response	*No treatment response †*
Montelukast (children 2 years and over)	2–4 weeks	Continue montelukast treatment	Stop montelukast and start treatment with an inhaled corticosteroid, starting with a low dose
Inhaled corticosteroid (low dose)	4 weeks	Continue regular treatment at low dose After ≥ 3 months, consider stopping treatment and reviewing in 4 weeks	Review the diagnosis, adherence and inhaler technique Consider referral to a specialist (e.g. paediatric respiratory physician or paediatrician, if available) for assessment Consider adding montelukast (in combination with inhaled corticosteroid)‡

† Symptom control not achieved with initial treatment after verifying treatment was taken as intended

‡ Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.

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Table. Reviewing and adjusting preventer treatment for children aged 6 years and over

Initial treatment	*When to schedule review*	*Management options and notes*	
		Treatment response (symptoms well controlled)	*No or partial response †*
Montelukast or cromones	2–4 weeks	Continue treatment Set review date (e.g. 3 months)	Stop treatment and start treatment with an inhaled corticosteroid, starting with a low dose
Inhaled corticosteroid (low dose)	4 weeks	Continue regular treatment at low dose Set review date (e.g. 3 months)	Consider one of the following options:‡ • Add montelukast in addition to inhaled corticosteroid (children 6–14 years)§ • Increase the dose of inhaled corticosteroid; reassess in 2–4 weeks • Switch to combination long-acting $beta_2$agonist/ inhaled corticosteroid

† Symptom control not achieved with initial treatment after verifying treatment was taken as intended

‡ Before considering a change in the treatment regimen:
- review the diagnosis, adherence and inhaler technique
- consider referral to a specialist (e.g. paediatric respiratory physician or paediatrician, if available) for assessment.

§ Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.

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INHALER DEVICES AND TECHNIQUE

For detailed guidance and information, see asthmahandbook.org.au/management/devices

There are three main types of inhalers for asthma and COPD medicines:

- standard pressurised metered-dose inhalers
- breath-activated pressurised metered-dose inhalers
- dry powder inhalers.

The correct inhaler technique depends on the device.

Adherence

Check the *Australian Asthma Handbook* website for more information on assessing and maximising patients' adherence to asthma treatment.

asthmahandbook.org.au/management/adherence

Table. Considerations for choice of inhaler device type when prescribing inhaled medicines

Clinical situation	*Consideration*
All patients	Recommend use of spacer when using reliever for acute asthma
Any patient using a pMDI for an inhaled corticosteroid	Recommend use of a spacer every time
Infants and small children	Use a facemask with a spacer
Poor manual dexterity (e.g. weak hands or osteoarthritis)	Consider a *Haleraid* device with pMDI, or a breath-activated inhaler
Difficulty connecting spacer to pMDI (e.g. elderly patient with weakness or poor coordination)	Consider a breath-activated inhaler
Inability to form a good seal around the mouthpiece of the inhaler or spacer (e.g. person with cognitive impairment)	Consider a spacer plus age-appropriate facemask
Difficulty speaking or reading English	Use an interpreter or provide written instructions in the person's first language
Using multiple inhalers	Choose the same type for each medicine, if possible, to avoid confusion If not possible, train person in the correct inhaler technique for each of their devices

Source

National Asthma Council Australia. *Inhaler technique in adults with asthma or COPD. An information paper for health professionals.* Melbourne: NAC; 2008.

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Table. Types of inhaler devices for delivering asthma medicines

Design type	*Brand name*	*Common medicines used with this type of inhaler*
Standard pMDI	Generic inhaler used alone or with a spacer	**Relievers** *Airomir* (salbutamol) *APO-Salbutamol* (salbutamol) *Asmol* (salbutamol) *Ventolin* (salbutamol) *Symbicort* (budesonide plus eformoterol) via *Rapihaler* when used in a maintenance-and-reliever regimen
		Preventers *Alvesco* (ciclesonide) *Flixotide* (fluticasone propionate) *Flutiform* (fluticasone propionate plus eformoterol) *Intal* (sodium cromoglycate) *Intal Forte* (sodium cromoglycate) *Qvar* (beclomethasone) *Seretide* (salmeterol plus fluticasone propionate) *Symbicort* (budesonide plus eformoterol) via *Rapihaler* *Tilade* (nedocromil sodium)
		Other bronchodilators *Atrovent* (ipratropium bromide)
Breath-activated pMDI	*Autohaler*	**Relievers** *Airomir* (salbutamol)
		Preventers *Qvar* (beclomethasone)
Dry-powder inhaler (capsule)	*Aerolizer*	**Other** *Foradile* (eformoterol)
Dry-powder inhaler (breath-actuated)	*Accuhaler*	**Preventers** *Flixotide* (fluticasone) *Seretide* (salmeterol plus fluticasone)
		Other *Serevent* (salmeterol)
	Ellipta	**Preventers** *Breo* (fluticasone furoate plus vilanterol)
	Turbuhaler	**Relievers** *Bricanyl* (terbutaline sulfate) *Symbicort* (budesonide plus eformoterol) when used in a maintenance-and-reliever regimen
		Preventers *Pulmicort* (budesonide) *Symbicort* (budesonide plus eformoterol)
		Other *Oxis* (eformoterol)

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ACUTE ASTHMA

MANAGING ACUTE ASTHMA IN CLINICAL SETTINGS

For detailed guidance and information, see asthmahandbook.org.au/acute-asthma/clinical

Acute asthma management is based on:

- assessing severity (mild/moderate, severe or life-threatening) while starting bronchodilator treatment immediately
- administering oxygen therapy, if required, and titrating oxygen saturation to target of 92–95% (adults) or at least 95% (children)
- completing observations and assessments (when appropriate, based on clinical priorities determined by baseline severity)
- administering systemic corticosteroids within the first hour of treatment
- repeatedly reassessing response to treatment and either continuing treatment or adding on treatments, until acute asthma has resolved, or patient is transferred to an intensive care unit or admitted to hospital
- observing the patient for at least 1 hour after dyspnoea/respiratory distress has resolved, providing post-acute care and arranging follow-up.

Notes

Definitions of severity classes for acute asthma used in this Handbook may differ from those used in published clinical trials and other guidelines that focus on, are or restricted to, the management of acute asthma within emergency departments or acute care facilities. In this Handbook, the severity of flare-ups and acute asthma is defined consistently across all Australian clinical settings (including community-based clinics and emergency departments). Accordingly, the classification of flare-ups and the classification of acute asthma overlap (e.g. a flare-up is considered to be at least 'moderate' if it is troublesome enough to cause the patient or carers to visit an emergency department or seek urgent treatment from primary care, yet it might be assessed as 'mild' acute asthma within acute services).

In this Handbook, the categories of 'mild' and 'moderate' acute asthma have been merged to avoid confusion between terminologies traditionally used at different levels of the health system. Mild acute asthma can usually be managed at home by following the person's written asthma action plan.

Table. Rapid primary assessment of acute asthma in adults and children

Mild/Moderate	*Severe*	*Life-threatening*
Can walk, speak whole sentences in one breath (For young children: can move around, speak in phrases) Oxygen saturation > 94%	Any of these findings: • Use of accessory muscles of neck or intercostal muscles or 'tracheal tug' during inspiration or subcostal recession ('abdominal breathing') • Unable to complete sentences in one breath due to dyspnoea • Obvious respiratory distress • Oxygen saturation 90–94%	Any of these findings: • Reduced consciousness or collapse • Exhaustion • Cyanosis • Oxygen saturation <90% • Poor respiratory effort, soft/absent breath sounds

Notes

The severity category may change when more information is available (e.g. pulse oximetry, spirometry) or over time

The presence of pulsus paradoxus (systolic paradox) is not a reliable indicator of the severity of acute asthma.

If oxygen therapy has already been started, it is not necessary to cease oxygen to measure pulse oximetry.

Oxygen saturation levels are a guide only and are not definitive; clinical judgment should be applied.

Definitions of severity classes for acute asthma used in this handbook may differ from those used in published clinical trials and other guidelines that focus on, are or restricted to, the management of acute asthma within emergency departments or acute care facilities.

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Figure. Managing acute asthma in adults

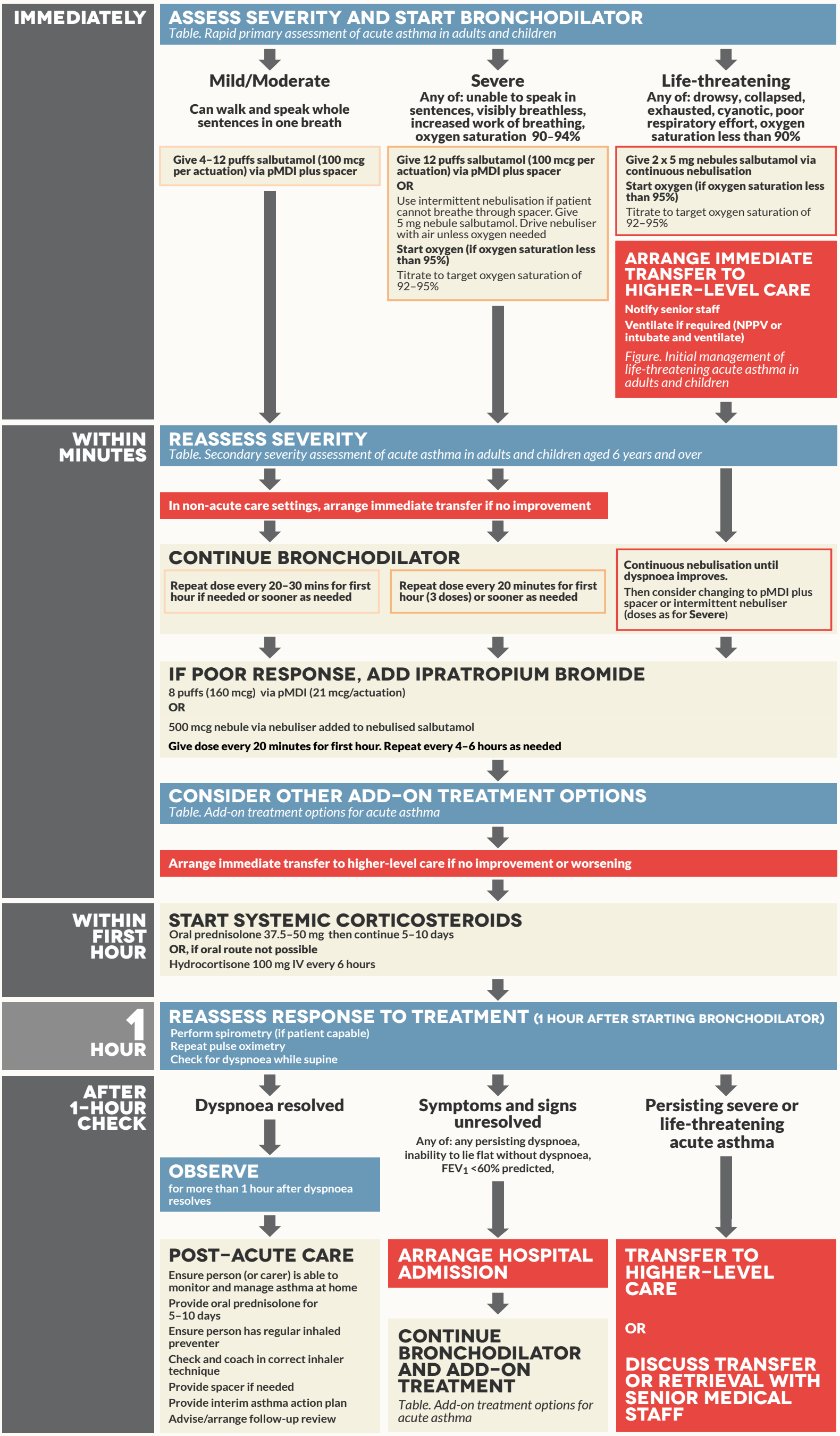

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Figure. Managing acute asthma in children

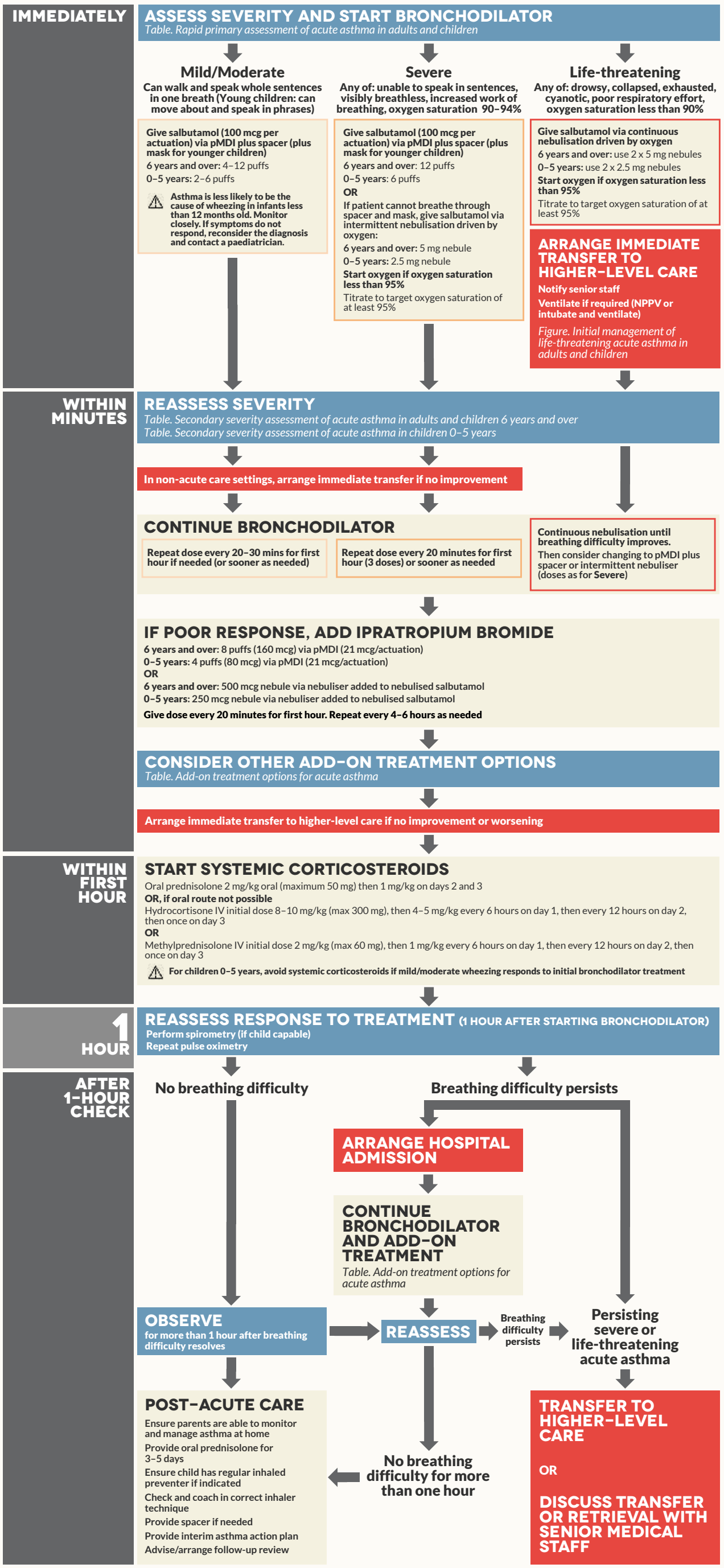

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Figure. Initial management of life-threatening acute asthma in adults and children

Note: This figure shows in more detail the first stages ('immediate' and 'within minutes') shown in the figures *Managing acute asthma in adults* and *Managing acute asthma in children*

SEVERITY ASSESSED AS LIFE-THREATENING ACUTE ASTHMA

Any of these findings:

- drowsy
- collapsed
- exhausted
- cyanotic
- poor respiratory effort
- soft/absent breath sounds
- oxygen saturation <90%

GIVE SALBUTAMOL VIA CONTINUOUS NEBULISATION

CHILDREN 0–5 YEARS
Salbutamol 2 x 2.5 mg nebules at a time
Use oxygen to drive nebuliser*
Maintain SaO_2 95% or higher

CHILDREN 6–12 YEARS
Salbutamol 2 x 5 mg nebules at a time
Use oxygen to drive nebuliser*
Maintain SaO_2 95% or higher

ADULTS AND ADOLESCENTS
Salbutamol 2 x 5 mg nebules at a time
Use oxygen to drive nebuliser*
Titrate oxygen to target SaO_2 ≥92%

*Piped oxygen or oxygen cylinder fitted with a high-flow regulator (6 L/min)

ARRANGE IMMEDIATE TRANSFER TO HIGHER-LEVEL CARE AREA
NOTIFY SENIOR STAFF

REASSESS IMMEDIATELY AFTER STARTING SALBUTAMOL

Marked improvement

Some improvement

No improvement or worsening

VENTILATE
NPPV OR INTUBATION AS REQUIRED

CONTINUE SALBUTAMOL AND MONITORING

ADD IPRATROPIUM BROMIDE
Add to nebuliser (repeat every 20 minutes for first hour)
Adults, adolescents and children 6 years and over: 500 mcg
Children 0–5 years: 250 mcg

No improvement or worsening

ADD MAGNESIUM SULFATE IV
Dilute in compatible solution as single IV infusion over 20 minutes
Adults and adolescents: 10 mmol
Children 2–12 years: 0.1–0.2 mmol/kg (max 10 mmol)

Marked improvement

CONTINUE BRONCHODILATOR AND MONITORING
When breathing improves, consider changing salbutamol route of delivery:

pMDI PLUS SPACER
Adults and children 6 years and over: 12 puffs (100 mcg/actuation) every 20 minutes
Children 0-5 years: 6 puffs (100 mcg/actuation) every 20 minutes

or

INTERMITTENT NEBULISATION
Adults and children 6 years and over: 5 mg nebule every 20 minutes
Children 0–5 years: 2.5 mg nebule every 20 minutes

REASSESS SEVERITY
Figure. Managing acute asthma in adults
Figure. Managing acute asthma in children

No improvement or worsening

CONTINUE SALBUTAMOL BY CONTINUOUS NEBULISATION*
CONSIDER THE NEED FOR NPPV OR INTUBATION AND VENTILATION
ARRANGE TRANSFER/RETRIEVAL TO ICU

* Salbutamol IV infusion can be considered in critical care units. Follow your hospital/organisation's protocol for dosage and delivery.

⚠ Monitor blood electrolytes, heart rate and acid/base balance (blood lactate)

Salbutamol toxicity can occur with either the inhaled or IV route of administration. Risk may be increased when the inhaled and IV routes are used concomitantly.

Table. Secondary severity assessment of acute asthma in adults and children 6 years and over

Note: If features of more than one severity category are present, record the higher category as overall severity level

	Mild/Moderate (all of):	*Severe (any of):*	*Life-threatening (any of):*
Speech	Can finish a sentence in one breath	Can only speak a few words in one breath	Can't speak
Posture	Can walk	Unable to lie flat due to dyspnoea Sitting hunched forward	Collapsed or exhausted
Breathing	Respiratory distress is not severe	Paradoxical chest wall movement: inward movement on inspiration and outward movement on expiration (chest sucks in when person breathes in) or Use of accessory muscles of neck or intercostal muscles or 'tracheal tug' during inspiration or Subcostal recession ('abdominal breathing')	Severe respiratory distress or Poor respiratory effort
Consciousness	Alert	†	Drowsy or unconscious
Skin colour	Normal	†	Cyanosis
Respiratory rate	<25 breaths/min	≥25 breaths/min	Bradypnoea (indicates respiratory exhaustion)
Heart rate	Adults: <110 beats/min Children: normal range	Adults: ≥110 beats/min Children: tachycardia	Cardiac arrhythmia or Bradycardia (may occur just before respiratory arrest)
Chest auscultation	Wheeze or Normal lung sounds	†	Silent chest or Reduced air entry
Oxygen saturation (pulse oximetry)	>94%	90-94%	<90% or Clinical cyanosis
Blood gas analysis (adults, if performed) ‡	Not indicated	Not indicated	PaO_2 <60 mmHg $PaCO_2$ >50 mmHg§ $PaCO_2$ within normal range despite low PaO_2 pH <7.35#

† Not applicable – may be the same as moderate and does not determine severity category

‡ Perform blood gas analysis only if clinically indicated

§ The presence of hypercapnoea indicates that the patient is tiring and may need ventilatory support.

Metabolic acidosis (often associated with hypokalaemia) may occur with increased work of breathing and with high-dose salbutamol.

$PaCO_2$, carbon dioxide partial pressure on blood gas analysis; PaO_2, oxygen partial pressure on blood gas analysis

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Table. Secondary severity assessment of acute asthma in children 0–5 years

Note: If features of more than one severity category are present, record the higher category as overall severity level

	Mild/Moderate (all of):	*Severe (any of):*	*Life-threatening (any of):*
Speech	Can talk or vocalise	†	Unable to vocalise due to dyspnoea
Posture	Can walk or crawl	Lethargic	Collapsed or exhausted
Breathing	Respiratory distress is not severe	Paradoxical chest wall movement: inward movement on inspiration and outward movement on expiration (chest sucks in when person breathes in) or Use of accessory muscles of neck or intercostal muscles or 'tracheal tug' during inspiration or Subcostal recession ('abdominal breathing')	Severe respiratory distress or Poor respiratory effort
Consciousness	Alert	†	Drowsy or unconscious
Skin colour	Normal	†	Cyanosis
Respiratory rate	Normal	Tachypnoea	Bradypnoea (indicates respiratory exhaustion)
Heart rate	Normal	Tachycardia	Cardiac arrhythmia or Bradycardia (may occur just before respiratory arrest)
Chest auscultation	Wheeze or Normal lung sounds	†	Silent chest or Reduced air entry
Oxygen saturation (pulse oximetry)	>94%	90-94%	<90% or Clinical cyanosis

† Not applicable – may be the same as moderate and does not determine severity category

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Appendix

Normal respiratory and heart rates in children

	Heart rate (beats/minute)	*Respiratory rate (breaths/minute)*
<1 year	110–160	30–40
1–2 years	100–150	25–35
2–5 years	95–140	25–30
5–12 years	80–120	20–25
12–18 years	60–100	15–20

Source

Samuels M, Wieteska S. (Eds) *Advanced paediatric life support: the practical approach.* 5th edn. Wiley-Blackwell, Oxford, 2011.

Table. Add-on treatment options for acute asthma

Agent	*Recommended use in acute asthma*	*Administration and dosage*		*Notes*
Inhaled ipratropium bromide	Second-line bronchodilator if inadequate response to salbutamol	Via pMDI 21 mcg/ actuation every 20 minutes for first hour Repeat every 4–6 hours for 24 hours	**Adults and children 6 years and over:** 8 puffs **Children 0–5 years:** 4 puffs	Use spacer (plus mask, if patient cannot use mouthpiece)
		Via nebuliser every 20 minutes for first hour Repeat every 4–6 hours	**Adults and children 6 years and over:** 500 mcg nebule **Children 0–5 years:** 250 mcg nebule	If salbutamol is delivered by nebuliser, add to nebuliser solution
IV magnesium sulphate	Second-line bronchodilator in severe or life-threatening acute asthma, or when poor response to repeated maximal doses of other bronchodilators	IV infusion over 20 minutes	**Adults:** 10 mmol **Children 2 years and over:** 0.1–0.2 mmol/ kg (maximum 10 mmol)	Avoid magnesium sulfate in children younger than 2 years Dilute in compatible solution
IV salbutamol (only in ICU)	Third-line bronchodilator in life-threatening acute asthma that has not responded to continuous nebulised salbutamol after considering other add-on treatment options	Follow hospital/organisation's protocol		Use only in critical care units (e.g. emergency department, intensive care unit/high-dependency unit) Monitor blood electrolytes, heart rate and acid/base balance (blood lactate) Reduce initial dose for older adults. Consider dose reduction for those with impaired renal function. Impaired liver function may result in accumulation of unmetabolised salbutamol
Non-invasive positive pressure ventilation	Consider if starting to tire or signs of respiratory failure			Do not sedate patient If no improvement, intubate and start mechanical ventilation

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CLINICAL ISSUES

TROUBLESHOOTING

For detailed guidance and information, see asthmahandbook.org.au/clinical-issues/troubleshooting

When a person's asthma is not well controlled despite treatment, unnecessary or risky dose escalation can be avoided by systematically working through the possible reasons before adjusting the treatment:

- Check whether current treatment is appropriate.
- Check whether the patient is taking the medicine correctly and as prescribed.
- Check whether the symptoms are due to asthma.
- Consider the individual's triggers and any comorbid conditions that may affect asthma symptoms, risk or management.

You can use the checklist as a guide to help you and the patient or carer consider common problems that may be contributing to suboptimal asthma control.

Other clinical issues

Check the *Australian Asthma Handbook* website for more clinical issues, including:

- *Allergies and asthma*
- *Comorbid conditions and asthma*
- *Complementary therapies and asthma*
- *Chronic obstructive pulmonary disease (COPD) and asthma*
- *Food and asthma*
- *Work-related asthma*

asthmahandbook.org.au/clinical-issues

Table. Troubleshooting checklist

Is the patient taking the medicine correctly?

- ☐ Is the person taking the medicine/s?
- ☐ Are there any reasons the person may be missing some or all doses? (e.g. cost, psychosocial reasons)
- ☐ Is the person's inhaler technique correct?
- ☐ Is the type of inhaler device right for the person?

Is the current treatment appropriate?

- ☐ Is the type of preventer right for the individual?
- ☐ Is the prescribed dose of preventer likely to be effective?

Is the person able to self-manage effectively?

- ☐ Is the written asthma action plan up to date and does the person know how to follow it?
- ☐ Is the person receiving conflicting advice from other health professionals?
- ☐ Is the person unable to manage their asthma due to life events, low health literacy, personal circumstances or other psychosocial factors?

Are the symptoms due to asthma?

- ☐ Is the diagnosis correct?
- ☐ Are other conditions present?

Is the person exposed to unidentified triggers?

- ☐ Does the person smoke?
- ☐ Is the person exposed to other people's tobacco smoke or other smoke?
- ☐ Does the person know what triggers their asthma symptoms?
- ☐ Consider:
  - ☐ cigarette smoke
  - ☐ allergens (e.g. animals, pollens, workplace materials)
  - ☐ cold/dry air
  - ☐ indoor and outdoor pollution
  - ☐ medicines (including complementary medicines)
  - ☐ food chemicals/additives (if person is intolerant)
  - ☐ viral respiratory tract infections
  - ☐ comorbid medical conditions
  - ☐ extreme emotions
  - ☐ hormonal changes
  - ☐ exercise.

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ASTHMA TRIGGERS

For detailed guidance and information, see asthmahandbook.org.au/clinical-issues/triggers

A wide range of factors can trigger asthma, and triggers differ between individuals.

Most of the evidence that certain exposures and physiological factors can trigger asthma comes from cross-sectional population studies and cohort studies. Because there is insufficient evidence to confirm without doubt whether some factors can or cannot act as triggers for an individual, triggers and avoidance strategies must be discussed with each patient.

Table. Summary of asthma triggers

Avoidable triggers	*Unavoidable triggers*
Always avoid	***Do not avoid***
Cigarette smoke	**Exercise** **Laughter**
Avoid or reduce where possible	***Manage***
Allergens (if person is sensitised and relevant avoidance strategies are practical and shown to be effective) • Animal allergens (e.g. pets, animals in workplace) • Cockroaches • House dust mite • Moulds • Occupational allergens • Pollens • Thunderstorms (airborne pollens, moulds) **Airborne/environmental irritants** • Cold/dry air • Fuel combustion (nitrogen dioxide-emitting gas heaters) • Home renovation materials • Household aerosols • Moulds (airborne endotoxins) • Occupational irritants • Outdoor industrial and traffic pollution • Perfumes/scents/incense • Smoke (any, including bushfires, vegetation reduction fires, indoor wood fires) • Thunderstorms (multiple mechanisms) **Certain medicines** • Aspirin and NSAIDs (in patients with aspirin-exacerbated respiratory disease) • Beta blockers† • Bee products (pollen, propolis, royal jelly) • Echinacea **Dietary triggers** • Food chemicals/additives (if person is intolerant) • Thermal effects (e.g. cold drinks)	**Respiratory tract infections** **Certain medicines** • Aspirin (when given for purpose of desensitisation)† • Anticholinesterases and cholinergic agents **Comorbid medical conditions** • Allergic rhinitis/rhinosinusitis • Gastro-oesophageal reflux disease • Nasal polyposis • Obesity • Upper airway dysfunction‡ **Physiological and psychological changes** • Extreme emotions • Hormonal changes (e.g. menstrual cycle) • Pregnancy • Sexual activity

† Requires close specialist supervision. ‡ Also known as vocal cord dysfunction

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EXERCISE AND ASTHMA

For detailed guidance and information, see asthmahandbook.org.au/clinical-issues/exercise

People with asthma can and should participate in physical activity. For adults or children involved in competitive sport, prescribers need to check which asthma medicines are permitted in the sport.

Exercise-induced bronchoconstriction can be managed effectively with relievers and preventers (or both) and should not stop people with asthma participating in physical activity.

Table. Managing persistent exercise-induced respiratory symptoms in adults and adolescents

Clinical scenario		*Action*	*Notes*
Prior confirmed asthma diagnosis and recent asthma symptom control is assessed as partial or poor*		Start low-dose ICS (if not already using a preventer) or step up preventer regimen# Salbutamol 15 minutes before exercise§ Review in 4–12 weeks†	
Prior confirmed asthma diagnosis, recent asthma symptom control is assessed as partial or good,* and symptoms only occur with exercise	*Exercise symptoms on most or all days*	Start low-dose ICS (if not already using a preventer) or step up preventer regimen# and review in 4–12 weeks†	Consider alternative causes (e.g. poor cardiopulmonary fitness, upper airway dysfunction‡) EIB can occur despite otherwise well-controlled asthma
	Exercise symptoms some days	Salbutamol 15 minutes before exercise§ Continue preventer if used	EIB can occur despite otherwise well-controlled asthma
No previous diagnosis of asthma		Investigate as for asthma (history, physical examination and spirometry before and after bronchodilator)** If asthma confirmed, follow management recommendations If asthma not confirmed by spirometry, consider: • a trial of salbutamol 15 minutes before exercise§ • whether regular preventer treatment is indicated • indirect challenge testing • Review in 4–12 weeks†	For adolescents, consider early referral to an accredited respiratory function laboratory for indirect challenge testing or respiratory physician for investigation to rule out other common causes of exercise-related respiratory symptoms
Competing athletes		Consider indirect challenge testing. (Check which tests are required to demonstrate airway hyperresponsiveness) Check which medicines are permitted in the particular sport by consulting the Australian Sports Anti-Doping Authority (ASADA) before prescribing any medicine	Advise warm-up before planned exercise

* See *Table. Definition of levels of recent asthma symptom control in adults and adolescents (regardless of current treatment regimen)*

Before stepping up, check that inhaler technique is correct and adherence is adequate. *See Figure. Stepped approach to adjusting asthma medication in adults*

† If exercise-induced symptoms do not resolve after adjusting medicines, and checking adherence and inhaler technique, consider alternative diagnoses, referral to an accredited respiratory function laboratory for indirect challenge testing, or referral to a respiratory physician for assessment.

‡ Also known as vocal cord dysfunction

§ Reliever should also be taken at other times as needed to manage symptoms

** See *Figure. Steps in the diagnosis of asthma in adults*

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Table. Managing persistent exercise-induced respiratory symptoms in children

Clinical scenario		*Action*	*Notes*
Prior confirmed asthma diagnosis and recent asthma symptom control is assessed as partial or poor*		Consider preventer treatment based on age and pattern of symptoms§	
Prior confirmed asthma diagnosis, recent asthma symptom control is assessed as partial or good,* and symptoms only occur with exercise	*Exercise symptoms most or all days*	If child 2–14, consider regular montelukast (as sole preventer or added to ICS)# Review in 4–12 weeks†	Consider alternative causes (e.g. poor cardiopulmonary fitness, upper airway dysfunction) If symptoms do not respond to montelukast alone, consider low-dose ICS# If child currently taking ICS/LABA combination, consider a treatment trial of ICS alone (and salbutamol taken before exercise) or ICS plus montelukast
	Exercise symptoms some days but not every day	If child 6 years and over, salbutamol 15 minutes before exercise## If child 2–5 years, consider regular montelukast Review in 4–12 weeks†	
No previous history of asthma		Investigate as for asthma (history, physical examination and spirometry before and after bronchodilator if child can do test)** If asthma confirmed, manage as for asthma If asthma not confirmed by spirometry (in children able to perform the test), consider: • a trial of salbutamol 15 minutes before exercise • whether regular preventer treatment is indicated • exercise testing for cardiopulmonary function to rule out exercise-related dyspnoea due to poor cardiopulmonary fitness • indirect challenge testing Review in 4–12 weeks†	Poor cardiopulmonary fitness is a common reason for exercise-related respiratory symptoms Some children with asthma avoid exercise
Competing athletes		Consider indirect challenge testing. (Check which tests are required to demonstrate airway hyperresponsiveness) Check which medicines are permitted in the particular sport by consulting ASADA (www.asada.gov.au) before prescribing any medicine	Advise warm-up before planned exercise

* See *Table. Definition of levels of recent asthma symptom control in children (regardless of current treatment regimen)*

§ See *Table. Initial preventer treatment for children aged 0–5 years* and *Table. Initial preventer treatment for children aged 6 years and over*

Before stepping up, check that inhaler technique is correct and adherence is adequate. See *Figure. Stepped approach to adjusting asthma medication in children*

† If exercise-induced symptoms do not resolve after adjusting medicines, and checking adherence and inhaler technique, consider alternative diagnoses, referral to an accredited respiratory function laboratory for indirect challenge testing, or referral to a respiratory physician for assessment.

** See *Figure. Steps in the diagnosis of asthma in children*

Reliever should also be taken at other times as needed to manage symptoms

Notes

For some children with asthma, exercise-related symptoms are their only asthma symptoms.

Check the Pharmaceutical Benefits Scheme for subsidisation status; criteria for some asthma medicines differ between age groups and indications.

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SMOKING AND ASTHMA

For detailed guidance and information, see asthmahandbook.org.au/clinical-issues/smoking

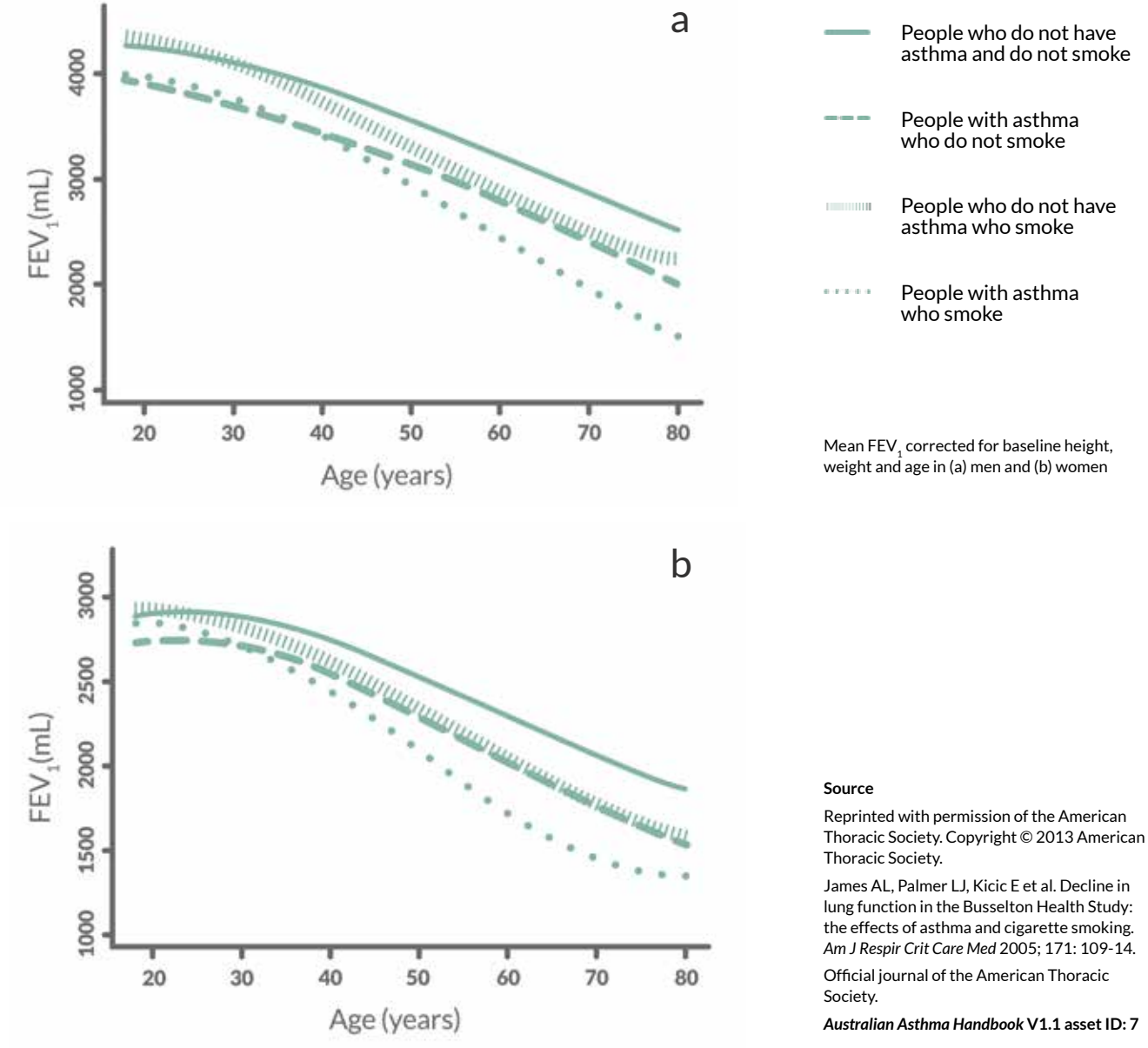
If a person smokes, or is exposed to other people's tobacco smoke, this factor must be taken into account when investigating respiratory symptoms, assessing asthma control, and managing asthma.

Exposure to environmental tobacco smoke during gestation or early childhood increases the risk of early childhood wheezing and adversely affects lung function, as well increasing the risk of other congenital and childhood conditions.

Smoking:

- increases the risk of asthma flare-ups in people with asthma
- increases the risk of COPD
- reduces the probability of achieving good asthma control
- reduces therapeutic response to inhaled corticosteroid
- accelerates long-term decline in lung function.

Figure. Lung function decline in smokers and non-smokers with or without asthma



Mean FEV_1 corrected for baseline height, weight and age in (a) men and (b) women

Source

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James AL, Palmer LJ, Kicic E et al. Decline in lung function in the Busselton Health Study: the effects of asthma and cigarette smoking. *Am J Respir Crit Care Med* 2005; 171: 109-14.

Official journal of the American Thoracic Society.

***Australian Asthma Handbook* V1.1 asset ID: 7**

POPULATIONS

ASTHMA IN PREGNANT WOMEN

For detailed guidance and information, see asthmahandbook.org.au/populations/pregnant-women

Good asthma control during pregnancy is a high priority, to protect the foetus as well as the mother. Untreated asthma, poorly controlled asthma or flare-ups during pregnancy put mothers and babies at risk.

Reducing asthma-related risk for women with asthma and their babies involves:

- giving preconception advice to women with asthma
- advising pregnant women about good asthma control
- managing asthma actively during pregnancy
- managing flare-ups during pregnancy.

Asthma medicines are used in pregnancy when the risks of poor asthma control outweigh the risks associated with medicines.

Most asthma medicines can be used by breastfeeding women, because the risks of poor asthma control outweigh the risks associated with medicines.

Other populations

Check the *Australian Asthma Handbook* website for more information on special considerations for these populations:

- *Adolescents and young adults*
- *Older adults*
- *Aboriginal and Torres Strait Islander peoples*
- *Culturally and linguistically diverse communities*

asthmahandbook.org.au/populations

Primary prevention of asthma

Check the Australian Asthma Handbook website for more information on preventing asthma from developing in people who do not already have a diagnosis of asthma (primary prevention).

asthmahandbook.org.au/prevention/primary

Table. Local pregnancy and breastfeeding safety information services

State or territory	*Service*	*Contact*
ACT	ACT Drug Information Service (based at The Canberra Hospital)	02 6244 3333
New South Wales	MotherSafe (based at the Royal Hospital for Women)	02 9382 6539 (Sydney metropolitan area) 1800 647 848 (non-metropolitan NSW) mothersafe.org.au
Queensland	Queensland Medicines Advice and Information Service (based at Royal Brisbane and Women's Hospital)	07 3646 7599
South Australia	Drugs Information Service (based at Women's and Children's Hospital)	08 8161 7222
Western Australia	Obstetric Drug Information Service (based at Women and Newborn Health Service)	08 9340 2723
Victoria	Medicines Information Service (based at the Royal Women's Hospital)	03 8345 3190 thewomens.org.au/contact/pharmacist

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PREVENTING ASTHMA

For detailed guidance and information, see asthmahandbook.org.au/prevention/preventive-care

In addition to the use of asthma medicines, asthma management involves managing relevant lifestyle factors, which are already the focus of broader chronic disease preventive health strategies in primary care.

Preventive care also includes appropriate immunisation, and managing other health conditions that may affect asthma control or self-management.

Table. Preventive healthcare in people with asthma

Type of preventive care	*Issues*	*Clinical notes*
Lifestyle risk factors for chronic disease	*Smoking*	Advise quitting and repeatedly offer help to quit smoking, whether or not the person shows interest in quitting Consider scheduling planned asthma check-ups to assess recent asthma symptom control every 6 months for people who smoke, due to increased risk offlare-ups and increased rate of decline in lung function over time Follow national guidelines for smoking cessation
	Nutrition	Encourage healthy eating for all patients with asthma: • eating plenty of fruit and vegetables every day • minimising intake of processed and take-away foods that are high in saturated fats Follow national dietary guidelines
	Physical activity	Recommend physical training for quality-of-life benefits Advise patients that having asthma does not prevent them doing physical activity, including exercise training
	Obesity	Advise that weight loss might help control asthma Support obese or overweight people with asthma to lose weight Follow current national guidelines for the management of obesity and overweight
Immunisation	*Influenza vaccination*	Advise routinely for patients with frequent hospitalisations due to asthma and requiring multiple asthma medicines Influenza vaccines are free of charge for people with severe asthma Vaccination may not reduce the risk or severity of asthma flare-ups during the influenza season Follow national immunisation guidelines
	Pneumococcal vaccination	Follow national immunisation guidelines
General health	*Comorbidities*	Manage other conditions that may affect asthma or self-management, e.g: • allergies, including allergic rhinitis • chronic obstructive pulmonary disease • gastro-oesophageal reflux disease • obstructive sleep apnoea syndrome
	Mental health	Consider how mental health and psychosocial issues could affect asthma and self-management Screen for depression, panic disorder and anxiety disorder in patients with asthma that is moderate–severe or difficult to control
	Complementary medicines	Ask patients whether they use complementary medicines If patient interested in using complementary and alternative medicines and therapies, discuss expectations and provide information about safety and efficacy
		If patient interested in using complementary and alternative medicines and therapies, discuss expectations and provide information about safety and efficacy

MEDICINES GUIDE

For detailed guidance and information, see asthmahandbook.org.au/resources/medicines-guide

Asthma medicines are classified by their role in asthma management (preventers and relievers) as well as by their pharmacological and chemical classes.

Preventers include combination preventers (inhaled corticosteroid and long-acting beta$_2$ agonist combinations).

Other medicines used in asthma management are neither relievers nor preventers, but have specific roles in the management of flare-ups, severe acute asthma, or difficult-to-treat asthma.

The main pharmacological classes of asthma medicines are beta$_2$ receptor agonists, corticosteroids and leukotriene receptor antagonists.

*Table. Classification of asthma medicines**

Duration	*Role*	*Pharmacological class*	*Agent*
Short term	*Relievers*	Short-acting beta$_2$ agonist relievers	Salbutamol Terbutaline sulfate
		Inhaled corticosteroid/rapid-onset long-acting beta$_2$ agonist combinations†	Budesonide/ eformoterol fumarate dihydrate
	Other short-term medicines (symptomatic and acute asthma treatment)	Systemic corticosteroids	Prednisolone or prednisone Methylprednisolone sodium succinate Hydrocortisone
		Anticholinergic bronchodilators (in acute asthma)	Ipratropium bromide
		Magnesium sulfate (in acute asthma)	Magnesium sulfate
Long term	*Preventers*	Inhaled corticosteroids (glucocorticosteroids)	Beclomethasone dipropionate Budesonide Ciclesonide Fluticasone propionate
		Inhaled corticosteroid/long-acting beta$_2$ agonist combinations	Budesonide/ eformoterol fumarate dihydrate Fluticasone furoate/vilanterol trifenatate ‡ Fluticasone propionate/ eformoterol fumarate dihydrate Fluticasone propionate/ salmeterol xinafoate
		Leukotriene receptor antagonists	Montelukast
		Cromones (mast cell stabilisers)	Sodium cromoglycate Nedocromil sodium
	Other long-term medicines	See: **asthmahandbook.org.au/resources/medicines-guide**	

* **Please note this is an abridged version of the complete table provided in the full online** *Australian Asthma Handbook*.

† The budesonide/eformoterol fumarate dihydrate combination is only used as reliever for adolescents and adults on maintenance-and-reliever regimen

‡ Fluticasone furoate/vilanterol should be taken as one inhalation once daily. Warn patients not to take more inhalations or more frequent doses.

Notes: Before prescribing any medicine, check the Therapeutic Goods Administration-approved product information.

Pharmaceutical Benefits Scheme criteria for some asthma medicines differ between age groups and indications.

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AUSTRALIA'S NATIONAL GUIDELINES FOR ASTHMA MANAGEMENT

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The *Australian Asthma Handbook* provides best-practice, evidence-based guidance translated into real-world advice for primary care health professionals.

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