

Asthma and Respiratory Foundation NZ child and adolescent asthma guidelines: a quick reference guide

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ABSTRACT

The purpose of the New Zealand *Child and adolescent asthma guidelines: a quick reference guide* is to provide simple, practical, evidence-based recommendations for the diagnosis, assessment and management of asthma in children and adolescents in New Zealand, with the aim of improving outcomes and reducing inequities. The intended users are health professionals responsible for delivering asthma care in the community and hospital emergency department settings, and those responsible for the training of such health professionals.

Abbreviations:

FEV ₁	Forced expiratory volume in one second
ICS	Inhaled corticosteroid
LABA	Long-acting beta-agonist
MDI	Metered dose inhaler
PEF	Peak expiratory flow
SABA	Short-acting beta-agonist
SpO ₂	Oxygen saturation

Inequities in New Zealand

Despite advances in knowledge about asthma and its management, we could be doing better. We believe that all children in New Zealand have the right to achieve the highest standard of asthma outcomes equally. In New Zealand, a large number of children are not faring well with their asthma, especially due to disadvantages that arise from inadequate income for the basics needed for wellbeing, and unhealthy indoor environments (homes which are crowded, cold, damp, mouldy,¹ smoke-exposed or with unflued gas heating²). Children aged 13–17

years usually do not have free primary healthcare visits or prescriptions. Māori and Pacific children with asthma are more likely to have severe asthma symptoms and be hospitalised, but are less likely to be prescribed inhaled corticosteroid (ICS), have an action plan or receive adequate education (see “*Māori—getting it right for Māori children with asthma*” and “*Pacific peoples—getting it right for Pacific children with asthma*”). Other groups who experience inequities include refugees, people living in remote rural areas and people with low English language proficiency. All health

professionals have a role in improving outcomes and reducing inequities, and these guidelines specify the actions required regarding asthma.

New reports to inform us

Three important reports were released by the Asthma and Respiratory Foundation of New Zealand in 2015: *The Impact of Respiratory Disease in New Zealand: 2014 Update*,³ *He Māramatanga Huangō: Asthma Health Literacy for Māori Children in New Zealand*⁴ and *Te Hā Ora: The National Respiratory Strategy*.⁵ In 2017 *The Impact of Respiratory Disease in New Zealand* report was updated. These reports describe the context of the growing impact of asthma in New Zealand, especially among children, the inequities suffered by Māori, Pacific peoples and low-income families, and the intersectorial and holistic approaches needed to tackle the issues.

Other guidelines consulted

This guide is a complete update of the outdated Paediatric Society of New Zealand 2005 *Management of Asthma in Children aged 1–15 years*. The following guidelines were reviewed in the preparation of this document: the National Asthma Council of Australia 2015 *Australian Asthma Handbook* version 1.1, including the companion *Quick Reference Guide*,⁶ the Global Initiative for Asthma 2016 *Asthma Management and Prevention*, including the companion *Pocket Guide*,⁷ the SIGN 2016 *British Guidelines on the Management of Asthma*, including the *Quick Reference Guide*,⁸ and the Asthma and Respiratory Foundation NZ *Adult Asthma Guidelines: A Quick Reference Guide*.⁹

A systematic review was not performed, although relevant references were reviewed as required to formulate this guideline, and to clarify differences in recommendations made between guidelines. Readers are referred to the above published guidelines and handbooks for the more comprehensive detail and references that they provide. Additional analyses and reviews on the assessment and management of preschool wheezing were consulted.^{10–12}

Grading

No levels of evidence grades are provided here due to the format of this quick reference guide. Readers are referred to the above published guidelines and handbooks for the level of evidence for the recommendations on which the *Child and Adolescent Asthma Guidelines: A Quick Reference Guide* are based.

Age

Adolescents

These guidelines apply to children 15 years and below. However, adolescents mature at different rates, and for many who are still maturing and require adult support with their asthma care, these guidelines will usually apply. Once adolescents are largely responsible for their own management, application of the recently published *Adult Asthma Guidelines: A Quick Reference Guide*, intended for those 16 years and over, becomes more appropriate. Special care is needed to ensure that the adolescent transitions in a developmentally appropriate way as they become more independent, make their own decisions and emerge as adults. Adolescents transitioning from family to self-management may have differing priorities.

Children aged under five years

There are special considerations in young children (1–4 years) who wheeze, as many of them do not go on to develop asthma (see *Diagnosis*).

Guideline development

The Guideline Development Group included representatives from a range of professions, disciplines and backgrounds relevant to the scope of the guidelines. A *Draft for Consultation* of this report was peer-reviewed by a wide range of respiratory health experts and key professional organisations (see Appendix C).

The guidelines are primarily presented through lists, tables and figures in an electronic format, which can be used in clinical practice. Key references are provided where necessary to support recommendations that may differ from previous or other guidelines, or standard clinical practice.

Dissemination plan

The guidelines will be translated into tools for practical use by health professionals, and used to update existing consumer resources. They will be published on the Asthma and Respiratory Foundation NZ website, and disseminated widely via a range of publications, training opportunities and other communication channels to health professionals, nursing and medical schools, primary health organisations and district health boards.

Implementation

The implementation of the *Child and Adolescent Guidelines: A Quick Reference Guide* by organisations will require communication, education and training strategies.

Expiry date

The expiry date of the guide is 2022.

Health professional to 10 actions These are the top 10 ways health professionals can help (apart from prescribing medicines)

1. Relationships

Encourage the continuity of care with doctors and nurses in your practice and secondary care, and make follow-up appointments—relationships help. Easy access to a trusted nurse and telephone follow-up is recommended.

2. Wellness

Work with families to attain and maintain wellness, and not accept sickness as the norm.

3. Smoke exposure

Ask about smoke exposure, encourage reducing tobacco smoke exposure in the child's environment (home and car) and recommend smoking cessation. If appropriate, give advice and refer to a local smoking cessation service or Quitline (0800 778 778). Provide Health Sponsorship Council's pamphlet *A Guide to Making Your Home and Car Smokefree* (www.healthed.govt.nz/).

4. Housing

A lot of New Zealanders live in unhealthy housing, and conditions are worse in private rental housing. Some families are homeless. Therefore ask about housing and unhealthy features (crowding, cold, damp, mouldy, unflued gas heater). (<http://www.asthmafoundation.org.nz/about-us/advocacy/national-respiratory-strategy>; <http://www.energywise.govt.nz/>). Provide the family with information about having a healthy home ("Tips for healthy living" <http://www.asthmafoundation.org.nz/your-health/healthy-living>) and if relevant, refer for healthy housing assessment if available in your region.

5. Income

Assume that most families struggle with income and ask about it. Inquire about the ability to access the doctor, the pharmacy and paying for prescriptions. Does the

child have partly or uncontrolled persistent asthma and meet criteria for Child Disability Allowance?¹³ (<http://www.workandincome.govt.nz/>). It is important for all family members to use the same pharmacy because once patients and their families have collected 20 new prescription items in a year, they won't have to pay any more prescription charges until 1 February the following year (<http://www.health.govt.nz/your-health/conditions-and-treatments/treatments-and-surgery/medications/prescription-charges>).

6. Health literacy

Assume little health literacy, and use steps described in *He Māramatanga Huangō: Asthma Health Literacy for Māori Children in New Zealand*. Specifically ask the child and whānau what they understand, what they want to know, and use simple language to explain about asthma. For example, use the term 'asthma flare-up' rather than 'asthma exacerbation'.

7. Adherence

Firstly, assume inhaler device technique is poor and check it. Secondly, assume adherence is imperfect and don't judge. Ask questions in an open way, such as "Many people take less preventer than the doctor prescribes—about how many times a week do you take your asthma preventer?"¹⁴⁻¹⁶

8. Asthma action plan

Develop an appropriate asthma action plan with the child and family and check on each visit. Plans should be made available to schools and child care facilities where appropriate. (<http://www.asthmafoundation.org.nz/resources>).

9. Access

Help the family to understand how to access care appropriate to asthma severity, and identify any barriers they have. Consider referral to asthma educator, Māori providers or paediatrician where available and appropriate.

10. Ambulance

Ensure the family know when and how to call an ambulance. In some regions this service may incur a charge.

Diagnosis

Goal: All children who have asthma are promptly and correctly diagnosed

Approach to diagnosis

- The diagnosis of asthma is based on the recognition of a characteristic pattern of symptoms and signs (Table 1) and response to treatment, in the absence of an alternative explanation.
- Initial diagnosis is probability-based and should always be reconsidered if the patient fails to respond to therapy, or has atypical symptoms or signs.
- The key to making the diagnosis of asthma is to take a careful clinical history and assess clinical +/- spirometry response to inhaled bronchodilator and/or ICS treatment. There is no reliable single 'gold standard' diagnostic test.
- The diagnosis and monitoring of asthma requires frequent and repeated review. This may require the use of recall or follow-up systems (Figure 2).
- Algorithms to guide the diagnosis in 1–4 year olds (Figure 1A) and 5–15 year olds (Figure 1B).

Practice points

- During a trial of therapy, give the patient a label of 'suspected asthma' as a means of communicating with other health professionals.
- In most children, observing a symptomatic response to treatment may help to confirm the diagnosis, but a limited response to bronchodilator or ICS does not rule out asthma.
- In children with a high probability of asthma, start a trial of treatment (see Figures 4 and 5) and assess the response to therapy.
- In children with a low probability of asthma, perform further investigations, such as chest x-ray and/or specialist referral prior to initiating preventer therapy.
- Spirometry may be helpful in older children (≥ 12 years or six years and above if paediatric-trained technician).
- In New Zealand, bronchiectasis should be considered for all children with asthma symptoms at any age. Sometimes bronchiectasis co-exists

with asthma, and can be missed on a chest x-ray. Chronic wet cough is a key marker.

Children 1–4 years of age

- Young children 1–4 years are a special group, as about half of those who wheeze do not have asthma at school age and later.
- They are managed according to three patterns of symptoms and labelled accordingly to assist making decisions about prescribing ICS.
- In each of these groups, a bronchodilator should be prescribed as for asthma, according to clinical severity (see Figure 4).

Infrequent preschool wheeze

For those with infrequent symptoms, or who wheeze only with viral illnesses, ICS are not indicated. An alternative term sometimes used is 'infrequent episodic (viral) wheeze'.

Frequent preschool wheeze

For those with frequent episodes of wheeze (more than every 6–8 weeks), only with viral illnesses, but no symptoms in the interval between—give a trial of ICS for a minimum of eight weeks. If there is a positive response, these children should then be labelled as 'preschool asthma', if not, the treatment should be stopped and the child should remain labelled as 'frequent preschool wheeze'. An alternative term sometimes used is 'frequent episodic (viral) wheeze'.

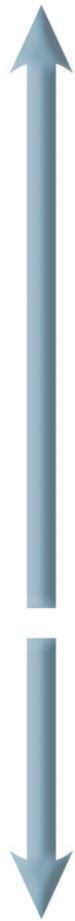
Preschool asthma

Those with frequent symptoms typical for asthma during and in the interval between viral illnesses. Treat as for asthma and give a trial of ICS (preferred) or montelukast, and the same treatment is indicated if there are severe attacks (see Figure 6). An alternative term sometimes used for this pattern is 'multi-trigger wheeze'. This label does NOT mean the child will go on to have asthma at school age or as an adult, which may be reassuring for many families.

Wheezing in children under one year

In children under one year, bronchiolitis is the most common cause of wheezing, and the PREDICT Australasian Bronchiolitis Clinical Practice Guideline¹⁷ should be followed. If the illness does not seem to be bronchiolitis, then refer to Table 1 and Figure 1A for guidance.

Table 1: Clinical features that increase or decrease the probability of asthma in children and adolescents.



<p>A. Asthma more likely</p> <ul style="list-style-type: none"> • More than one of the following: <ul style="list-style-type: none"> - Wheeze (most sensitive and specific symptom of asthma) - Breathlessness - Chest tightness - Cough • Particularly if: <ul style="list-style-type: none"> - Typically worse at night or in the early morning - Provoked by exercise, cold air, allergen exposure, irritants, viral infections, stress and aspirin - Recurrent or seasonal • Personal history of atopic disorder or family history of asthma • Widespread wheeze heard on chest auscultation • Otherwise unexplained expiratory airflow obstruction on spirometry • Otherwise unexplained blood eosinophilia or raised exhaled nitric oxide • Bronchial hyper-responsiveness on challenge testing at appropriate age • Positive response to bronchodilator (clinical or lung function) <p>B. Asthma less likely</p> <ul style="list-style-type: none"> • Isolated cough in absence of wheeze or difficulty breathing • History of wet, moist or productive cough—consider alternative diagnosis • No wheeze or repeatedly normal physical examination when symptomatic • Normal spirometry or peak flow (PEF) when symptomatic • No response to trial of asthma treatment • Features that point to an alternative diagnosis (see C below) <p>C. Red flags suggesting alternate diagnoses*</p> <ul style="list-style-type: none"> • Daily symptoms from birth • Frequent or daily wet, moist-sounding or productive cough • Digital clubbing • Chest wall deformity • Failure to thrive • Heart murmur • Spilling, vomiting or choking • Asymmetrical chest findings • Stridor as well as wheeze • Persistent ear, nose or sinus infection • Family history of unusual chest disease • Symptoms much worse than objective signs or spirometry
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*Consider aspiration, bronchiectasis, ciliary dyskinesia, cystic fibrosis, developmental airway anomaly, foreign body aspiration, heart disease, hyperventilation, immunodeficiency, tuberculosis, vocal cord dysfunction.

Figure 1A: Diagnostic pathway for asthma and wheeze in children 1–4 years.^{6,8}

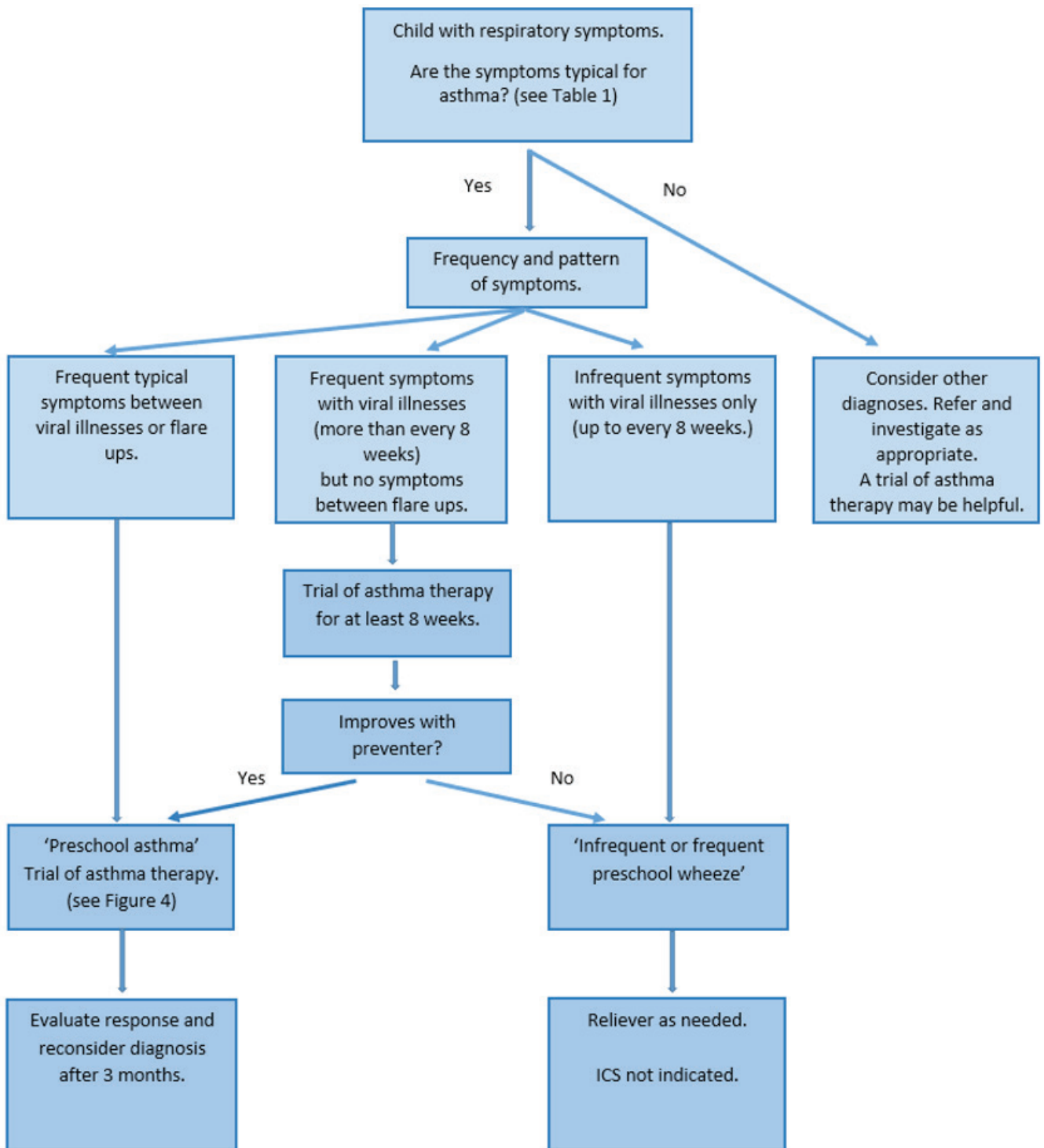
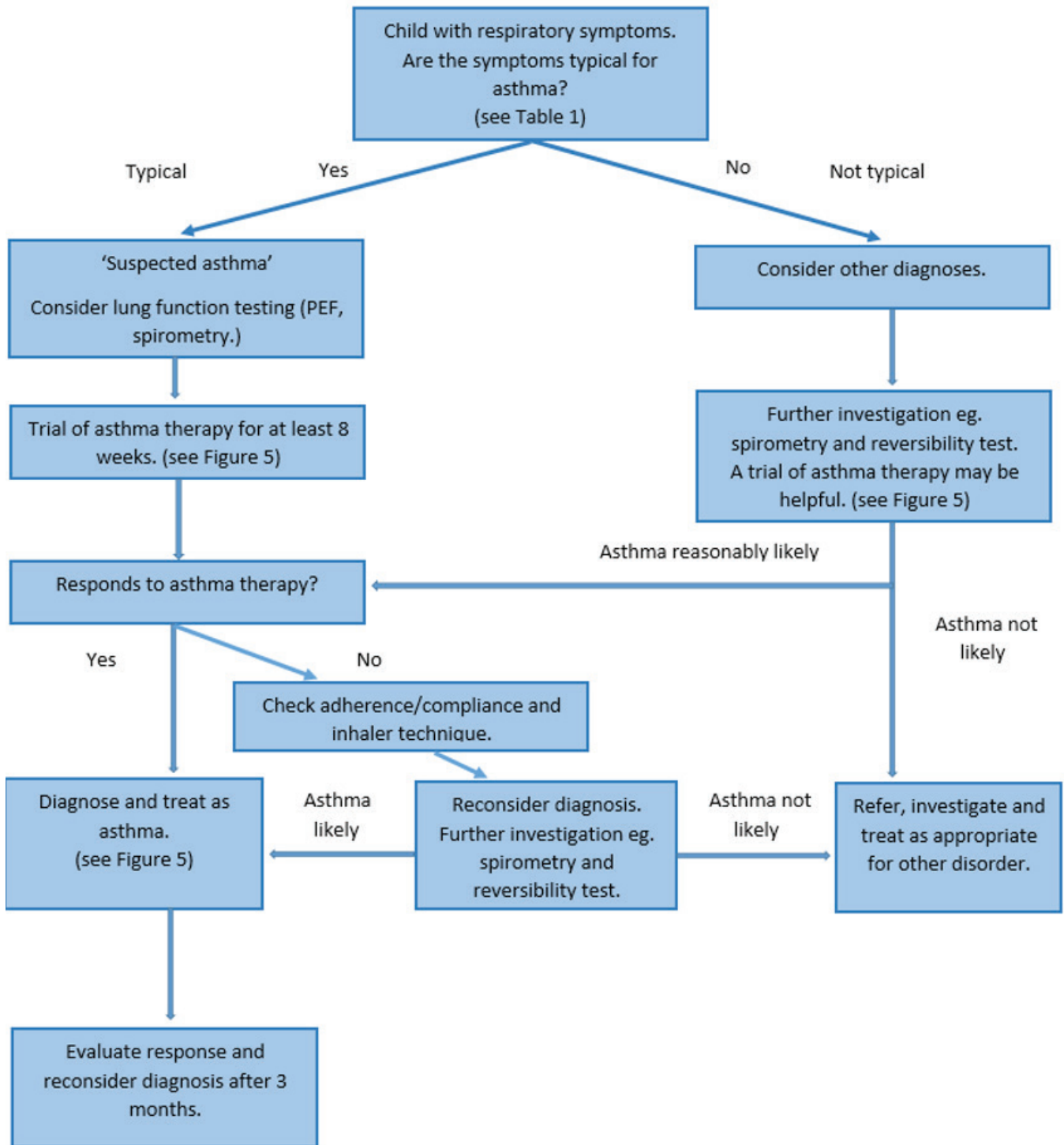


Figure 1B: Diagnostic pathway for asthma and wheeze in children 5–15 years.^{18,19}



Assessing asthma severity, control and future risk


Goal: All children with asthma are assessed for their severity, control and future risk

Evaluation of asthma control and severity

- Evaluation of asthma severity, the level of control and the risk of future events are all-important components of the assessment of children with asthma.
- Asthma control is defined by the frequency of symptoms, the degree to which symptoms affect sleep and activity, and the need for reliever medication.

- Poor asthma control is defined as regular symptoms occurring in a usual week that affect the patient's quality of life, or according to the asthma symptom control measures below.
 - Poor control should trigger a review of adherence, inhaler technique and preventer therapy.
 - If poor control persists, then reconsider the diagnosis.
 - If poor control persists despite above, then consider increasing the asthma treatment step.
 - The level of asthma control should be assessed regularly. Two methods for assessing asthma symptom control are the Asthma Control Test and the GINA Assessment.
1. Asthma Control Test for children 4–11 years (below; Adult guideline for ≥12 years⁹).

Is your child's (4-11yrs) asthma under control?



Asthma Control Test™

The first step to achieving control over your child's asthma is to know where they're at right now. This test is a way of assessing your child's present level of asthma control.^{1,2} It will provide a score that may help your health care professional determine if your child's asthma treatment plan is working or if it might be time for a change. Take five minutes now and do this simple 3 step test with your child.

STEP 1 Let your child answer these questions. You may help, but let your child select the response.

Q1 How is your asthma today? SCORE

0 Vary Bad 1 Bad 2 Good 3 Vary Good

Q2 How much of a problem is your asthma when you run, exercise or play sports?

0 It's a big problem, I can't do what I want to 1 It's a problem and I don't like it 2 It's a little problem but it's ok 3 It's not a problem

Q3 Do you cough because of your asthma?

0 Yes, all of the time 1 Yes, most of the time 2 Yes, some of the time 3 No, none of the time

Q4 Do you wake up at night because of your asthma?

0 Yes, all of the time 1 Yes, most of the time 2 Yes, some of the time 3 No, none of the time

STEP 1 SUBTOTAL

Continue the test over

STEP 2 Complete these questions on your own

Q5 During the last 4 weeks, how many days did your child have any daytime asthma symptoms? SCORE

Not at all 1-3 days 4-10 days 11-18 days 19-24 days Everyday

5 4 3 2 1 0

Q6 During the last 4 weeks, how many days did your child wheeze during the day because of asthma?

Not at all 1-3 days 4-10 days 11-18 days 19-24 days Everyday

5 4 3 2 1 0

Q7 During the last 4 weeks, how many days did your child wake up during the night because of asthma?

Not at all 1-3 days 4-10 days 11-18 days 19-24 days Everyday

5 4 3 2 1 0

STEP 2 SUBTOTAL

STEP 3 Add step 2 subtotal to step 1 subtotal (from the front) to get the final score

STEP 1 SUBTOTAL + **STEP 2 SUBTOTAL** = **TOTAL**

What does your child's Asthma Control Test™ result mean?
Your child's test result is an assessment of their level of asthma control.¹

SCORE: 20 or more Your child's asthma appears to be controlled?²
Even so, it can change over time so it's important to retest your child regularly. Continue to talk to your health care professional about their asthma control.

SCORE: 19 or less Your child's asthma may be uncontrolled or only partly controlled.²
Make an appointment to discuss your child's asthma score with their health care professional.*

Modified US version for use in New Zealand. This does not replace a full assessment from your Doctor. Asthma Control Test™ copyright, QualityMetric Incorporated 2002, 2004. All Rights Reserved. Asthma Control Test™ is a trade mark of QualityMetric Incorporated. Asthma Control Test is distributed by GlaxoSmithKline NZ Limited, Auckland.

References: 1. Liu A et al. *J Allergy Clin Immunol*. 2007;119:817-825
2. Koolen BB et al. *Eur Respir J*. 2011;38:561-566. TAPS NAB093/16FE/AST/0006

*Please note that normal doctor fees will apply.

¹The C-ACT contact information and permission to use: Mapi Research Trust, Lyon, France. Internet: <https://eprovide.mapi-trust.org/>

Table 2: GINA assessment of asthma symptom control in people six years and over (1) (See Table 3).

A. Asthma symptom control		Level of asthma symptom control		
In the past four weeks, has the patient had:		Well controlled	Partly controlled	Uncontrolled
• Daytime asthma symptoms more than twice/week?	Yes <input type="checkbox"/> No <input type="checkbox"/>	None of these	1–2 of these	3–4 of these
• Any night waking due to asthma?	Yes <input type="checkbox"/> No <input type="checkbox"/>			
• Reliever needed for symptoms* more than twice/week?	Yes <input type="checkbox"/> No <input type="checkbox"/>			
• Any activity limitation due to asthma?	Yes <input type="checkbox"/> No <input type="checkbox"/>			

*Excludes reliever taken before exercise.
 (GINA recommends assessment of risk factors as an essential part of the assessment of asthma control).
 (Modified with permission of GINA).

- The GINA yes/no questions about the four criteria in Table 2 above, regardless of current treatment regimen.⁷

Practice points—severity and future risk

- Assessment of asthma also involves risk of adverse outcomes, including severe exacerbations, deaths and treatment-related adverse effects (Table 3).
- Severity of asthma is defined by the treatment step (Figures 4 and 5) needed to maintain good control. Work with patient/parent to determine what good control looks like.⁶

- For symptomatic children, asthma severity can be determined only after a therapeutic trial of ICS for at least eight weeks (Figures 4 and 5). Start the therapeutic trial and book the follow-up appointment for eight weeks later.
- The best predictor of future asthma attacks is the number of exacerbations in the last 12 months.
- Growth (height and weight) should be measured at least annually in children with asthma, and plotted on a percentile chart. Fall-off on percentiles suggests poor asthma control; other causes include malnutrition, frequent oral corticosteroids or after initiation of higher dose ICS.

Table 3: Features associated with increased risk of severe asthma exacerbations and/or death from asthma.²⁰

<p>A. Asthma</p> <ul style="list-style-type: none"> Poor asthma control Hospitalisation or emergency department visit for asthma in the last year Extreme inhaled bronchodilator use (>1 canister per month) History of sudden asthma attacks Intensive care admission or intubation (ever) Requirement for long-term oral steroids <p>B. Comorbidity</p> <ul style="list-style-type: none"> Major psychosocial problems Alcohol and drug abuse in family Severe food allergy and anaphylaxis <p>C. Other factors</p> <ul style="list-style-type: none"> Poor inhaler technique Underuse or poor adherence to ICS treatment Tobacco smoke exposure Discontinuous medical care Socioeconomic disadvantage Financial hardship Unhealthy housing Māori and Pacific ethnicity Child protection issues (consider Vulnerable Children Act 2014). www.legislation.govt.nz/act/public/2014/0040/latest/DLM5501618.html
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- Increase in weight may reflect inappropriate diet and steroid dose.
- Monitor healthcare use. Children and adolescents with high healthcare use (such as hospital admissions, emergency department visits, emergency doctor visits and unplanned doctor visits) are at high risk for severe or life-threatening asthma.
- Monitor medicine use. Children and adolescents with high medication requirements or usage (such as courses of oral steroids, frequency of beta-agonist prescriptions and more prescriptions for beta-agonists than ICS) are at high risk for severe or life-threatening asthma.

Management approaches

Identifying management goals with the child & whānau

Goal: The child and family participate in goal-setting

- Managing asthma requires a partnership between the child, their parents, their whānau and their healthcare team. This will change and develop as children age and involves patient willingness and understanding, agreeing on management goals.
- Management and partnership are based on a cycle of repeated assessment, adjustment of treatment and review of responses, as outlined in Figure 2.

Non-pharmacological measures

Goal: Personal, whānau or environmental factors which may be unsettling asthma are identified and addressed (see *Health professional to 10 actions* section)

- To improve asthma outcomes, avoid smoke exposure and known triggers.
- Avoid triggers which are known to provoke or precipitate asthma attacks (except exercise) or anaphylaxis.
- Exercise and physical activity should be encouraged, as exercise-induced asthma can be managed. Chlorinated swimming pools may be a trigger for some children.

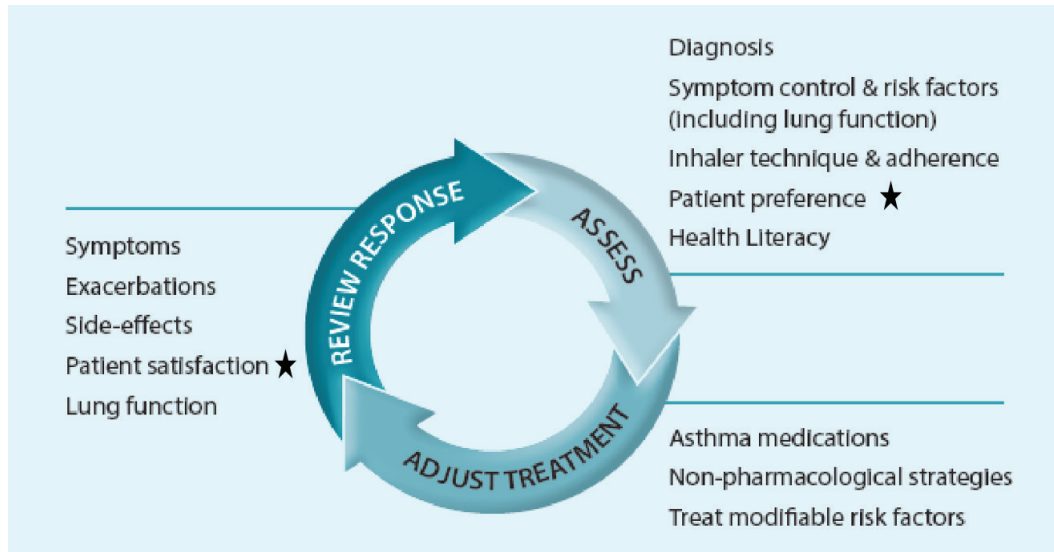
- Psychosocial stressors are potent triggers of asthma symptoms. Identification of these triggers and the introduction of very simple strategies, such as slow, relaxed breathing when stressed, may help the patient and whānau in managing symptoms.
- If anxiety or panic play a part, involve the family to support the patient and consider referral for psychological counselling.
- Dysfunctional breathing or a breathing pattern disorder can be a contributing factor in the severity of asthma. A physiotherapist can advise on breathing awareness and exercises to help relaxation and improve effectiveness of breathing.
- Keeping the nose clear will help asthma control, as it filters, warms and humidifies the air to the lungs. Saline drops and frequent blowing are usually adequate.
- Asthma control may be improved by better insulation and avoiding cold, damp, mouldy or crowded housing.
- Unflued gas heaters may make asthma symptoms worse (<http://www.health.govt.nz/your-health/healthy-living/environmental-health/household-items-and-electronics/unflued-gas-heaters>).
- House dust mite avoidance measures are not effective³⁸ unless the child has symptoms that are clearly triggered on exposure to dust mite allergens.
- A healthy diet is wise, but other modifications to diet are unlikely to improve asthma control unless food allergy is confirmed.

Self-management

Goal: Effective self/family education and management is achieved

- Asthma education and improving health literacy and self-efficacy are fundamental in asthma management, and are the responsibility of all health professionals.
- All patients with asthma and their caregivers should be offered management education, which should include a written personalised asthma

Figure 2: Asthma management as a continuous cycle of monitoring and reassessment, adapted from GINA (1).



*(patient or parent).

- action plan. Ask the patient/parent how best to achieve this.^{6,8}
- Adherence to treatment should be routinely assessed and encouragement provided as part of the self-management education. The health professional should gain an understanding of why the patient/parent is doing anything different^{7,8}
- Asthma management in all contexts needs attention, including child care and school environments, and support of teachers.

Practice points—enhancing self-management

- Asthma education should increase health knowledge about asthma, general health literacy and self-efficacy, and should be reinforced every visit.
- Teach families to recognise when asthma is poorly controlled, know when and how to call emergency services.
- Asthma education should utilise a variety of media, including printed materials as well as verbal explanations, and printed materials in the first language if possible, eg, www.pamp.co.nz, which produces simple, individualised pictorial asthma medication plans in Te Reo Māori, Samoan, Tongan, Tuvaluan and Chinese.²²

- Education should be delivered in chunks and delivered across multiple visits instead of all at once.
- Education should be developmentally appropriate. As children mature, offer further information and coach to take increasing responsibility for their care.
- Inhaler technique should be routinely assessed wherever possible and training provided as part of self-management education.

Asthma action plans

Goal: All children with asthma are provided with an asthma action plan

- To assist in self-management of childhood asthma, consider all of the child’s regular caregivers and environments in preparing and distributing the action plan.
- Asthma action plans that are symptom-based, rather than PEF-based, are preferred in children, although some older children may want a PEF-based plan.
- Child asthma action plans from the Asthma and Respiratory Foundation NZ can be downloaded from <http://www.asthmafoundation.org.nz/> resources
- The *Child Asthma Action Plan* should be written and reviewed with the

family/caregivers. It must be individualised for the child and culturally appropriate (see Appendix A).

- A *Child Asthma Symptom Diary* may be used to clarify the pattern of symptoms and response to treatment, to guide the Action Plan (see Appendix B).

Practice points—asthma action plans

- Always involve the child by using developmentally-appropriate language.
- Ensure the child (in an age appropriate manner) and the family/caregivers understand the plan.
- Keep a record of the plan and provide copies of the *Child Asthma Action Plan* for all caregivers—including child care or school.
- Arrange a formal review, at least annually, of the *Child Asthma Action Plan* with the family/caregivers. Frequency of reviews will be dependent on family/carer's confidence and competence with asthma management.
- Ensure family/caregivers understand the importance of not running out of inhalers and prescribed medication. Check that they know the process for obtaining repeat prescriptions.
- Ensure enough medications are prescribed and reinforce the need for appropriate regular clinical assessment.

Adolescents: getting it right for adolescents with asthma

Goal: Adolescents with asthma transition smoothly towards emerging adulthood, with good asthma control

- Children are normally seen accompanied by a caregiver, with caregivers taking responsibility for management, while most adults are seen on their own and assumed to be self-managing. Adolescents require an approach which is inbetween and enables them to take increasing responsibility. Ensure adolescents have a developmentally appropriate understanding of their asthma and treatment. If they have had asthma for a long time, they may not have had updated information since childhood.

- Assume adolescents are interested in WHY they should control their asthma and HOW it might benefit their own goals, such as by saying, “*good asthma control will help you get on with life*”, which may be more motivating than saying “*Aim for good control*”. Assess compliance with open and nuanced questions, such as “*When you get wheezy, what do you normally do?*” or “*Which doses do you find easiest to remember?*”
- Develop a treatment regimen; consider simple regimes. Ensure the young person is aware of what to do if symptoms escalate, and has someone to contact if they have concerns.
- Offer the chance to ask questions.
- Arrange follow-up appointments and ensure the adolescent knows how and when to instigate appointments.^{7,8}

Practice points—adolescents

- Prioritise the relationship, introduce yourself and offer continuity of care.
- Give adolescents the full consultation time. Consider if a practice nurse could play a coaching role.
- See adolescents individually first, and then with parents/caregivers as appropriate. Ensure the adolescent knows that as they age they will take more responsibility for their own healthcare and that they can make appointments for themselves.
- Explain confidentiality, which can be as simple as having health privacy information on the wall and providing a brief verbal outline, such as “*Your health information is confidential. We are not allowed to tell other people, like school or family members, unless you agree or unless there are serious safety issues.*”
- Explain risks of sharing inhalers with others (infection, inhaler runs out more quickly).
- Ask about smoking and e-cigarettes (vaping) and advise.
- Assume that the young person is likely to have other health issues and questions. Complete a brief HEADSS (Home & Environment, Education & Employment, Activities, Drugs, Sexuality, Suicide/Depression) or holistic

psychosocial assessment if practicable. Ask if they have questions about asthma, or about how they are feeling²³⁻²⁸ (http://www.health.govt.nz/system/files/documents/publications/depression_summary.pdf).

- Consider these eight key points from this recent systematic review:²⁹
 - a) Many adolescents have poor knowledge about asthma and treatments.
 - b) Non-adherence is frequently caused by forgetting to take medication.
 - c) Adolescents with established routines are better able to self-manage.
 - d) Some adolescents do not use treatments or use them incorrectly due to erroneous beliefs about their asthma and medication.
 - e) Asthma self-management is difficult for those with a lack of support at school.
 - f) Parents play a key role in reminding adolescents to take medication.
 - g) Many adolescents are embarrassed about having asthma and using medication, particularly around their friends and peers.
 - h) Many adolescents report difficulties in communicating with their healthcare professional.

Māori—getting it right for Māori children with asthma

Goal: Māori children have asthma outcomes equal to non-Māori and non-Pasifika children

Māori rights in regards to health, recognised in Te Tiriti O Waitangi and other national and international declarations, promote both Māori participation in health-related decision making, as well as equity of health outcomes for all New Zealanders. Currently, Māori with asthma are more likely to be hospitalised or die due to asthma. Despite this, Māori with asthma are less likely to be prescribed ICS, have an asthma action plan or receive adequate education. Major barriers to good asthma management for Māori may include access to care, discontinuity and poor quality care, and poor health literacy. Māori whānau have greater exposure to environmental triggers for asthma, such as smoking and poor housing.^{9,30}

It is recommended that for Māori with asthma:

- Asthma providers should undertake clinical audit or other similar quality-improvement activities to monitor and improve asthma care and outcomes for Māori.³¹
- A systematic approach to health literacy and asthma education for Māori whānau is required. The evidence of the health literacy demands, the barriers and facilitators, and steps to delivering excellent asthma management with Māori, which are described in He Māramatanga Huangō: Asthma Health Literacy for Maori Children in New Zealand (www.health.govt.nz), also apply to adults. Asthma healthcare providers should support staff to develop cultural competency skills for engaging Māori with asthma and their whānau, in line with professional requirements (<http://www.health.govt.nz/publication/equity-health-care-maori-framework>).
- Māori leadership is required in the development of asthma management programmes that improve access to asthma care and facilitate ‘wrap-around’ services to address the wider determinants (such as housing or financial factors) for Māori with asthma (<http://practice.mvcot.govt.nz/policy/assessment-and-decision-making/resources/working-with-maori.html>; <http://what-works.org.nz/kaupapa-maori/>).

Pacific peoples—getting it right for Pacific children with asthma

Goal: Pacific children have asthma outcomes equal to non-Pacific & non-Māori children

The Pacific population is diverse and growing fast, with Pacific children numbering one in four babies born in Auckland. Pacific children have great disparities and unequal access to healthcare compared with other New Zealand children, which is well documented.³²⁻³⁷ Changes will come from health workers understanding the drivers for poor health in minority groups, and action at multiple levels of the health and social systems. Central action to improve the health of Pacific children will

be a commitment to work with the strengths of the Pacific communities.

The following recommendations for health services and practitioners are based on theory and lessons from good practice:

- Understand the Pacific population profile, with the majority living in urban areas. Perform an audit on the clinical activities and understand who is registered with the service, and who is registered but does not attend.
- With over 60% of Pacific children living in families with hardship and 30% in severe hardship, material insecurities will affect the family's engagement with health providers. Practitioners should explore these insecurities and set up effective pathways to address them.
- Research shows communication difficulties are a barrier for healthcare. Assess the level of English language proficiency, and use interpreters if necessary. The Health and Disability Commissioner's Code of Rights (<http://www.hdc.org.nz/the-act--code/the-code-of-rights>) outline the right to a competent interpreter.

Health systems approaches

Goal: All aspects of the health system will support better asthma care, aiming to decrease inequities and improve outcomes

Good asthma management requires a system approach incorporating information systems to improve quality and service delivery. The following are recommended:

- Educate clinicians by providing educational outreach visits, such as training visits to GP practices.
- Computerised decision-support systems, such as web-based systems for self-management. These should

incorporate simple tools for the assessment and monitoring of asthma control.

- School-based asthma interventions, such as education programmes and *Asthma Friendly Schools*.
- Pharmacy-based interventions, such as inhaler technique education and the identification of asthma medicine uptake from dispensing history, eg, infrequent preventer dispensing history.
- Continuity of care between doctors, nurses, pharmacists and patients.

Medicines

Inhaler devices at different ages

Goal: The correct inhaler device is considered and age appropriate

- Prescribe an inhaler device that is appropriate for the development of the child and that the child and/or caregiver is able to demonstrate they can use well (Table 4).
- Health professionals who teach patients should ensure they have correct inhaler technique themselves.
- When teaching inhaler technique, have the child or caregiver demonstrate how they use the device. Use checklists and reminder lists to identify and correct errors.
- Inhaler technique needs to be taught repeatedly. Check inhaler technique and adherence every visit by asking child or caregiver to demonstrate how they use the device.
- Advise not to share inhalers.
- Consider alternative inhaler devices if the patient has persistent difficulty with technique.

Table 4: Inhaler devices recommended by age group.

Inhaler device	<2 years	2–4 years	5–7 years	8–15 years
MDI, small volume spacer & mask	Yes	May transition to no mask		
MDI & spacer No mask		Possible	Yes	Yes
MDI (alone)*				Possible, but use with a spacer is preferable
Dry powder device			Possible	Yes
Breath-activated device			Possible	Yes

*A spacer should be used with the metered dose inhaler (MDI) for the regular administration of inhaled corticosteroids, and for the administration of short-acting beta agonist (SABA) in the setting of an acute attack. The use of a spacer is always recommended.

Figure 3: Stepwise approach to treatment of children with wheeze 1–4 years.

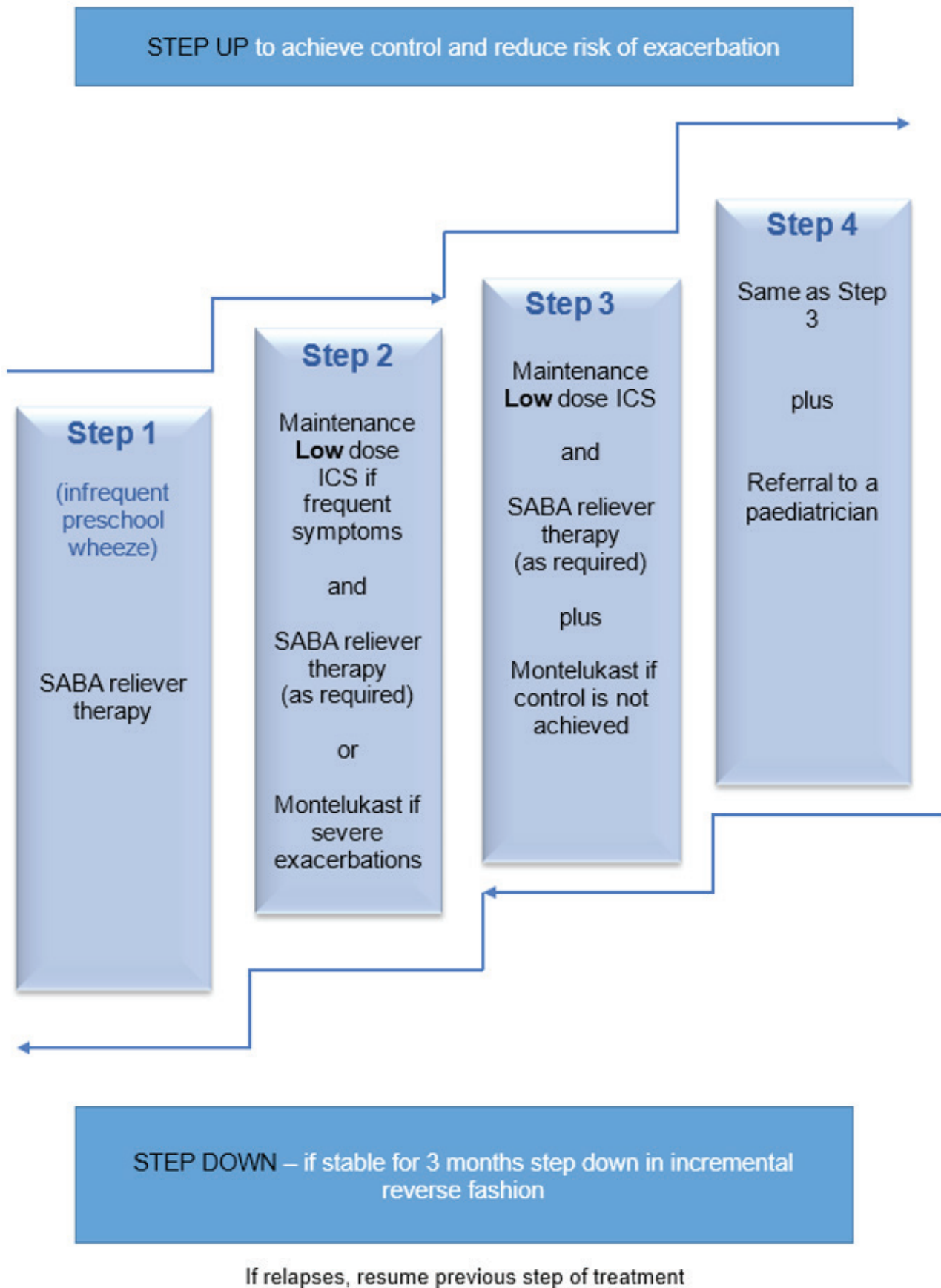
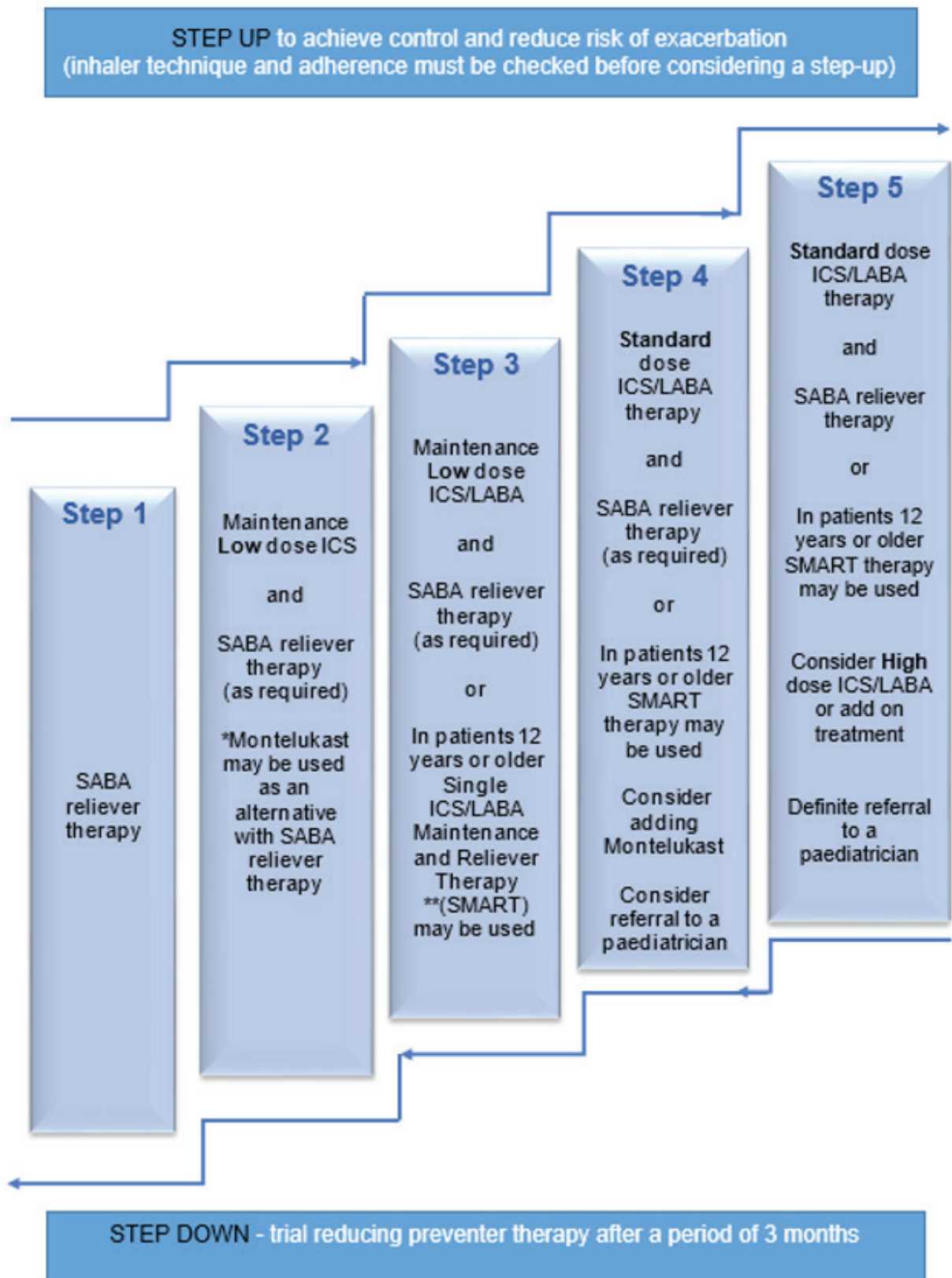


Figure 4: Stepwise approach to treatment of children with asthma 5–15 years.



*Montelukast not funded in this instance

**Budesonide 100mcg and Formoterol 6 mcg

Stepwise approach to long-term asthma treatment

Goal: The right step of medicine in the right device is used for the age and symptoms of the child

- In the stepwise approach to management, children step-up and down therapy as required to achieve and maintain control of their symptoms and reduce the risk of exacerbations.^{6,8,39}
- Achieving good control requires frequent and repeated assessments. This may require the use of recall or follow-up systems.
- At each step, check inhaler technique, adherence to treatment, understanding of a self-management plan, and barriers to self-care.^{6,8,42-46}

Practice points—stepwise management

- Step-up and step-down are determined by asthma control (see section *Evaluation of asthma control and severity*). Step-up may be required when asthma is partially controlled or uncontrolled. Once asthma has been well-controlled for at least eight weeks, consider step-down and reassess control after at least eight weeks.
- Many children have intermittent asthma (Step 1) and do not need an asthma preventer.
- Recommended doses of ICS are lower in children than adults (see Table 5). The usual maximum daily dose in children is also lower than adults, and equivalent to beclomethasone 800 micrograms or fluticasone propionate

500 micrograms. Both these doses are at the top of the dose response curve. If this dose is exceeded there is no therapeutic benefit and there is an increase in adverse medication effects. At Step 5, oral steroids, oral theophylline and even subcutaneous monoclonal antibody therapy (IgE) may be considered as an add-on treatment, if directed by a paediatrician.

- Alternative therapies, such as sodium cromoglycate, may be considered in some children on the lower steps. Long-acting muscarinic receptor antagonists may be future add-on therapy, such as tiotropium, which is currently licensed for use but not funded for asthma indications in New Zealand.²¹
- Remember non-pharmacological approaches to management as well as medicines (see *Health Professional Top 10 Actions* and *Non-pharmacological measures* sections).

Initial treatment choices (when to add ICS)

Goal: For all children with asthma it should be clear if ICS should be prescribed, and if so, a prescription given and the medicine taken

- At initial diagnosis, all children with asthma should be provided with a short-acting beta-agonist (SABA) to take as required for relief of symptoms.
- The key issue is when to start ICS therapy. It is recommended that ICS therapy is introduced if children have symptoms >2 times per week.

Table 5: The recommended low and standard daily dose of ICS in children with asthma. “High” doses are double the standard doses (see Tables 4 and 5).

Low dose		Standard dose	
Beclomethasone dipropionate	200mcg/day	Beclomethasone dipropionate	400-500mcg/day
Beclomethasone dipropionate ultrafine	100mcg/day	Beclomethasone dipropionate ultrafine	200mcg/day
Budesonide	200mcg/day	Budesonide	400mcg/day
Fluticasone propionate	100mcg/day	Fluticasone propionate	200-250mcg/day

- An exacerbation requiring oral steroids in the previous year is widely regarded as a requirement for regular ICS therapy.

Practice points on ICS

- The daily doses of ICS in children, which achieve 80–90% of maximum efficacy, are the low doses shown in Table 5. The doses labelled ‘standard’ doses are the same microgram/day ‘standard’ doses in the adult asthma guidelines.
- ICS should be administered from a MDI with spacer, or from a dry-powder inhaler. The child’s ability to use the inhaler should be checked.^{6,7,47,48}

When to add long-acting beta-agonist (LABA) therapy

Goal: LABAs should never be prescribed without ICS

- Combination ICS/LABA combined single inhaler treatment should be prescribed at a fixed maintenance dose and patients also prescribed a SABA as a reliever therapy. LABA monotherapy is unsafe.
- LABAs should not be used in children ≤4 years of age.
- LABAs (with ICS) should not be initiated when the child is clinically unstable. They should be stopped if they are ineffective or worsen asthma stability.
- The SMART (Single Maintenance And Reliever Therapy) regimen is an alternative for children 12 years or older. It

involves using a low-dose budesonide–formoterol combination powder inhaler. The same inhaler is used for both regular twice-daily maintenance use, and for relief of symptoms, instead of salbutamol.^{7,45,49,50} A self-management plan prototype is in the Adult Asthma Guidelines.⁹

- The LABA should be stopped if the child deteriorates after starting it.
- The LABA should be stopped after three months if ineffective.

Treatment of acute severe asthma (primary care, after-hours care or ED)

Goal: All children should be managed to avoid life-threatening asthma or death

- Acute asthma management is based on:
 - Objective measurement of severity.
 - Assessment of the need for referral to hospital and/or hospital admission (Table 5).
 - Administering treatment appropriate for the degree of severity.
 - Repeatedly reassessing the response to treatment.
- Monitor pulse rate, respiratory rate, accessory muscle use and ability to speak (words/breath).
- Key priorities include identification of a life-threatening attack requiring urgent admission to intensive care, and a severe asthma attack requiring hospital admission (Table 6 and Figure 6).

Table 6: Criteria for acute referral to hospital and/or hospital admission in children and adolescents.

<ul style="list-style-type: none"> • Child with any feature of life-threatening asthma • Child with any feature of an acute severe attack persisting after initial treatment • Child in whom other considerations suggest that admission may be appropriate: <ul style="list-style-type: none"> - Still have significant symptoms - Psychosocial problems in child or parent/caregiver - Physical disability or learning difficulties - Previous near fatal or brittle asthma - Exacerbation despite adequate dose of oral steroids pre-presentation - Presentation at night - Remote location or without transportation/communication

Practice points—acute severe asthma

- A lack of response to initial bronchodilator treatment and/or a requirement for repeat doses two-hourly or more often indicates the need for referral to hospital and/or admission.
- For most children, initial treatment with beta-agonist via a spacer and oral steroids is likely to be sufficient. Reserve nebulised beta-agonists for those with severe asthma who require continuous oxygen.
- The standard regimen for a course of prednisone in the situation of severe asthma is 1–2 milligrams/kg (to a maximum of 40 milligrams) daily for 3–5 days.
- Steroids, such as oral prednisone are not likely to be effective in children <5 years. In this age group, they should be reserved for children admitted to hospital (or who are en route) and who are on oxygen.
- In hospital consider IV magnesium sulphate, aminophylline or salbutamol according to local protocol.
- Non-invasive ventilation in life-threatening asthma is not recommended outside of an intensive care setting.
- For children with acute severe asthma who are treated in primary care or discharged from the after-hours clinic or ED, long-term management should be reviewed and follow-up appointment within the week with their primary healthcare team should be arranged.
- All children ≥5 years who have presented with acute severe asthma and who are not taking ICS should be prescribed ICS before going home.^{8,51–57}

Figure 5: Algorithm for community management of moderate, severe and life-threatening acute asthma in children and adolescents. (Mild asthma is asthma symptoms not usually requiring medical attention and should be managed according to the asthma action plan.)

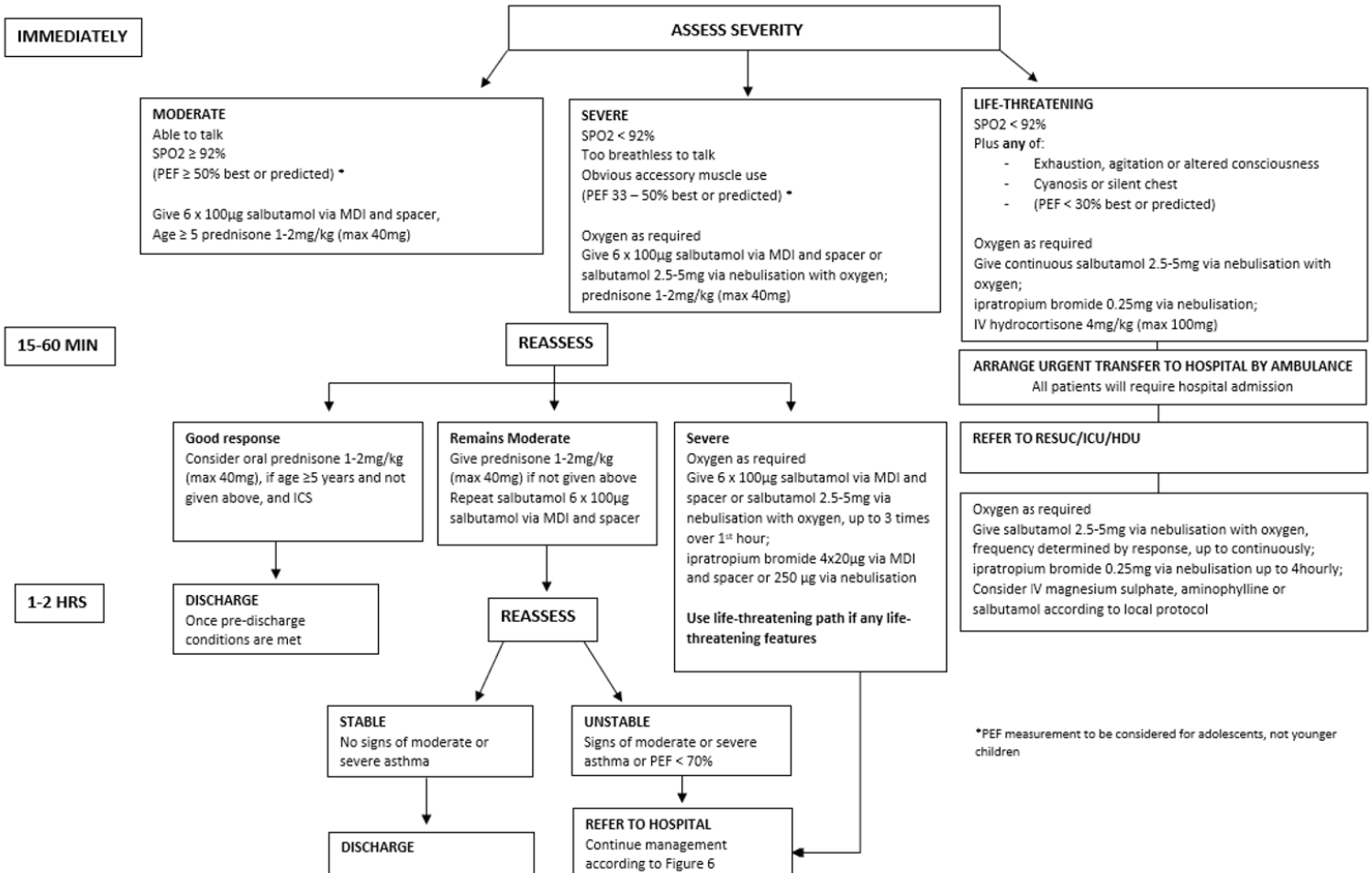


Table 7: Pre-discharge considerations in children and adolescents.

1. Most children presenting with acute exacerbations of asthma should have a course of oral prednisone, 1–2 milligrams/kg (to a maximum of 40 milligrams) daily for 3–5 days.
2. All children admitted to hospital for asthma should have a structured review assessing control, inhaler technique, asthma education, an action plan and follow-up.
3. It is recommended that children have prednisone and ICS dispensed prior to discharge to ensure there are no barriers to taking medication.
4. Before sending a child home, ensure that the child with caregiver:
 - Understands treatment prescribed and the signs of worsening asthma.
 - Can demonstrate inhaler use correctly and has a supply of the medication.
 - Understands how to contact emergency services/seek further advice if symptoms deteriorate (ie, has an action plan).
 - Arranges an early follow-up appointment with their primary healthcare team for review (within a week).
 - Consider referral to asthma educator.
 - Consider housing and social implications, eg, social worker involvement.
 - Encourage notification of hospital admission to school or child care centre.

Checks at follow-up visit after admission

1. Clinical assessment—resolution of symptoms and signs would be expected.
2. Consider spirometry in older children.
3. Understands treatment prescribed and the signs of worsening asthma.
4. Can demonstrate inhaler use correctly and has a supply of the medication.
5. Understands how to contact emergency services/seek further advice if symptoms deteriorate.
6. Check written action plan.
7. Check housing and social implications.

Appendix A



Well

When I'm well:

- I have no cough
- I play just like other children
- I use my reliever puffer less than 2 times a week

My puffers are:

Preventer: I take this every day even when I'm well.
 The name of my preventer is _____ The colour is _____
 I take _____ puffs in the morning and _____ puffs at night through a spacer.

Reliever: I take this only when I need it
 The name of my reliever is _____ The colour is _____
 I take _____ puffs through a spacer when I wheeze, cough or when it's hard to breathe.

If I find it hard to breathe when I exercise I should: Take _____ puffs of my reliever



Worse

When my asthma is getting worse:

- I cough or wheeze and it's hard to breathe, or
- I'm waking at night because of my asthma, or
- I cough or wheeze when I play, or
- I need my reliever inhaler to control my asthma more than 2 times per week

If my asthma gets worse I should:

Keep taking my preventer every day as normal and take _____ puffs of my reliever every 4 hours
 If I'm not getting better doing this I should see my doctor today

Contact:



Worried

My asthma is a worry when:

- My reliever isn't helping, or
- I'm finding it hard to breathe, or
- I'm breathing hard and fast, or
- I'm sucking in around my ribs/throat, try looking under my shirt
- I'm looking pale or blue

• Sit me down and try to stay calm

• Give me 6 puffs of reliever through a spacer, taking 6 breaths for each puff

• **If I don't start to improve I need help now** →

Emergency

DIAL 111 and ask for an ambulance

WHILE YOU'RE WAITING:

- Try to stay calm and keep me sitting upright
- Give 6 puffs of reliever through a spacer every 6 minutes with 6 breaths for each puff until help arrives

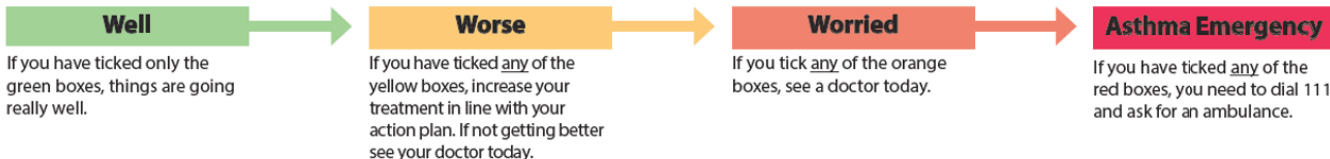
Date Prepared: _____ Doctors Signature: _____ Plan to be reviewed when treatment changed

Appendix B

Doctor: _____ Preventer: _____ Reliever: _____

If you are frightened at any stage call 111

Refer to the symptoms key to help you fill in the symptom diary chart below. Use this Symptom Diary along side your Asthma Action Plan.



Date	Did you cough today?	Did you wheeze today?	Did your asthma affect your normal activity?	Did your asthma wake you up in the night?	How many doses of reliever did you take today?	Comments

Appendix C

- List of organisations and individuals consulted for feedback:
- All DHBs
- All PHOs
- Asthma NZ
- Australasian College of Emergency Medicine
- Authors of adult guidelines
- Breathing works
- Canterbury Health
- Conference delegates
- Departments of General Practice for Medical Schools
- General Practice NZ
- Health Informatics NZ
- Health Information Standards Organisation
- Ian Town
- Internal Medicine Society of Australia and NZ
- Julian Crane
- Kidz First
- Maternal and Child Health Mid-Central District Health
- Medtech
- Ministry of Education
- Ministry of Health NGO
- National Health IT Board
- Ngā Kaitiaki Te Punao Rongoā Aotearoa, Māori Pharmacists' Association
- NZ Medical Association
- NZ Resuscitation Council
- NZ Speech Therapists Association
- NZNO & NZNO Respiratory Nurses Section
- Paediatric Society
- Paediatrics' Otago Medical School
- Pasifika GP Network
- Pasifika Medical Association
- PHARMAC Pharmaceutical Management Agency
- Pharmaceutical Society of NZ
- Pharmacy Guild of NZ

Philippa Howden-Chapman	St Johns Ambulance
POI Team Public Health South	Starship Children's Health
ProCare Clinical Advisory Committee	Te Ora: Māori Medical Practitioners
Respiratory and Sleep Medicine Auckland University	Te Rūngāngao Aotearoa (NZNO Māori)
Royal Australasian College of Physicians	Thoracic Society of Australia and NZ—NZ Branch
Royal NZ College of GPs	TSANZ Nurses special interest group
Special Education	Wellington Free Ambulance

Competing interests:

Dr Harwood reports personal fees from Astra Zeneca Limited outside the submitted work; Dr Reid reports affiliation with Contract Research outside the submitted work; Dr Asher reports one grant from Boehringer Ingelheim New Zealand outside the submitted work; Dr Ingham reports personal fees from Te Hā Ora: The Asthma & Respiratory Foundation of New Zealand, grants from Janssen Research & Development, non-financial support from Astra Zeneca, outside the submitted work; Teresa Demetriou reports grants from REX Medical outside the submitted work.

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