ASTHMA IN CHILDREN | HBA1C FOR DIAGNOSIS | INITIATING INSULIN | SUBSTANCE MISUSE IN ADOLESCENTS

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ACKNOWLEDGEMENT
We would like to acknowledge the following people for their guidance and expertise in developing this edition:

Dr Sue Bagshaw, Christchurch
Dr Rick Cutfield, Auckland
Dr Paul Drury, Auckland
Gavin Hendry, Dunedin
Andrew McKean, Christchurch
Dr David McNamara, Auckland
Dr Sharon Sime, Wellington
Dr Neil Whittaker, GP Reviewer, Nelson

CONTACT US:

Mail: P.O. Box 6032, Dunedin
Email: editor@bpac.org.nz
Phone: 03 477 5418
Free-fax: 0800 27 22 69

www.bpac.org.nz

Best Practice

Issue 42 February 2012

Best Practice Journal (BPJ)
ISSN 1177-5645
BPJ is published and owned by bpac^{nz} Ltd
Level 8, 10 George Street, Dunedin, New Zealand.

Bpac^{nz} Ltd is an independent organisation that promotes health care interventions which meet patients' needs and are evidence based, cost effective and suitable for the New Zealand context.

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Bpac^{nz} Ltd is currently funded through contracts with PHARMAC and DHBNZ.

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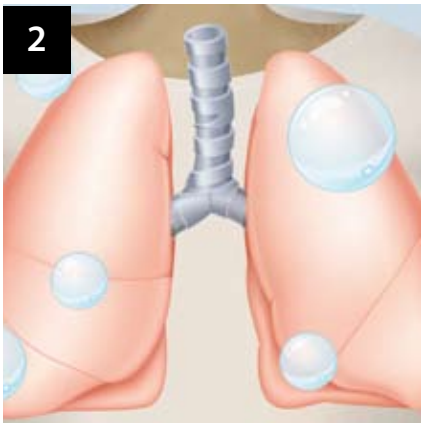
Issue 42 February 2012



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Diagnosing and managing asthma in children

New Zealand has one of the highest rates of childhood asthma in the developed world.[1] It is the leading cause of sleep disturbance, missed school days and hospital admissions in children, and more than one in four children have some form of asthma or asthma symptoms.[2] Asthma affects Māori and Pacific children disproportionately to other children in New Zealand. Asthma management varies depending on the age of the child (i.e. under or over age five years) and the severity of symptoms. The following article outlines the diagnosis and management of asthma in children aged one to 15 years, and is based on the British Thoracic Society/ Scottish Intercollegiate Network guideline,[3] adapted to reflect New Zealand practice.

Asthma is "chronically common" amongst New Zealand children

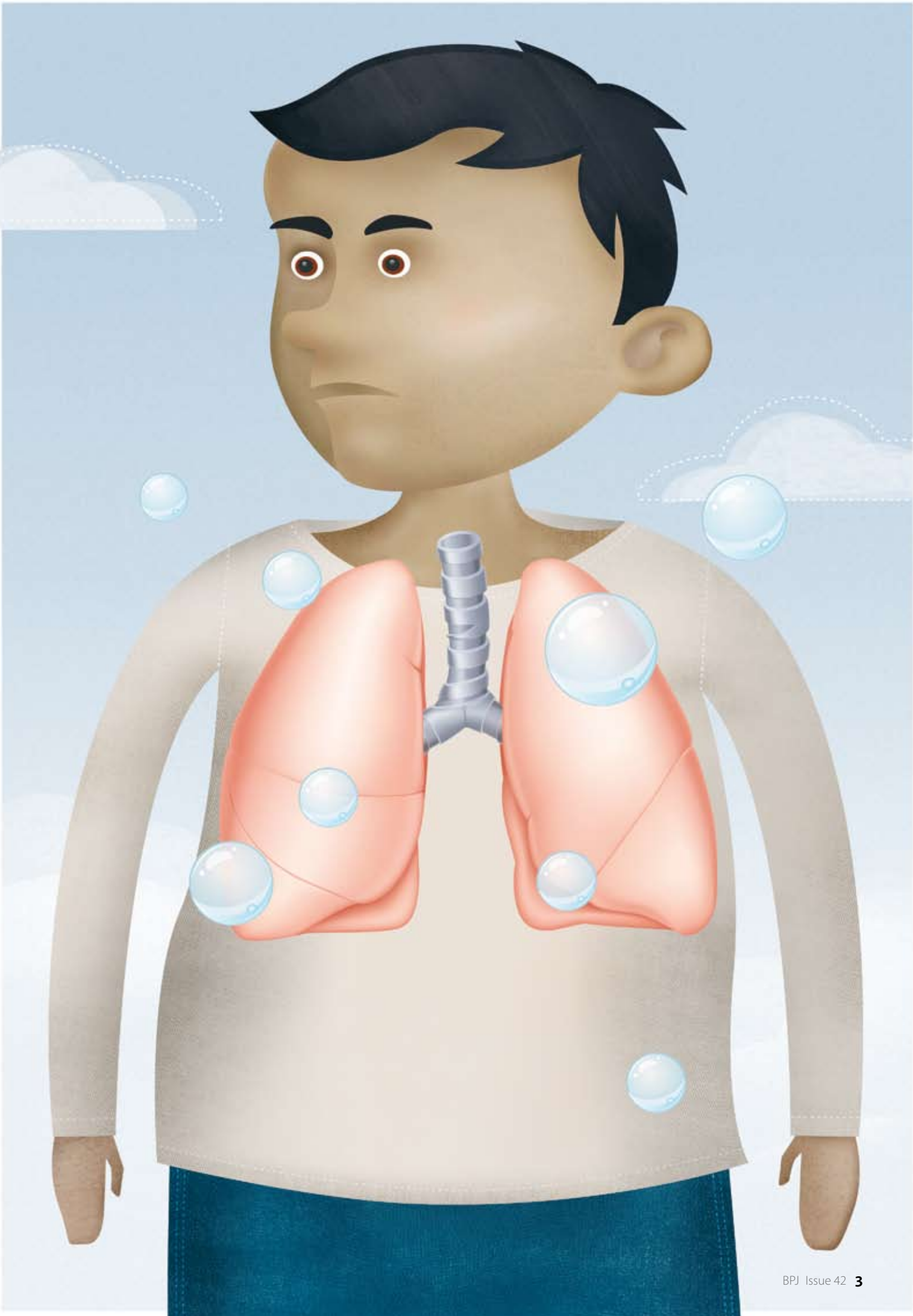
Symptoms of wheeze or asthma most commonly develop in early childhood. However, in 50–75% of children, these symptoms resolve by adulthood.[2] Accurate diagnosis and management will allow children with asthma to have a quality of life no different from children without asthma. Poor management, incorrect diagnosis, under or over-prescription of medicine can lead to lower quality of life and adverse effects later in life.[4]

In New Zealand, the prevalence of current asthma symptoms is greater in Māori (28.5%) and Pacific children (25.2%) than European children (20.7%).[5] This disparity appears to be growing and continues among adults.[6] Māori and Pacific children have a greater frequency of severe asthma than European children and are more likely to be admitted to hospital and have days off school for asthma-related illness.[7] There are also disparities in clinical care with caregivers of Māori and Pacific children reporting lower rates of receiving "easy to understand" education about asthma and action plans than caregivers of European children.[8] Māori and Pacific children also appear less likely to receive inhaled corticosteroids for their asthma than European children.[8]

While the reasons for this disparity are difficult to pinpoint it is likely that the differences are influenced by environmental factors, health literacy, housing standards/crowding and the prevalence of smoking among household members. Difficulty in accessing primary healthcare is also likely to play a large role. The challenge is for primary healthcare to assist in addressing these disparities, to detect asthma early and to manage it effectively, while minimising unnecessary treatment caused by inaccurate diagnosis.

Diagnosing asthma in children

The diagnosis of asthma in children is clinical and based on history, examination and assessing the response to treatment. While investigations such as respiratory function testing may be helpful in pointing to a diagnosis, there is no single



Shortness of breath mimicking asthma

While exercise is a common trigger of asthma, exercise-induced dyspnoea and laryngeal dysfunction both produce breathlessness and are commonly misinterpreted as asthma. These conditions may be differentiated from asthma by exercise testing. Children with asthma will develop increased airway obstruction on spirometry if they are symptomatic with exercise. Children with laryngeal dysfunction present with stridor which is difficult to separate from wheeze. It is usually only present during vigorous exercise and is difficult to reproduce in a laboratory setting. Older children who are involved in sports to a high or elite level may present with exercise-induced dyspnoea as they reach the physiologic limits of their performance. This can be identified by observing no reduction in lung function with exercise testing.[9]

Children with hyperventilation syndrome may also present with symptoms similar to asthma. This syndrome can be identified through observing the patient breathe by moving their upper chest and shoulders rather than their abdomen, particularly when discussing symptoms, and asking about symptoms of tingling around the lips and mouth, palpitations and faintness. A non-judgmental description of the problem and demonstration of normal abdominal breathing is usually successful in resolving mild cases. However, referral to a physiotherapist specialised in the disorder may be required to correct the breathing pattern. Laryngeal dysfunction and hyperventilation-syndrome may co-exist with asthma, complicating diagnosis and management.

diagnostic test for asthma in children. The likelihood of a child having asthma is determined by how well the symptoms fit the typical pattern of recurrent episodic symptoms, including wheeze, and whether features to suggest an alternative diagnosis are present.[3]

Symptoms of asthma

The typical clinical pattern of asthma in children is recurrent and episodic symptoms of:

- Wheezing
- Cough
- Difficulty breathing
- Chest tightness

Other factors which can help indicate asthma are:

- A personal history of atopy
- Family history of asthma or atopy
- Widespread wheeze on auscultation
- An improvement in symptoms or lung function with treatment (bronchodilators or inhaled corticosteroids)

Wheezing

Wheezing is the most familiar and useful sign for the diagnosis of asthma but is just one of a large number of respiratory noises children make. Parents may use the term "wheezing" non-specifically to describe any respiratory noise such as stridor or rattly breathing. Therefore, it is essential to confirm that they are describing: "a high-pitched musical or whistling sound coming from the chest".[3] Acute, severe episodes of wheeze are most often triggered by viral illnesses. Symptoms between severe episodes (**interval symptoms**) may occur in response to a trigger such as exercise, cold or damp air and exposure to pets or with emotion and laughter. Symptoms may be worse at night or in the early morning.

Wheeze alone is not necessarily indicative of asthma.[3, 9-11] Wheezing may be seen in other disorders, which should be considered in the differential diagnosis, including: inhaled foreign body, laryngeal abnormalities, congenital airway narrowing, chronic aspiration of feeds/gastro-oesophageal reflux, bronchiectasis, cystic fibrosis and primary or acquired immune deficiency syndromes. Signs suggesting a disorder other than asthma include very sudden onset of symptoms, abnormal voice or cry, continuous daily wheeze, wheeze that has been persistent since infancy, failure to thrive, digital clubbing, a chronic moist or wet-sounding cough, persistent diarrhoea and recurrent skin or other infections. Further

investigations and treatment may be discussed with a paediatrician where necessary.

Wheeze in children aged under five years

Wheeze in response to a viral illness is common in children aged under five years. Children aged under one year with symptoms of wheeze should generally be regarded as having bronchiolitis, or another disorder causing wheeze, and not asthma.

Many children with episodes of wheeze commencing under age five years will have transient wheeze and resolution of their symptoms by mid-childhood.[12] However, a proportion of children will have persistent wheeze and have asthma when they reach school-age. Unfortunately, at the time of presentation it is not possible to clinically separate those with transient wheeze and those who will have persistent wheeze and asthma. In addition, children aged under five years are not reliably able to perform lung function testing. Assessment in pre-school children should be directed at eliminating other causes (by history and examination), assessing bronchodilator response to see if this is a useful symptomatic treatment and determining whether interval symptoms are present. Symptoms that are persistent from infancy, especially if continuous, should suggest an alternate diagnosis and discussion with a paediatrician is recommended.

The asthma cough

Cough is a common symptom of asthma, however, it is very unlikely that a cough in the absence of wheezing is due to asthma.[13] The diagnosis of "cough-variant asthma" should no longer be used. Asthma cough is often dry and occurs in response to a trigger. During exacerbations the cough may be wet or moist-sounding due to increased mucous production.

A chronic or frequent, wet or moist-sounding cough, particularly on waking or with exercise, is suggestive of chronic suppurative lung disease such as bronchiectasis or cystic fibrosis rather than asthma. Children with a chronic cough lasting longer than six weeks (other than pertussis) should be referred for a chest x-ray and further investigation. Unlike adults, trials of treatment for asthma, reflux or hay fever in children with chronic cough, prior to performing investigations, are not appropriate unless there are specific features suggesting an underlying cause.[14]

Personal and family history of atopy

A diagnosis of asthma is more likely if the child has a history of associated eczema or hay fever.[9] A history of asthma or atopy in a close relative also increases the likelihood of a diagnosis of asthma in the child. Positive skin prick tests for aeroallergens (e.g. house dust mite, cat dander) or a raised eosinophil count may be helpful in confirming an atopic tendency although aeroallergens are difficult to avoid except in the case of sensitisation to a household pet.

Lung function testing and other investigations for asthma

Lung function testing in children is time-consuming and needs active participation both for the patient and the person performing the test. Therefore, it may not be easy to perform reproducibly in primary care. In secondary care spirometry may be used in children aged over five years to aid in diagnosing asthma, assessing treatment response and monitoring. Children aged under five years are unlikely to produce consistent or reliable results on a spirometry test. Normal results do not exclude asthma and many other respiratory diseases will lead to abnormal results.[3]

A measure of clinical responsiveness to a bronchodilator can support a diagnosis of asthma.[3] This can be assessed in primary care by observing an improvement in symptoms, work of breathing or a >12% improvement in peak expiratory flow rate (PEFR) 20 minutes after inhaling six puffs of salbutamol administered via a spacer. Regular PEFR monitoring is generally considered inaccurate in children. Forced expiratory volume in one second (FEV1) is a more reproducible measure and hand-held electronic meters are now available which can measure this.

Assessing the probability of asthma

After a clinical assessment of the child's symptoms, history and other factors, the probability of a diagnosis of asthma can be determined.

High likelihood of asthma

Children with typical history and examination findings for asthma and without features to suggest an alternate diagnosis have a high likelihood of asthma. Further investigations, such as chest x-ray or spirometry, are unnecessary prior to commencing treatment. Initial treatment should be based on the severity and frequency of the asthma symptoms using the step-wise treatment plan (over page).

The response to treatment should be assessed within two to three months. If the child has responded, then continue treatment, titrating up and down steps as appropriate for the severity of symptoms. If the child has not responded, discussion with a paediatrician is recommended for consideration of other diagnoses.

An intermediate likelihood of asthma

In children with wheeze, who do not fit the clinical pattern for asthma but do not have signs to suggest an alternate diagnosis, the most practical first step may be to wait and review in one month. Alternatively, a trial of asthma treatment may be commenced and the response assessed. Symptoms may resolve with time, therefore the return of symptoms following the withdrawal of asthma treatment is particularly helpful in establishing a diagnosis. A positive response to bronchodilator testing (if the child is old enough) increases the likelihood of asthma. If there is no response after one month of treatment, discussion with a paediatrician about other diagnoses should be considered.

Low likelihood of asthma

Children who have features that suggest an alternate diagnosis and whose clinical pattern on history and examination are not consistent with asthma have a low likelihood of asthma. Further investigation should be carried out as appropriate and discussion with a paediatrician is recommended. Diagnostic trialling with asthma medication is unlikely to be beneficial in this group.

Long-term management of asthma

Most guidelines recommend a step-wise approach to management in order to titrate treatment to achieve symptom control and minimise adverse effects.

Step 1: SABA alone

Step 2: **A:** Add ICS at low dose

B: Increase ICS to moderate dose

Step 3: Add LABA

Step 4: High dose ICS+LABA and/or add oral medication – consider referral to paediatrician

Step 5: Frequent or continuous oral steroids – definite referral to paediatrician

SABA = Short-acting beta 2-agonist, ICS = Inhaled corticosteroid, LABA = Long-acting beta 2-agonist

In children assessed as likely to have asthma, treatment can be commenced with consideration of the following practice points:

- Treatment should be commenced at the lowest step consistent with the frequency of symptoms
- Children with only intermittent symptoms can be commenced on Step One
- Children with frequent interval symptoms should be commenced on Step Two
- Assessment of severity will change with response to treatment and the level of ongoing treatment is determined by the level of control achieved
- Children should be assessed after two to three months (or sooner if clinically indicated or on Step 4 or 5) and treatment titrated up or down on the step-wise treatment plan according to the level of control achieved
- Treatment should be titrated to the lowest step that achieves control of symptoms

Treatment in children aged one to five years

Most children aged one to five years with wheeze will only have symptoms when acutely unwell with a viral illness. Treatment should be symptomatic with bronchodilators during these periods. Children without interval symptoms will not benefit from inhaled corticosteroids (ICS) and maintenance treatment is not indicated. Montelukast (a leukotriene receptor antagonist) can be effective for these children to prevent and treat exacerbations but is not currently funded in New Zealand.[15]

A proportion of children aged one to five years will have persistent or interval symptoms between viral illnesses. These children can be managed similarly to older children with asthma but with ICS maintenance treatment directed at control of the interval symptoms rather than preventing exacerbations.[15] Treatment should be for three month periods and, unlike in older children, should be trialled off (after tapering) rather than titrated down if interval symptoms resolve.

Step One – short-acting beta-2 agonists

All children with symptomatic asthma should be prescribed a short-acting beta-2 agonist (SABA) such as salbutamol or terbutaline. This is for symptomatic relief and is taken as required. Regular SABA use is not more effective than "as needed" use. Good asthma control is associated with little or no SABA use and children with increasing or high frequency of SABA use should have their asthma management reviewed.

Children with mild intermittent asthma should be treated with SABA only, as needed. Children with more persistent symptoms should start on Step Two. Children who commence on Step One but are poorly controlled should progress to Step Two.

Using two or more canisters of beta-2 agonists per month or >10-12 puffs per day is a marker of poorly controlled asthma that puts children at risk of potentially life-threatening asthma.

Step Two – Regular preventer treatment

The addition of inhaled corticosteroids (ICS) may be beneficial for children whose symptoms are uncontrolled on Step One or whose asthma symptoms are more severe.

There are a variety of types and strengths of ICS. As a rough guide; 200 mcg beclomethasone = 200 mcg budesonide = 100 mcg fluticasone.[3] An ICS should be administered via the same inhaler device as the child's SABA. Children should be advised to clean their teeth or rinse their mouth after using their ICS inhaler to remove any steroid from the oral cavity.

Initial treatment is one puff, twice daily of fluticasone 50 mcg or beclomethasone/budesonide 100 mcg.

Initiate treatment at a low dose if the asthma symptoms are mild yet not controlled with a SABA. The lower dose inhalers should be prescribed initially (50 mcg fluticasone or 100 mcg of beclomethasone or budesonide). The initial starting treatment for mild symptoms should be one puff, twice daily of the lowest dose inhaler. If control is not achieved, or symptoms are moderate or severe, the dose should be doubled to two puffs, twice daily (i.e. total daily dose 200 mcg fluticasone or 400 mcg of beclomethasone or budesonide). Adverse effects on growth and adrenal function are unlikely at these levels. Higher doses should not be used in children aged under 12 years without trialling the addition of a long-acting beta-2 agonist (LABA).

Inhaled chromones (e.g. sodium chromoglycate or nedocromil sodium) may be used as an alternative initial preventer treatment in children aged over five years, but require frequent dosing which makes them second-line treatment. An oral leukotriene antagonist (e.g. montelukast) may also be used as initial preventer treatment, particularly in children aged under five years, but these are currently not funded.

Best Practice tip: Ensure that patients and their caregivers understand that they should continue to use their "preventer" until instructed otherwise, even if they experience asthma symptoms (i.e. no longer "preventing" symptoms).

Step Three – Initial add-on treatment

If control is not achieved with a SABA and an ICS preventer, then additional treatment will be needed. It is recommended that children aged under five years are referred to a paediatrician at this point. For children aged 5–12 years adding a long-acting beta-2 agonist (LABA) should be considered. The maximum dose for a LABA in children is 50 mcg salmeterol, twice daily or 12 mcg eformoterol, twice daily.

It is unsafe for a LABA to be used without an inhaled corticosteroid

A LABA should only be used if the child is receiving an ICS, therefore to increase compliance and safety it is recommended that a combination LABA/ICS inhaler is prescribed (fluticasone with salmeterol or budesonide with eformoterol) where possible. Recent changes to Special Authority restrictions now means that there is no requirement for a three month trial period on separate LABA and ICS inhalers before prescribing a combination inhaler. Patients must, however, have previously been treated with an ICS – at least 400 mcg/day beclomethasone or budesonide, or 200 mcg/day fluticasone in a child aged under 12 years and at least 800 mcg/day beclomethasone or budesonide, or 500 mcg/day fluticasone in those aged over 12 years.

For further information see: "Schedule changes for asthma inhalers", Page 12

The response to the LABA should be assessed two to four weeks after the treatment begins. Continue treatment if there is a positive response. However, if there is no response or a negative response proceed to Step Four and consider stopping the LABA.

Step Four – Poor control on moderate ICS and LABA

The principle causes of persistent poor control of asthma in children are non-adherence or poor technique with inhalers, environmental tobacco smoke exposure and psychosocial stressors.[16] These issues need to be identified and addressed before medication is increased. A home visit by the local Asthma Society or district nurse may be helpful. Allergy testing for aeroallergens and dust-mite avoidance measures may also be useful at this stage. Although allergen reduction and avoidance is hard to implement and is unlikely to improve asthma control, it may avoid the necessity for further medication in some cases.

Asthma in children with food allergy

Children with food allergy are at an increased risk of life-threatening anaphylaxis if they also have asthma. Good control of asthma is essential in this group. These children should have an allergy action plan and carry an adrenaline pen if needed.

Healthy homes, healthy lungs

There are many environmental factors that can cause or exacerbate asthma in children. Tobacco smoke, damp homes, dust mites, pets, diet and air pollution have all been associated with asthma.

Smoking in particular has been shown to exacerbate asthma. Maternal smoking during pregnancy is strongly associated with wheezing and decreased lung function in the infant.[3] Several studies have shown that when parents stop smoking there is a decrease in asthma symptoms in children.[3] Smoking cessation advice and help should be offered to parents and other household members if there are young children in the home. The smoking status of the household members should be recorded at all asthma check-ups.

Other potential asthma triggers should be removed where possible to create a healthy home environment. Pets should be excluded from the house only if the child is sensitised. House dust mite allergen exposure reduction is difficult to achieve and maintain and results from trials have shown inconsistent results on asthma control. Nonetheless, this may be attempted if the child has persistent symptoms despite appropriate preventive treatment.

Children with persistent poor symptom control despite appropriate use of ICS and LABA require investigation for alternate causes such as cystic fibrosis or for additional disorders which may be worsening asthma control such as hay fever and gastro-oesophageal reflux ("asthma plus").[16] This usually involves discussion with, or referral to, a paediatrician.

Children who are confirmed to have asthma require add-on treatment with either oral medication or an increase in their ICS to a high dose.[3] Children aged under 12 years may be given up to 200 mcg fluticasone, twice daily (i.e. total daily dose 400 mcg) or 400 mcg of beclomethasone, twice daily (i.e. total daily dose 800 mcg) in a primary care setting. At this dose a spacer must always be used regardless of proficiency to ensure optimal drug deposition in the lungs and minimise oro-pharyngeal deposition. Children on doses higher than this are at risk of adrenal suppression and adrenal crises in the event of surgery or infection and should be under the care of a paediatrician.[3]

Alternatives to high dose ICS are oral add-on treatment with an antihistamine, montelukast or theophylline. However, antihistamines may only be effective for the rhinitis component, montelukast is not currently funded and theophylline may be toxic so these medicines would usually be initiated after discussion with a paediatrician.

Step Five – Frequent or continuous oral steroid treatment

The need for frequent or continuous oral steroid treatment, such as prednisolone, in children for persistent asthma symptoms despite maximal inhaler treatment is very unusual and has a high rate of adverse events such as poor growth, adrenal suppression and osteoporosis. These children should be referred for assessment and ongoing monitoring by a paediatrician.

Choice of inhaler

Children aged four years or younger will generally require a metered dose inhaler (MDI) via a spacer with a mask. Children should progress to using a spacer and mouthpiece without mask as soon as they are able. Some older children may wish to use an MDI without a spacer, however, drug deposition in the lungs is poor without a spacer so this should be discouraged where possible.

Children aged over seven years may prefer a dry powder inhaler, such as a Turbuhaler or Accuhaler, as they are less conspicuous than a MDI with a spacer, which may increase compliance. Inhaler technique with dry powder inhalers is

difficult and the child's ability to use the device should be observed with a placebo device or sample prior to issuing a prescription.

Good inhaler technique is important to maximise lung deposition of medications. All health professionals caring for children with asthma should ensure they are familiar with ideal inhaler technique so they can train and monitor their patients correctly.

The Asthma Foundation website has useful information for patients and parents/caregivers on correct inhaler technique: **www.asthmafoundation.org.nz/understanding_your_inhalers.php**

Regular consultation and review

Children with asthma should be monitored on a regular basis, at least annually. Asthma symptom control should be checked opportunistically at every health encounter. Inhaler technique should be checked until technique is good and then reviewed at each asthma consultation, especially before increasing medicine doses. Practitioners should monitor and record:[3]

- Symptom control or symptom score, e.g. Childhood Asthma Control Test (see "Assessing symptom control")
- Exacerbations, oral corticosteroid use and time off school due to asthma
- Inhaler technique
- Adherence to treatment (including prescription filling)
- Existence and use of self-management and personal action plans
- Growth (height and weight centile)
- Scheduled vaccinations plus annual influenza vaccine in moderate and severe cases
- Smoking status of household members
- Psychosocial stresses/caregiver/parental support

As part of the assessment, review treatment and if there is good control, step down the treatment to the lowest dose at which effective control is maintained, which may mean reducing to

Table 1: Assessment of interval symptoms and asthma control

Asthma Control Questions	**Indicator of good control** (good control is defined as all of the following)
In a usual or "good" week how often does your child wake at night with cough or wheeze?*	No waking
In a usual or "good" week how often does your child have wheezing?*	Less than three times per week
In a usual or "good" week how often does your child use their reliever ("blue inhaler") except before sport?*	Less than three times per week
When they are well how much can your child run around or play compared to other children the same age?*	Same or better than other children
How often has your child needed oral steroids in the past 12 months?	No more than one course in last 12 months
How many times has your child been admitted overnight to hospital for their asthma in the past 12 months?	No admissions in last 12 months

*Interval symptoms

Step One (i.e. SABA alone). Some children with mild asthma only require maintenance ICS treatment during their worst time of the year. **The ICS dose should be reduced slowly by 25–50% at three month intervals.** Caregivers should be given clear instructions to step back up to the previous dose if control worsens.

Assessing symptom control

The aim of asthma treatment is to achieve complete control while minimising treatment adverse effects. Complete control of asthma is defined as:[3, 9]

- Few symptoms, day or night
- Minimal use of reliever medication
- No exacerbations
- No limitation of activity or play
- Normal lung function (FEV1 and PEFR >80% predicted)
- Minimal adverse effects from medication

Patients and caregivers may under-report symptoms when asked in an open/general manner, therefore it is important to also enquire about specific symptoms. The Childhood Asthma Control Test[17] can be used or Table 1 lists suggested questions to ask parents. Peak flow diaries and symptom diaries are often unreliable and do not add to management. Complete control of exacerbations may not be possible in children due to their frequent viral illnesses. In children aged one to five years, aim to control the interval symptoms rather than the frequency of exacerbations.

ACKNOWLEDGEMENT Thank you to **Dr David McNamara**, Paediatric Respiratory Specialist, Starship Hospital, Auckland for expert guidance in developing this article.

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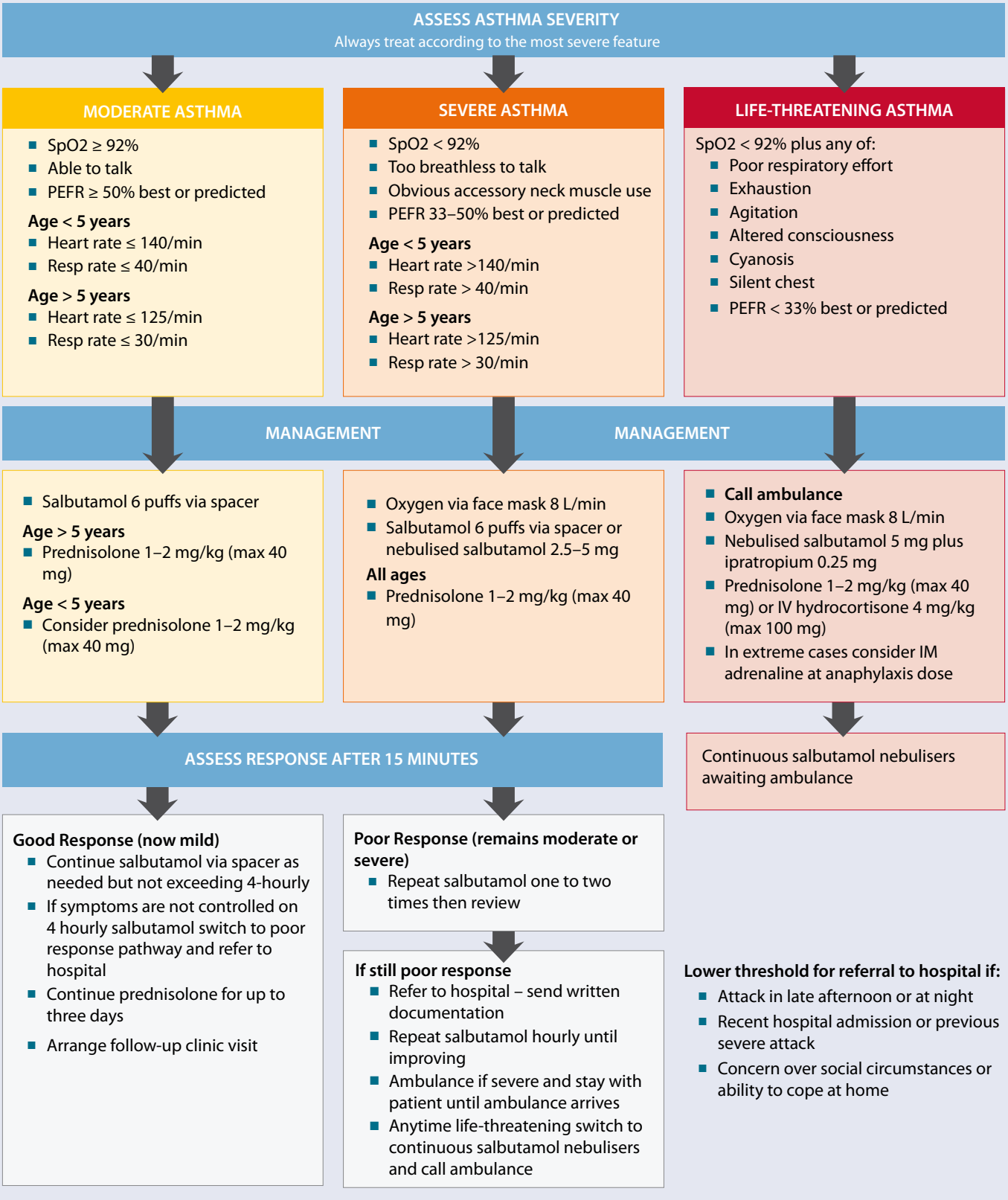
Management of acute asthma in children in primary care (Adapted from BTS/SIGN, 2011)[3]



Notes:

If a patient has signs and symptoms across categories, always treat according to their most severe features

Usual salbutamol dose is six puffs via spacer. Ten puffs may be used in children aged over six years if desired.

Nebulisers are not more effective than MDI via spacer but are recommended for life-threatening asthma to maintain continuous oxygen therapy.

Studies in children aged under five years have not shown that prednisolone prevents hospital admission in this age group. However, prednisolone is still recommended for severe asthma.

This flow chart is adapted from the 2011 BTS/SIGN guideline to reflect usual New Zealand dosages and practice.

Schedule changes for asthma inhalers

A bestpractice Decision Support Module

Childhood Asthma

The *bestpractice* Childhood Asthma module assists clinicians in providing the most appropriate course of action for a patient depending on their symptoms and history. Individualised advice about what treatment to consider and when referral is appropriate is offered, as well as a personalised asthma action plan for each patient.

Progression through an initial consultation for a patient presenting with symptoms/risk factors for asthma. The probability of asthma is determined from this information and then management recommendations are provided.

Control and treatment of previously diagnosed asthma using a stepwise approach. This section includes information about appropriate choice of devices, dose, possible non-pharmacological management and when to refer.

Use the module to create a personalised Action Plan which clearly illustrates to the patient and caregivers:

- What inhaler to take
- When to take it
- How much to take
- What to do in the event of an emergency
- What might trigger the patient's asthma

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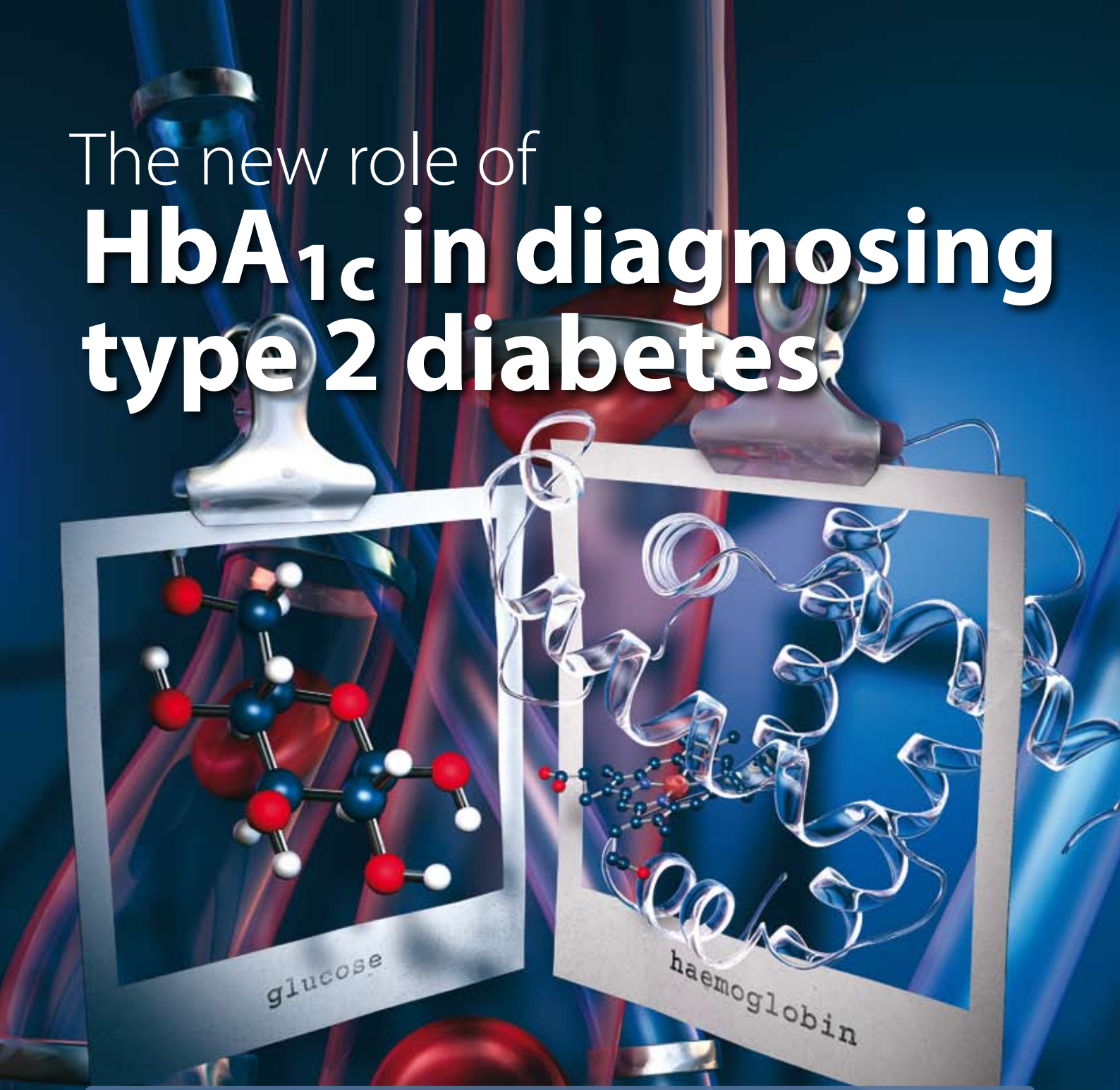
The new role of HbA$_{1c}$ in diagnosing type 2 diabetes



A position statement released in September 2011 from the New Zealand Society for the Study of Diabetes (NZSSD) now recommends the use of glycated haemoglobin (HbA$_{1c}$) for the diagnosis of type 2 diabetes. In addition, HbA$_{1c}$ should also be the test of choice for opportunistic screening in the majority of people. This use, particularly for opportunistic screening, may help address the rapidly growing epidemic of type 2 diabetes in New Zealand,[1, 2] and assist with the detection of the estimated 20 – 40% of all people with type 2 diabetes who remain undiagnosed.[1, 3] The use of HbA$_{1c}$ for screening and diagnosis in type 2 diabetes has been widely debated in the international literature. The decision to recommend this change is based on the advantages of HbA$_{1c}$, such as the lack of need for fasting, reduced biological variability and simpler laboratory requirements. Existing glucose criteria remain valid but the statement emphasises the necessity of having two separate diagnostic readings when a patient is asymptomatic.

HbA_{1c} is now the recommended test for the screening and diagnosis of type 2 diabetes

NZSSD has recommended that, in most cases, HbA_{1c} should be the first-line test for screening and diagnosis of type 2 diabetes.[4] This recommendation aims to complement and update current guidance from the New Zealand Guidelines Group and is also broadly in line with many international guidelines.[5–7] Until now, the recommended diagnostic and screening tests for type 2 diabetes have been fasting plasma glucose levels or the two hour post-oral glucose tolerance test. However HbA_{1c} has several advantages over these tests for the majority of patients.[8, 9]

The advantages of HbA_{1c} for screening and diagnosis of type 2 diabetes

HbA_{1c} testing offers several significant advantages over fasting plasma glucose. Firstly, there is **no need for fasting**. Research and anecdotal evidence suggests that many people are not compliant with the requirement for fasting, thereby reducing the accuracy of fasting plasma and oral glucose tolerance tests.[10]

HbA_{1c} is less affected by day to day variation in plasma glucose, due to exercise, smoking, medicines and diet patterns, than fasting plasma glucose testing, because it reflects the average level of glycaemia over six to eight weeks rather than measuring it at a single moment in time.[10]

There is also less **biological variability associated with HbA_{1c}** than with fasting plasma glucose testing.[4, 10] The variability between two tests, in the same person, is approximately four times greater with fasting plasma glucose than with HbA_{1c}.[10, 11] This means that the likelihood of false negatives and positives, with repeat testing, is lower with HbA_{1c} than with fasting plasma glucose.

HbA_{1c} measures chronic glycaemic exposure rather than an acute value, therefore providing a more relevant view of long-term glycaemia and future risk of complications.[10] As with fasting plasma glucose, there is a well established, and accurate **relationship between HbA_{1c} and future retinopathy risk**.[4, 5, 12–14] For example, in previously undiagnosed people with HbA_{1c} values above 50 mmol/mol the prevalence of moderate retinopathy begins to increase exponentially. A value above this level is therefore strongly predictive of a risk of development of clinically significant retinopathy. There is also overwhelming evidence that HbA_{1c} levels are predictive of the prevalence of other microvascular complications such as nephropathy and neuropathy.[5] HbA_{1c} is a superior indicator of future cardiovascular (CVD) risk than fasting plasma glucose, although the relationship is not as well defined as with retinopathy.[10,15]

HbA_{1c} has simpler sampling and analysis requirements.[4] As it is very stable, a blood sample for HbA_{1c} can be collected either at a laboratory or during a consultation at a general practice clinic, allowing for more opportunistic testing. While fasting plasma glucose samples can also be taken at the practice, the requirements are more complex than with HbA_{1c} and values can be misleading if the sample is not processed immediately, due to pre-analytical instability**.** This is because glucose consumption continues to occur in blood after sampling, even when anti-glycolyic fixatives are applied to the tube.[16] The pre-analytic variability of fasting plasma

PHO Performance Indicator

Diabetes detection is a PHO Performance Programme (PPP) indicator. Its purpose is to determine what proportion of the PHO population estimated to have diabetes has been diagnosed.[19]

As HbA_{1c} testing can be done opportunistically, ideally as part of an overall cardiovascular risk assessment, the number of people tested and diagnosed with diabetes is likely to rise, meaning that the Indicator performance should improve (along with a potential improvement in refining the estimate of people with diabetes, which forms the denominator for this indicator).

The Indicator currently comprises 9% of a PHO's performance payment, with 3% for achieving the target in the total eligible PHO population and 6% in the high needs population (N.B. Indicator weightings are subject to change).

glucose testing is approximately 5 – 10%, with New Zealand laboratories generally accepting approximately 5% variability as inherent.[10,17] In comparison, the pre-analytic variability of HbA_{1c} is negligible.

Concerns about the use of HbA_{1c} for screening and diagnosis

One of the main concerns expressed about the use of HbA_{1c} for screening and diagnosis is that there has previously been a lack of standardisation with the test. There is now a level of quality standardisation equal to that of fasting plasma glucose testing.[10] This has been driven by:[4]

- Improvement in the technologies used for processing and analysing samples
- An overall effort and agreement by laboratories towards international standardisation
- The change to international units (mmol/mol)

A further concern has been that the HbA_{1c} test is more expensive than fasting plasma glucose – although still less expensive than oral glucose tolerance testing.[5] However, the long-term cost of diabetes is high, and effective screening aims to reduce the incidence of diabetes through detection of people with pre-diabetes and reduce the risk of complications post-diagnosis through early detection.[4] The cost in terms of time and inconvenience to the patient is also less for HbA_{1c}.

HbA_{1c} is not, however, suitable for patients with some haemoglobinopathies and disorders with abnormal red-cell turnover such as many anaemias, as these falsely alter the value. There is also some evidence of individual and ethnic variations in HbA_{1c}, although local data on this is very limited.

Table 1 compares the attributes of HbA_{1c} and fasting glucose assays.

Using HbA_{1c} for diagnosis of type 2 diabetes

NZSSD and the Ministry of Health have recommended that the threshold for a diagnosis of diabetes using HbA_{1c} is ≥ 50 mmol/mol.[4,9] This slightly differs from other international bodies and is designed to have high specificity for the diagnosis; sensitivity issues are addressed by the repeat requirements for patients with borderline levels of HbA_{1c}.

All tests should be performed in an accredited laboratory, i.e. point-of-care testing is not acceptable for diagnostic purposes.[4]

In symptomatic people a single HbA_{1c} ≥50 mmol/mol can be considered diagnostic of diabetes in New Zealand for the majority of people (see below for exceptions).[4]

In asymptomatic people a HbA_{1c} ≥50 mmol/mol strongly indicates diabetes; however, a second test, ideally HbA_{1c} (at least three months later), or alternatively fasting plasma glucose, is needed for confirmation.[4] Lifestyle interventions should be encouraged during the three month wait for a second HbA_{1c}. If the second result is discordant, repeat testing again in three to six months is recommended.[4]

Table 2 summarises diagnostic criteria for diabetes using HbA_{1c}.

HbA_{1c} results may be falsely low in people:[4, 5, 7]

- With a high red blood cell turnover
- Taking iron, vitamin B12 or any other product that temporarily increases red blood cell production
- Who have undergone a blood transfusion any time in the previous three months

HbA_{1c} results may be falsely high in people with:[4, 5, 7]

- Iron deficiency* anaemia
- Vitamin B12 or folate deficiency
- Alcoholism or chronic renal failure
- With certain haemoglobinopathies, e.g. sickle cell anaemia, methaemoglobinaemia

Fasting plasma glucose testing remains a valuable test

Fasting plasma glucose testing is still a valid test for diagnosing people with type 2 diabetes, including when HbA_{1c} is not appropriate or cannot be used.[4, 5] The use of fasting plasma glucose is recommended where HbA_{1c} results are borderline or further investigation of the result is necessary, such as in a patient with two discrepant HbA_{1c} results. In this situation, a fasting plasma glucose test may be used to clarify the diagnosis. Fasting plasma glucose is also the preferred initial test if the patient has a specific condition or complication that may lead to an inaccurate HbA_{1c} result.[4, 5, 7]

The criteria for diagnosing diabetes using fasting plasma glucose and oral glucose tolerance testing (if indicated) remain unchanged. However, other than in pregnancy, oral glucose tolerance testing should now only be used if HbA_{1c} is contraindicated and fasting plasma glucose results are inconclusive.[4]

* Amended 5/12/2012 from "Severe anaemia"

Table 1. Advantages and disadvantages of HbA_{1c} and fasting glucose assays.[4, 5, 17]

	Fasting glucose	HbA_{1c}
Patient preparation	Fasting required, this is often misunderstood or not adhered to	None
Sample processing	Stringent requirements for processing and separation; rarely achieved	Relatively simple
Standardisation	Fully standardised	Fully standardised
Variability	Moderate pre-analytic and biological variation	Little to no variation
Effect of illness	Severe illness may increase glucose concentration in hours or days	Severe illness may shorten red-cell lifespan, reducing HbA_{1c} levels in days or weeks
Haemoglobinopathies and disorders of red blood cell turnover	Few problems	May interfere with values in some cases
Cost to laboratory (approximate)	$2.30	$11.40

Table 2. Recommended guidelines for the diagnosis of diabetes[4–6]

HbA_{1c} results	Glucose Equivalent	Diagnosis	Comments
≥50 mmol/ mol, **with symptoms**	≥7.0 mmol/ mol, **with symptoms**	Diabetes	
≥50 mmol/ mol, **no symptoms**	≥7.0 mmol/ mol, **no symptoms**	Diabetes	A second HbA_{1c} test ≥50 mmol/mol is required to confirm diagnosis (after three months)
41 – 49 mmol/mol	6.1 – 6.9 mmol/mol	Pre-diabetes	Offer lifestyle advice. Perform CVD risk assessment and follow guidelines for treatment of risk. Repeat testing of HbA_{1c} every 6 – 12 months
≤40 mmol/mol	≤6.0 mmol/mol	Diabetes unlikely	Normal range. Repeat HbA_{1c} at next CVD assessment or when clinically indicated

A single fasting plasma glucose result ≥7 mmol/L is indicative of diabetes in **symptomatic** people; in **asymptomatic** people two fasting plasma glucose results ≥7 mmol/L, on separate days, are required to confirm the diagnosis. A fasting glucose of 6.1 – 6.9 mmol/L indicates impaired fasting glucose/pre-diabetes.

Testing for diabetes in women who are pregnant

HbA_{1c} testing is not currently recommended for diagnosis of diabetes in pregnant women because glucose tolerance is altered in pregnancy; a separate glucose-based diagnostic algorithm is used. Oral glucose tolerance testing (75 g) is still used for diagnosis of gestational diabetes in women with an abnormal initial polycose screen (50 g), although there are controversial proposals to change this.

ACKNOWLEDGMENT: Thank you to **Dr Paul Drury**, Clinical Director, Auckland Diabetes Centre for expert guidance in developing this article.

Monitoring glycaemic control

HbA_{1c} remains the preferred, and only really useful, test for monitoring glycaemic control in people with diabetes, in primary care. Glycaemic control targets should be discussed with the patient, with the aim of deciding on a realistic goal that lowers long-term risk.

New Zealand guidelines and NZSSD recommend a target HbA_{1c} of 50 – 55 mmol/mol or as individually agreed.[4, 9]

Table 3. HbA_{1c} values and associated outcomes[4, 5, 20, 21]

HbA_{1c} (mmol/mol)	Individual targets and possible patient outcomes
<50	Exceptional control, if taking insulin there is an increased risk of hypoglycaemia
50 – 54	Very good control, some risk of hypoglycaemia if on insulin
55 – 64	Acceptable in many individuals but higher than recommended. Long-term risk of microvascular complications increases exponentially from this point
65 – 79	Suboptimal glycaemic control. More intensive control may be required. Risk of retinopathy, CVD and other complications very high
80 – 99	Poor glycaemic control. More intensive control recommended
≥100	Extremely poor glycaemic control. Immediate action required

For further information see: "HbA_{1c} targets in people with type 2 diabetes", BPJ 30 (Aug, 2010).

Who should be screened for type 2 diabetes?

Current recommendations are for asymptomatic men aged over 45 years and women aged over 55 years to be screened for diabetes as part of a joint diabetes/cardiovascular risk assessment.[4] Screening of asymptomatic Māori, Pacific and Indo-Asian people should begin at age 35 years for men and age 45 years for women. Screening should be undertaken every three to five years depending on risk.

New Zealand Guidelines recommend screening ten years earlier in people with multiple risk factors. In addition, NZSSD recommends screening should be undertaken opportunistically at age 25 years in people with the following specific risk factors:[4]

- Ischaemic heart disease (angina or myocardial infarction), cerebrovascular disease or peripheral vascular disease
- Long-term steroid or antipsychotic treatment
- BMI ≥30 or BMI ≥27 kg/m^2 for Indo-Asian peoples
- Family history of early age of onset type 2 diabetes in more than one first degree relative
- Past personal history of gestational diabetes mellitus

Additional risk factors for diabetes include:[7, 18]

- Central obesity
- Impaired glucose tolerance on previous assessment, e.g. HbA_{1c} 41 – 49 mmol/mol or fasting glucose 6.1 – 6.9 mmol/L
- Adverse lipid profile, e.g TC/HDL ratio ≥7.0
- High blood pressure, e.g. ≥160/95 mm Hg
- Polycystic ovary syndrome
- Current smoker (or have quit within the last twelve months)

Children and young adults with BMI >30 (or >27 kg/m^2 in Indo-Asian children) should be screened for diabetes if:[4]

- There is a family history of early onset type 2 diabetes or
- They are of Māori, Pacific or Indo-Asian ethnicity

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Initiating insulin in people with type 2 diabetes

Due to its progressive nature, many people with type 2 diabetes will eventually require insulin treatment. Insulin initiation is frequently managed in secondary care. However, New Zealand guidelines now recommend that insulin initiation for people with type 2 diabetes be managed in primary care where possible, with additional support as required. It is important that practitioners manage this process effectively, as there are benefits for many patients with type 2 diabetes through the timely and appropriate introduction of insulin treatment.

Insulin depletion is probable over time

Type 2 diabetes is a progressive disease characterised by insulin resistance and a decreasing ability of pancreatic β-cells to produce insulin. Both of these factors contribute to hyperglycaemia. Following lifestyle modifications, most patients with diabetes begin treatment with oral hypoglycaemic medicines. Over time, the efficacy of oral medication frequently diminishes. Treatment with insulin is eventually required, either alone, or more commonly in conjunction with oral medicines such as metformin.

It is possible for people with insulin resistance to delay or, in some cases, even avoid the need for insulin treatment through exercise and significant weight loss, however, patients with type 2 diabetes should be made aware at an early stage of treatment, of the probability that they may require insulin in the future.

Insulin initiation is often delayed

Evidence is accumulating that in all developed countries, many people with diabetes are failing to meet glycaemic targets.[1, 2] As insulin has a greater blood glucose lowering ability than any other hypoglycaemic medicine, it is important that initiation of insulin treatment is considered in all patients with poor glycaemic control, following appropriate lifestyle changes and the use of oral hypoglycaemic medicines. In the United Kingdom, a large ten year population-based study of treatment practices for people with type 2 diabetes reported a median delay of 7.7 years between introduction of the first oral medicine and the initiation of insulin. This report concluded that many patients may benefit from earlier transition from oral medicine to insulin.[3] Other studies suggest that if insulin is initiated early enough then β-cell damage and disease progression may be slowed.[4, 5]

Overcoming reluctance to initiate

General Practitioners may be reluctant to begin insulin treatment due to:[6, 7]

- The complexity of the training required to educate the patient
- A lack of time and resources to perform adequate consultations and follow-up
- A lack of practice training and access to educators
- Concerns that insulin increases the risk of hypoglycaemia
- Concern that patients will view insulin as a "shortcut" and become less compliant with oral hypoglycaemic medication and lifestyle changes
- The possibility of weight gain that is associated with insulin treatment


INITIATING INSULIN
START
FINISH
EDUCATION
Your patient starts regular exercise, healthy eating and gives up smoking.
MOVE FORW

These issues need to be carefully considered and practice strategies put in place to address any barriers to providing treatment.

In addition, patients may be reluctant to begin insulin treatment due to:[8]

- The fear of injections and the inconvenience of performing them
- The need for regular monitoring of blood glucose levels
- Social discomfort surrounding the need for injections, or fear of loss of employment if their job involves driving
- A feeling that insulin initiation means that they have failed and are "at the end of the line"
- Concern over adverse effects such as weight gain and hypoglycaemia that are associated with insulin

In order to allay concerns, it is important that patients understand that having type 2 diabetes means they have a progressive shortage of insulin to manage glucose levels over time and that medicine needs will change – beginning insulin does not mean that they have failed. Insulin types and delivery systems have improved over the years and injections now cause minimal discomfort while allowing discreet use. Many patients also report increased energy levels and well-being following insulin initiation.

It is usually beneficial to include the patient's partner or family in discussions about insulin initiation. If patients are particularly reluctant, a two month trial period can also be suggested, after which point the patient can reassess their decision.

Making the decision to initiate insulin

In most people with type 2 diabetes, insulin is considered in conjunction with, or following:[8]

1. Lifestyle modification – physical activity, dietary changes and smoking cessation advice
2. Initiation of metformin
3. Addition of a sulphonylurea

Patients should be referred to hospital when there are immediate health concerns such as significant hyperglycaemia, ketonuria and weight loss. Newly diagnosed patients displaying these symptoms may be considered for immediate initiation of insulin.

Initiating insulin in primary care requires additional funding

Starting a patient on insulin requires a series of consultations and follow-up to ensure compliance with the treatment plan and in order to titrate the insulin dose. The financial cost to the patient and practice through this process can be significant. A portion of this extra cost may be covered in some PHOs where patients are eligible for a High User Health Card or for entry into the Care Plus programme.

An example of a PHO providing support to General Practices initiating patients on insulin is occurring in the Southern PHO. An eight step process has been linked to an electronic decision support tool used by many practices. There is funding available for patients who meet eligibility criteria at each stage of the insulin initiation process, including follow-up phone calls and face-to-face meetings. Other PHOs are likely to launch similar programmes for primary care insulin initiation (if they have not already done so), particularly as the annual diabetes "Get Checked" programme will be replaced with the diabetes care improvement package from 1 July, 2012.

When to consider insulin?

New Zealand guidelines recommend that any person with type 2 diabetes should be considered for insulin treatment where their measured HbA_{1c} level is not close to a previously agreed target, or where there are symptoms of hyperglycaemia despite:[8]

- Appropriate focus on diet, physical exercise, behavioural strategies and other lifestyle interventions
- Appropriate compliance with and dose optimisation of oral hypoglycaemic medicines

As a general rule, most people with a HbA_{1c} > 65 mmol/mol should be considered for insulin treatment (see Page 18 for a list of HbA_{1c} values and associated outcomes).[8] However, consideration should also be given to: age, presence of symptoms and the long-term risk of complications, ability to manage insulin treatment, appropriate family/caregiver support and patient acceptance of the need for insulin.

Choosing an insulin regimen

There are a variety of recommended insulin regimens. Selection of a regimen should be guided by the pattern of blood glucose results and individual patient factors.

There are three types (analogues) of insulin currently subsidised on the Pharmaceutical Schedule in New Zealand for the treatment of type 2 diabetes:

Isophane – recommended as the first-line insulin treatment for type 2 diabetes in New Zealand. Isophane is an intermediate-acting form of insulin with a maximal effect at four to 12 hours.[9] There are currently two fully funded brands of isophane available in New Zealand – Protaphane and Humulin NPH.[10] Isophane is usually administered once daily – at night, if the pre-breakfast glucose is high, or before breakfast if the patient has progressive daytime hyperglycaemia. Metformin and sulphonylurea medicine should be continued. If twice daily isophane is required, sulphonylurea medicine should cease.[8] See opposite and over page for examples of isophane treatment regimens.

Basal insulin analogues – long-acting forms of insulin such as glargine (currently fully funded).[10] Glargine is given morning or night where hypoglycaemia is a concern and is titrated to normalise the pre-breakfast glucose levels.

As of 1 February 2012 the restriction has been removed requiring that glargine be prescribed either following a three month trial of another insulin regimen, or to people who require assistance in administering insulin. Glargine can now be considered as an alternative to twice daily isophane.

Premixed insulin – preparations containing a fixed ratio of short-acting and intermediate-acting forms of insulin, designed to be given either once or twice a day. Premixed insulin can be considered where a patient already taking insulin has consistently high blood glucose levels following meals, and where HbA_{1c} targets are not being met.[8] This type of insulin is not commonly used when first initiating insulin. If a premixed insulin is being considered, referral to a diabetes clinic is recommended.

Advice about insulin regimen should also be sought from a diabetes clinic in cases where:[8]

- The patient is a child or adolescent
- The patient is very lean or has lost weight rapidly – in which case testing for glutamic acid decarboxylase autoantibodies (GAD) indicating type 1 diabetes may be appropriate
- There is repeated hypoglycaemia
- The patient is a vocational driver
- HbA_{1c} levels remain above target following insulin initiation and titration

Examples of isophane treatment regimens

Once daily at night – indicated if, following one week of self-monitoring of blood glucose (SMBG) the patient has high pre-breakfast glucose levels that decrease or stay the same during the day. Start isophane at eight to ten units at bedtime and continue with metformin and a sulphonylurea. The insulin dose should be titrated as indicated in Table 1 every four to five days.[8] Patients should be alert for the symptoms of nocturnal hypoglycaemia with doses over 20 units.

Once daily before breakfast – indicated if, following one week of SMBG the patient has acceptable pre-breakfast glucose, but levels rise during the day. Start isophane at eight to ten units before breakfast and continue with metformin and a sulphonylurea. The insulin dose should be titrated as indicated in Table 1.[8] Patients should be alert for pre-lunch and nocturnal hypoglycaemia.

Twice daily – indicated if, following one week of SMBG, the patient has high blood glucose levels during night and day, or at point of considering insulin is significantly hyperglycaemic (HbA_{1c} > 75 mmol/mol). Start with six to ten units of isophane, twice daily, before breakfast and evening meal. The patient should continue on metformin, although if taking a

Table 1: Isophane dose titration[8]

Isophane once daily at night dose titration	
Pre-breakfast blood glucose (mmol/L)	**Dose titration (units)**
	Starting dose eight to ten units
Generally > 8 and never < 4	Increase by four to six units
Generally 6 to 8 and never < 4	Increase by two to four units
Once patient taking > 20 units per day – three consecutive fasting blood glucose over the individually agreed target AND blood glucose never < 4	Increase daily dose by 10–20%

Isophane once daily before breakfast dose titration	
Pre-evening meal blood glucose (mmol/L)	**Dose titration (units)**
	Starting dose eight to ten units
Generally > 8 and never < 4	Increase by four to six units
Generally 7 to 8 and never < 4	Increase by two to four units
Once patient is taking > 20 units a day, three consecutive pre-evening meal blood glucose over the individually agreed target AND blood glucose never < 4	Increase daily dose by 10–20%

Twice daily isophane dose titration	
	Dose titration (units)
	Starting dose six to ten units, twice daily
Pre-breakfast blood glucose (mmol/L)	
Generally > 8 and never < 4	Increase night dose by four to five
Generally 6 to 8 and never < 4	Increase night dose by two to four
Pre-evening meal blood glucose (mmol/L)	
Generally > 8 and never < 4	Increase pre-breakfast dose by four to five
Generally 7 to 8 and never < 4	Increase pre-breakfast dose by two to four
Once patient is taking > 20 units a day, three consecutive pre breakfast or evening meal blood glucose over the individually agreed target AND blood glucose never < 4	Increase the day or night dose by 10–20% of daily dose

sulphonylurea this should now be discontinued (due to the increased risk of hypoglycaemia). The insulin dose is titrated as indicated in Table 1.[8]

Patient education

Patients require adequate education and training before they begin SMBG and self-administering insulin. It should be made clear that the initial dose of insulin is merely a starting point from where titration will be based – a common error is to initiate but not to titrate the dose effectively. Patients can be safely taught to self-adjust insulin doses in response to blood glucose levels, however, follow-up is essential. The need for continued exercise to prevent weight gain should also be emphasised. Practice staff training patients with type 2 diabetes to self-administer insulin need to have a thorough working knowledge of all the practical aspects of insulin treatment. In some DHBs training programmes for health professionals are run by diabetes nurse educators. In some cases it may be necessary for practices to contact manufacturers for specific product training.

After the initiation of insulin, twice weekly phone calls to the patient are recommended in combination with face-to-face meetings as required, until satisfactory glycaemic control is achieved. From this point, regular contact between the patient and the practice should be maintained, as blood glucose levels may be affected by other illnesses and insulin dose adjustments may be required. A face-to-face meeting approximately one month after initiation is also recommended to assess the need for regimen adjustment.

It should be emphasised to all patients, before they begin taking insulin, that medication is not a substitute for a healthy lifestyle and that behavioural strategies such as exercise, healthy eating and smoking cessation should still continue. Alcohol consumption should be moderate as this increases the risk of hypoglycaemia in patients taking insulin.

It may be possible for some people with type 2 diabetes, following significant voluntary weight loss, to stop taking insulin, especially if they have had diabetes for a short period and now have a body mass index (BMI) < 30.

The Ministry of Health has published clinical guidelines for weight management in New Zealand adults available from: **www.health.govt.nz/publication/clinical-guidelines-weight-management-new-zealand-adults.**

Self-monitoring of blood glucose

SMBG should be performed for approximately one week prior to deciding which insulin treatment regimen a patient would benefit from the most. This can be done before each meal and ideally, two hours after the evening meal and breakfast. After insulin is started it is recommended that patients continue to monitor blood glucose regularly so that insulin doses can be adjusted if required.

There are several different kinds of **blood glucose testing meters** currently fully subsidised. When selecting a blood glucose meter, patient preference and the familiarity of practice staff with the different models of meter are two important considerations.

A comparison of blood glucose monitoring devices is available from: **www.pharmac.govt.nz/2011/04/08/2011-04%20Blood%20glucose%20monitors%20comparison.pdf**

Each type of blood glucose meter requires the use of specific **blood glucose testing strips**. A supply sufficient for up to four tests per day for three months should usually be prescribed.

Choice of **insulin pen** is dependent on the type of insulin used. Insulin pens can be obtained at no cost from the suppliers, usually through diabetes societies. The Diabetes New Zealand website contains a list of insulin pens which match specific insulin types (search under diabetes products/insulin pens) and links to contact details for local diabetes societies: **www.diabetes.org.nz**

Individual patient preference may also play a role in selecting a delivery device. In order to ensure that the dose of insulin is successfully delivered, the instructor needs to have a thorough working knowledge of the delivery device, including:

- Cartridge loading
- Needle attachment
- Priming the device and "dialling" up a dose
- Injection technique
- Confirmation that a full dose has been given (dial returned to zero)
- Cap replacement

Spare insulin should always be available and injections should occur at regular times. Used needles should be disposed of safely and responsibly. Sharps containers can be purchased at some community laboratories at an estimated cost of $15,

including disposal. Although manufacturers advise using a fresh needle for each injection, in practice needles can be re-used up to four times.

The use of **logbooks** allows the systematic recording of blood glucose levels. Logbooks are available from diabetes clinics or diabetes medicine manufacturers. A logbook can also be ordered from: **www.pharmaconline.co.nz**

For ease of interpretation it is suggested that blood glucose levels be recorded in columns rather than in graphical form. Software can also be downloaded from manufacturers allowing analysis of blood glucose readings on home computers. When reviewing blood glucose profiles, occasional abnormal recordings due to food or alcohol "binges" may be overlooked, but the patient should be advised to note the effect of these events.

Prescribing insulin safely

Ensure that the patient knows (and can repeat back):

- The name of the insulin they have been prescribed
- The correct dose
- Whether the insulin is short, intermediate, long-acting or premixed
- What cartridge/vial size they need
- How to correctly match their insulin with the required delivery device (i.e. type of pen or syringe)

In order to reduce the risk of a prescription error occurring clinicians can:

- Use the full brand name of the insulin when prescribing
- Inform the patient of the details of the insulin preparation being prescribed and the importance of describing it accurately (e.g. appearance of liquid, label and packaging)
- Ensure that any changes in insulin regimen are explained to the patient and clearly understood

Insulin storage and administration

Insulin should be stored in the door of the fridge, although insulin in use can be stored at room temperature for up to 28 days. Degradation can occur at high temperatures (e.g. being left in a car during summer) or by being inadvertently frozen. Insulin that may have degraded or that has passed its expiry date should be discarded.

Insulin is always administered by subcutaneous injection, with a pen (3 mL cartridges) or syringe (10 mL vials). The needle

Driving advice

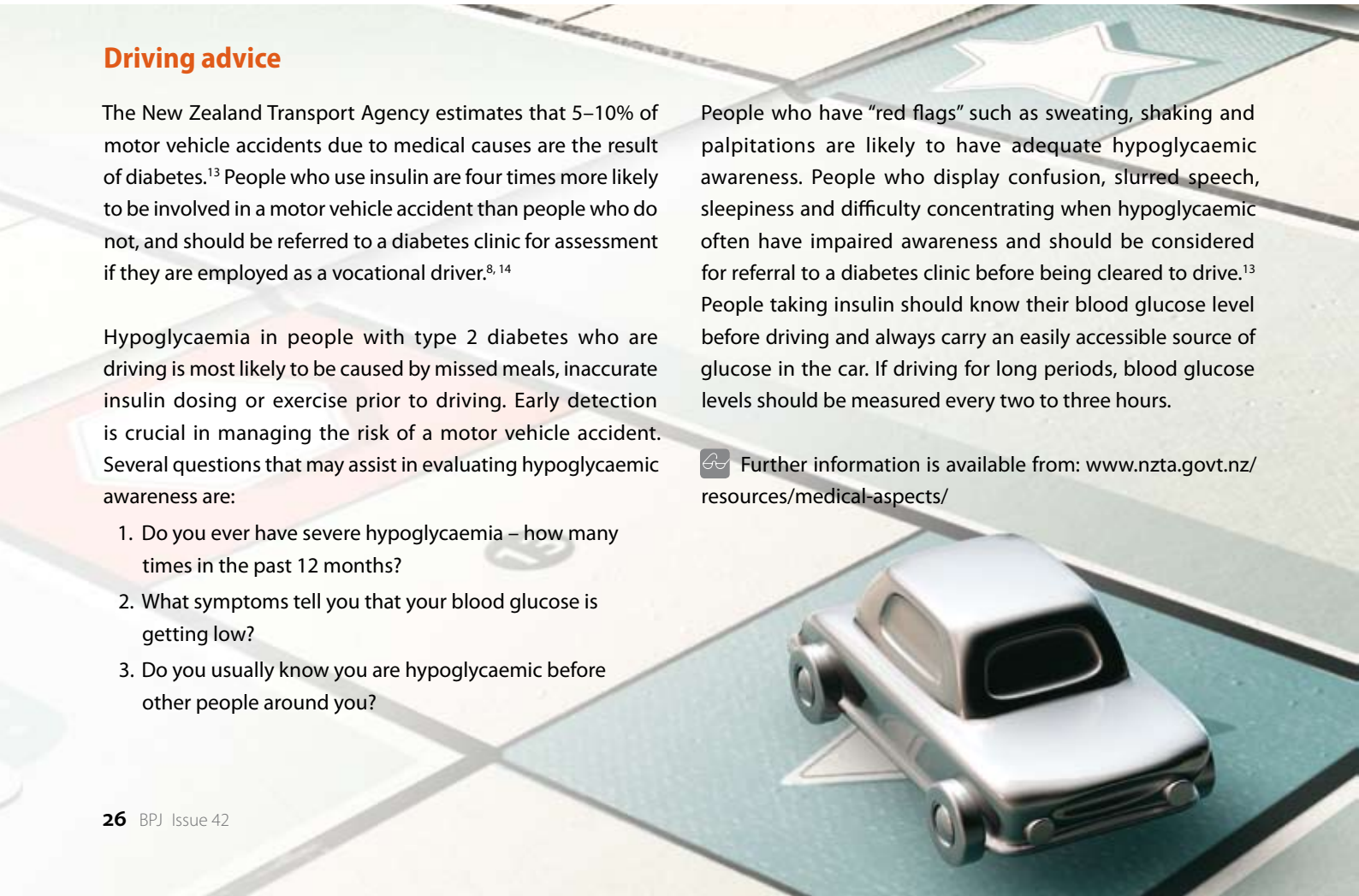
The New Zealand Transport Agency estimates that 5–10% of motor vehicle accidents due to medical causes are the result of diabetes.[13] People who use insulin are four times more likely to be involved in a motor vehicle accident than people who do not, and should be referred to a diabetes clinic for assessment if they are employed as a vocational driver.[8, 14]

Hypoglycaemia in people with type 2 diabetes who are driving is most likely to be caused by missed meals, inaccurate insulin dosing or exercise prior to driving. Early detection is crucial in managing the risk of a motor vehicle accident. Several questions that may assist in evaluating hypoglycaemic awareness are:

1. Do you ever have severe hypoglycaemia – how many times in the past 12 months?
2. What symptoms tell you that your blood glucose is getting low?
3. Do you usually know you are hypoglycaemic before other people around you?

People who have "red flags" such as sweating, shaking and palpitations are likely to have adequate hypoglycaemic awareness. People who display confusion, slurred speech, sleepiness and difficulty concentrating when hypoglycaemic often have impaired awareness and should be considered for referral to a diabetes clinic before being cleared to drive.[13] People taking insulin should know their blood glucose level before driving and always carry an easily accessible source of glucose in the car. If driving for long periods, blood glucose levels should be measured every two to three hours.

Further information is available from: www.nzta.govt.nz/resources/medical-aspects/



should be short (5–8 mm) and fine (31 gauge).[11] Immediately prior to each injection the expiry date should be checked and the insulin (especially isophane) shaken thoroughly to ensure homogeneity. The injection should be administered in varying sites around the abdomen.

Managing hypoglycaemia

Symptomatic hypoglycaemia can occur when a person's blood glucose levels falls below 4.0 mmol/L.[12] People taking insulin need to be alert for the symptoms of hypoglycaemia and know how to manage the condition. The most common reasons for hypoglycaemia occurring in a person with type 2 diabetes are a lack of food, an increase in physical activity, administration of insulin or less commonly, a sulphonylurea, or consumption of alcohol without food.[12]

Symptoms of hypoglycaemia include:[12]

- Hunger
- Blurred vision, headache, light-headedness
- Loss of concentration, confusion, irritability
- Sweating, tingling around mouth and lips, trembling, weakness and possible loss of consciousness

What to do? A person with diabetes who suspects they are hypoglycaemic should stop what they are doing, sit down and check their blood glucose level. The consumption of 10–15 g of glucose (six jellybeans, two or three glucose tablets or a small glass of non-diet soft-drink) may help alleviate the symptoms. After five to ten minutes blood glucose levels should be reassessed and more glucose taken if required. This process should continue until blood glucose levels are above 4.0 mmol/L. A meal, or a snack such as a slice of bread or a pottle of yoghurt should then be eaten.[12] Patients should be encouraged to report any episodes of hypoglycaemia to their general practice as a change in insulin dose may be needed. The use of a MedicAlert bracelet is also recommended.

Best Practice tip: Patients who believe they may be experiencing nocturnal hypoglycaemia can confirm this by setting an alarm and performing a blood glucose test during the night (e.g. at 3am) on several occasions.

Further resources

Diabetes group education classes are offered by local Diabetes Centres. Diabetes New Zealand provides additional information on subjects such as healthy eating and exercise as well as providing links to support groups and research publications.

Pamphlets for patients can be ordered through Diabetes Supplies Ltd at: **www.diabetessupplies.co.nz** or by phoning 0800 DIABETES, or downloaded from **www.diabetes.org.nz/resources/pamphlets**

ACKNOWLEDGEMENT Thank you to **Dr Rick Cutfield**, Physician and Endocrinologist, Mercy Specialist Centre, Waitemata DHB and **Gavin Hendry**, Clinical Nurse Specialist-Diabetes, Southern District Health Board for expert guidance in developing this article.

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Substance misuse in adolescents:

Despite it being a period of optimal physical health, the risk of injury or death during adolescence is two to three times higher than it is during childhood.[1] The main reason for this increase is the emergence of risk-taking behaviour occurring at a time when many adolescents first experiment with sex, smoking, alcohol and other drugs. It is important to identify substance misuse in people in any age group, however, identifying misuse and providing intervention for adolescents can help to avoid serious substance misuse and addiction in adulthood. In general, adolescents, especially males, attend general practice infrequently, so any encounter should be seen as an opportunity to ask about and offer help for substance misuse issues.

N.B. While smoking is an important issue for all ages, including adolescents, it is not covered in the following article.

Substance misuse is a significant problem in New Zealand

Each year in New Zealand, a large proportion of adolescents are likely to experiment with alcohol, cannabis or other drugs. For some this will be an isolated incident, but for many, this experimentation may be the beginning of a much more serious problem.

Alcohol consumption among New Zealand adolescents is high by international standards.[2] It is estimated that 90% of New Zealand adolescents will have tried alcohol before age 14 years.[2] Excessive use of alcohol is also common, with a major study reporting that one-third of secondary school students admitted to binge drinking (more than five drinks in four hours) in the past four weeks.[3] Drinking is also particularly problematic among Māori adolescents.[4]

The 2007/08 Alcohol and Drug survey revealed that the most common illegal drug used by New Zealanders aged between 16 and 17 years was cannabis.[5] Almost one quarter of females and 15% of males in this age group had also used benzylpiperazine (BZP or "party pills" – now banned) and approximately 5% of 16 and 17 year olds had used either stimulants or hallucinogenics, with sedatives, nitrous oxide and injected drugs being less common.[5]


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Although the causes of such behaviours are complex, what is clear, is that the earlier that adolescents experiment with alcohol and other drugs, the more likely they are to develop substance misuse issues later in life.[2]

Alcohol is commonly misused by adolescents

In the 2007 National Survey of Health and Wellness among New Zealand secondary school students, it was identified that:[3]

- 34% had undertaken binge drinking within the previous four weeks
- 22% had received an alcohol related injury
- 16% had been told by family or friends to "cut-down" on their drinking
- 14% had unsafe sex due to alcohol
- 7% had unwanted sex due to alcohol

Motivations for adolescent drinking fall into three broad categories:[6]

1. Social facilitation – increased social and sexual confidence
2. Individual benefits – escapism, getting a "buzz", having something to do
3. Social influences – peer pressure, wanting respect, image, accepted culture

Short-term effects of alcohol

Alcohol consumption increases risk behaviours by reducing inhibition and motor control and impairing judgement. Among adolescents alcohol consumption has been shown to increase the risk of sustaining serious injury, having a fatal motor vehicle accident, committing or being the victim of crime (including sexual assault), contracting a sexually transmitted disease and becoming pregnant.[2]

The lethal dose of alcohol is 5 – 8 g/kg. In a 60 kg person this would equate to approximately 1 L of spirits or four bottles of wine drunk over a short period of time.[7] Adolescents who binge drink are most at risk of alcohol toxicity. Symptoms of acute alcohol intoxication include nausea, vomiting, dehydration, slowed respiratory rate and loss of consciousness.

Long-term effects of alcohol in adolescents

Excessive drinking is a health problem at any age, however, alcohol misuse during early adolescence is of particular concern as it is a risk factor for alcohol dependence later in life.[8] Māori males are particularly at risk as they are twice as likely to consume a large amount of alcohol when aged 14 years or younger than other New Zealand males.[8] A 2009 Australian study reported a lifetime prevalence of alcohol dependence of 47% amongst individuals who began drinking before age 14 years compared to 9% among those beginning after age 21 years.[9] Early and persistent use of alcohol during

What does the law say?

People aged under 18 years can be supplied with alcohol for responsible consumption in a private home or function by a parent, or legal guardian. People aged under 18 years cannot buy alcohol, or ask anyone else to buy it for them, or drink in a public place, or enter a pub or bar without their parent or legal guardian. It is also illegal for any person aged under 20 years to have a blood alcohol concentration above zero while driving.

The Alcohol Reform Bill was passed in September 2011. This Bill provides further guidelines for reducing the impact and harms from drinking in New Zealand.

For full details of the laws around alcohol, see: **http://www.parliament.nz/en-NZ/PB/Legislation/Bills/8/2/7/00DBHOH_BILL10439_1-Alcohol-Reform-Bill.htm**

Harm reduction when drinking

Encouraging adolescents to plan ahead for any social occasions involving alcohol may reduce the risk, or severity of intoxication. Specific advice for adolescents who will be drinking alcohol may include:

- Eating before going to a party and during the event if food is available
- Drinking slowly and alternating alcoholic and non-alcoholic drinks
- Making prior arrangements for safe transport home
- Looking after friends

adolescence increases the risk later in life of anxiety, eating disorders, suicide, cirrhosis of the liver, cancer, coronary heart disease and stroke.[10] Māori are four times more likely than non-Māori to die of an alcohol related condition.[11]

Cannabis is the most widely used illegal drug in New Zealand

It is now estimated that by the age of 21 years, 80% of New Zealanders will have tried cannabis on at least one occasion, with 10% developing signs of dependence.[2] Previous figures from the 2007/08 New Zealand Alcohol and Drug use survey showed that almost half (46%) of people aged 16 to 64 years reported using cannabis at some point in their life.[5] Cannabis use was higher amongst Māori with almost two-thirds (63%) of Māori aged 16 to 64 years reporting having used it.[5]

Short term effects of cannabis

The main psychoactive component of cannabis is delta-9 tetrahydrocannabinol (THC). The effects of THC are wide ranging and include:

- Relaxation and laughter
- Increased appetite
- Confusion, paranoia and hallucinations

There have been no reported fatalities from cannabis overdose. However, in the 2007/08 Alcohol and Drug use survey, one in six people reported having experienced a harmful effect with cannabis and 2% reported having sustained an injury in the past 12 months due to cannabis use.[5] Cannabis is also reported to be a major contributor to road deaths.[12]

Long term effects of cannabis

Evidence is increasing that the adolescent brain is particularly sensitive to the effects of heavy cannabis use.[13] The following long-term adverse effects have been reported in adolescent cannabis users:

Poor educational outcomes are more common amongst adolescents using cannabis than those that are not. Adolescents who use cannabis are more likely to drop-out of school, less likely to enter University and less likely to earn a University degree.[2]

Other illegal drug use has been shown to be approximately 70 times higher amongst weekly cannabis users, compared to non-users.[14] Cannabis is described as a "gateway drug" as its use often precedes the use of other illicit substances.[15] Tobacco use prior to cannabis experimentation is also common.

Mental disorders such as depression, anxiety and suicidal thoughts are more common amongst adolescents who are heavy cannabis users.[2]

Adolescents who are heavy users of cannabis are two to 2.5 times more likely to develop **psychosis** or **schizophrenia** than non-users.[16]

Young people who start using cannabis before age 18 years are eight times more likely to develop symptoms of dependence later in life. This is of particular concern for Māori, who are significantly more likely to have tried cannabis before the age of 14 years than non-Māori.[5, 17]

Other drugs of misuse

Until BZP based "party pills" were banned in 2008, they were a significant source of drug misuse among adolescents, particularly young females.[5] While BZP is still illegally available in some areas, it is likely that in the absence of an easy supply of this drug, alternative substances are now being used more frequently. It can be helpful for clinicians to be familiar with current drug trends among adolescents and the street names used to describe these drugs (Table 1, over page).

Identifying the problem

Assess for substance use and mental health problems using HEEADSSS

In general, adolescents, especially young males, do not frequently consult with a primary care provider. Therefore, every encounter should be regarded as an opportunity to perform a mental health assessment and in particular, to ask about substance use. New Zealand guidelines recommend that every adolescent's psychosocial welfare should be routinely assessed using a standardised interview format such as **HEEADSSS** (Page 35).[18]

It is preferable to conduct the interview when the patient is otherwise well. However, the acute distress of a crisis may assist in revealing important information.

Identifying substance misuse or dependence

During a HEEADSSS assessment, if an adolescent discloses alcohol or drug use, this should be assessed further with more direct questioning.[18] Verbal or physical aggression, academic under-performance, impulsivity, hyperactivity, depressed mood and poor social skills may also be indicators of substance misuse.[19]

Table 1: Illicit drugs reportedly used by adolescents in New Zealand

Category	Drug	Street name(s) / notes
Stimulants	Amphetamines	P (pure methamphetamine)
		Ice (crystal methamphetamine)
		Speed (amphetamine sulphate)
	Cocaine	Cocaine (cocaine hydrochloride powder for inhaling)
		Crack cocaine (freebase form for smoking)
	Prescription stimulants	Ritalin (methylphenidate)
		Duromine (phentermine)
		Dexamphetamine, modafinil
		Pseudoephedrine based decongestants
Hallucinogenics	Synthetic hallucinogens	LSD (d-lysergic acid diethylamide): Acid, Trips
		DMT (dimethyltryptamine)
		N.B. usually prepared for ingestion by infusion into blotting paper
	Natural hallucinogens	Magic mushrooms (Blue Meanies, Gold Tops – contain psilocine and psilocybine)
		Datura and angel's trumpet (Solanaceae – contain atropine-like substances)
		Morning glories (Ipomoea – contain psychogenic alkaloids)
		Peyote cactus (contain mescaline)
	Ketamine	Special K, Vitamin K, Kitkat
Ecstasy	Ecstasy	E
		Has both stimulant and hallucinogenic properties. Main component is generally MDMA, but active constituents can vary considerably, e.g. BZP, mephedrone, methylone, caffeine
Sedatives	Gamma-hydroxybutyrate	GHB, Fantasy, Grievous Bodily Harm, Liquid E, Liquid X
	Kava (Piper methysticum)	Also widely used in Pacific communities for ceremonial purposes
	Prescription sedatives	Barbiturates, benzodiazepines, zopiclone
		Downers, Reds, Purple Hearts
Nitrous oxide	Nitrous oxide	NOS, Laughing Gas
Opiates	Natural opiates	Heroin, poppy seeds (tea), homebake (monoacetylmorphine)
	Prescription opiates/opioids,	Morphine sulphate (MST, Misties), oxycodone, methadone
Inhalants	Amyl nitrite, butyl nitrite	Rush
Solvents	Aerosols, glue, petrol, butane, paint thinners, paint, methylated spirits	Huffing
Steroids	Testosterone	Roids, Juice, Gear
		N.B. Used for image enhancement and sporting performance

CRAFFT is a set of questions designed to detect alcohol and substance misuse in adolescents:[20]

1. Have you ever been in a **C**ar driven by someone (including yourself) who had been using alcohol or drugs?
2. Do you ever use alcohol or drugs to **R**elax, feel better or "fit in"?
3. Do you ever use alcohol or drugs when you are **A**lone?
4. Do you ever **F**orget things you did while using alcohol or drugs?
5. Have **F**amily or friends ever told you to cut down your use of alcohol or drugs?
6. Have you ever got into **T**rouble while you were using alcohol or drugs?

Answering "yes" to two or more questions indicates that substance misuse may be a problem. Red flags for a more serious problem are:

- Substance use when the adolescent is alone
- Friends expressing concern about usage

Co-existing mental illness

It is estimated that 60–75% of adolescents with a substance misuse disorder also have some other form of mental illness.[19] The most common mental disorders amongst adolescents in New Zealand are anxiety, depression and conduct disorders.[18] All people identified with a substance misuse disorder should be also screened for mental health disorders and treated appropriately.

For further information see: "Depression in young people", BPJ special edition (Jan, 2010).

Treating adolescents for substance misuse in primary care

Goals of treatment

The overall objective of treatment for substance misuse is to return the patient to a state of medical and social wellbeing. The combination of education and harm reduction strategies has been shown to reduce substance misuse in adolescents.[21]

Psychological treatments are recommended first-line in adolescents. There is little evidence supporting the use of pharmacological treatments (e.g. benzodiazepines) for adolescents with substance misuse problems. Substitution medication (e.g. methadone) is also not recommended for young people.[21]

It is important that adequate follow-up and support is provided. The aim is for the general practice team to be viewed as helpful, accessible and safe. Text messages are a non-confrontational way of maintaining contact with adolescents and reminding them of future appointments. Phone calls and face-to-face contact with practice nurses can also promote accessibility to the general practice team. A multidisciplinary approach involving social agencies, school counsellors and other health professionals is often required.

Treatment techniques

Self-management involves reducing drug and alcohol consumption and avoiding triggers which may cause a relapse, by encouraging positive daily routines. Examples of this include; exercise, sleep hygiene, scheduling of activities, keeping a diary and stress management.[18] For further information about self-management see "Treatment resources" (over page).

Brief interventions of five to ten minutes, where the adolescent is given advice on the harms of excessive consumption, can be effective in reducing alcohol and other drug use.[21] Practitioners should discuss the health consequences of the substance misuse and ask if the adolescent is willing to try to change their behaviour. Those who are willing should be encouraged to set a goal (e.g. not using cannabis for a week) and be provided with supportive educational material.

Motivational interviewing is a form of brief intervention which can help a person to make the decision to stop misusing a substance by highlighting and resolving factors such as denial and ambivalence.[22] The aim is to encourage people to recognise that there is a problem, to make a change and to stick with it. Motivational interviewing is of particular benefit in encouraging engagement with more intensive treatment for substance misuse for those who require it.[23]

For further information see "Motivational interviewing", BPJ 17 (Oct, 2008)

Cognitive behavioural therapy (CBT) is a technique used to help the patient identify their thoughts, beliefs and feelings which may be contributing to their behaviour. With the assistance of the therapist over a series of sessions, the patient develops coping strategies for events that may trigger substance use. CBT should only be performed by a health professional trained in the technique.

Sexual health

Substance misuse amongst adolescents is associated with increased numbers of sexual partners and unprotected sex, leading to higher rates of sexually transmitted infections, pregnancy and abortion.[2] In some cases sexual abuse may be a causative factor in substance misuse. Adolescents may find it difficult to confide in someone about their sexual behaviour – particularly if they do not identify as being heterosexual. A confidential and non-judgemental approach is required to build trust and communication.

Adolescents should be instructed and encouraged in the consistent and correct use of condoms. Condoms can be obtained under "Practitioner's Supply Order" or prescribed fully subsidised on the Pharmaceutical Schedule. Sexually active adolescent females should be encouraged to use condoms and one other form of contraceptive. Long-acting forms of contraception may be considered for adolescent females who may have difficulty with daily contraceptive compliance.

A Public Health Officer or Child, Youth and Family Services (CYF) should be contacted where a person aged under 16 years is having consensual sex with a person significantly older than them, or where there are issues that may place the young person in danger. Where non-consensual sex or any other form of abuse is involved, the police or CYF should be contacted and, if necessary, a paediatrician consulted. If local resources are limited, it is essential for the practitioner to give advice on how the adolescent can remove themself from harm. In all cases the safety of the adolescent is the paramount consideration.

For further information see "Treatment resources" (opposite) and "Let's talk about sex", BPJ 20 (Apr, 2009).

Best Practice Tip: "Become a coach"

Negative health behaviours such as substance misuse are often the "tip of the iceberg" in adolescents. Psychosocial issues that underpin behaviours will influence any health intervention that occurs. For example, an adolescent will smoke marijuana to cope with chronic stress (e.g. financial problems, abusive parents, relationship problems), and they are unlikely to successfully address the substance misuse problem without also making a positive change in their circumstances (e.g. finding employment). Merely supplying information on the harms of cannabis is by itself would be ineffective. Primary care clinicians have an important role in coaching adolescents so that they can make positive changes in their social circumstances and learn coping skills to manage their reactions to adversity. An example of coaching may be: "You can't change the situation, but you can change how you deal with it".

Treatment resources

A searchable directory of **addiction treatment and advice services** (including Kaupapa Māori) in New Zealand is available from: www.addictionshelp.org.nz

The **alcohol drug helpline** is available from 10 am – 10 pm, Ph: 0800 787 797 or visit: www.alcoholdrughelp.org.nz

Education material is available from: the Alcohol Advisory Council of New Zealand (ALAC) at: www.alac.org.nz , the Alcohol and Drug Association of New Zealand (ADANZ) at: www.adanz.org.nz and the Foundation for Alcohol and Drug Education (FADE) at: www.fade.org.nz

The **Low Down** is a Ministry of Health sponsored website focused on self-management of adolescent problem solving, and is available from: www.thelowdown.co.nz

Family planning provide resources for promoting sexual health. Clinics are available around the country or visit: www.familyplanning.org.nz

Rainbow Youth is an organisation for gay, lesbian and bisexual youth, run by youth. Visit: www.rainbowyouth.org.nz

Training in **cognitive behavioural therapy** is available from The Werry Centre in Auckland, which has occasional seminars on CBT and has strong links with Auckland University which offers several papers in CBT, for further information visit: www.werrycentre.org.nz

Performing a HEEADSSS assessment with an adolescent

Step 1 – Discuss confidentiality: The patient should be told that their personal information will not be disclosed without their permission, unless the information reveals that someone might harm them or they might harm themselves or someone else.[18] Parents or caregivers should not be present during the interview.

Step 2 – Begin the interview: The interviewer creates their own questions which relate to the subjects which make up the HEEADSSS acronym. The interview itself, including the order of questioning should not be treated rigidly and should evolve naturally, based on the direction of conversation. More specific questions can be asked at the interviewer's discretion. Questions should cover:

- **H**ome
- **E**ducation/employment
- **E**ating
- **A**ctivities
- **D**rugs
- **S**exuality
- **S**uicide/depression
- **S**afety

Questions should be open-ended and non-judgemental. It is important not to make any assumptions about the adolescent's personal, family or social circumstances. In some cases it may be appropriate to discuss issues of culture and spirituality. Questions that require a description, rather than an opinion, help to avoid a "dunno" type of response. Some examples of questions are shown in Table 2 (over page).

It is recommended that the adolescent is asked if they have a trusted adult they can discuss personal matters with.[24] A connection to supportive parents or other adults has been shown to be protective against a range of negative behaviours, including substance misuse.[25]

Step 3 – Wrapping up: By the end of the session, the interviewer should have a clear idea about how the adolescent feels about their home-life, schooling or employment, interactions with peers and sexuality. The interviewer should also have identified any factors such as peer pressure, bullying or substance misuse which may be placing the adolescent at risk. The adolescent also needs to be given the opportunity to raise any concerns, or request further information on specific topics.

It is important that the interview should also highlight the successful elements of an adolescent's life. Commenting on things that are going well provides a positive aspect to the interview and a source of encouragement for the adolescent.

Best Practice Tip: For a useful and detailed account of how to perform an effective HEEADSSS assessment see: Goldenring J, Rosen D. Getting into adolescent heads: An essential update. Contemporary Pediatrics 2004;21(1):64-89.

Table 2: Examples of positive questions that may be asked and negative questions that are discouraged during a HEEADSSS assessment

	Ask questions more like	Ask questions less like	Reason
Home	Where do you live and who lives there with you?	Tell me about your mother and father?	If the person's situation does not conform to the question then they may be defensive
Education or employment	What are your favourite subjects at school?	What marks are you getting at high school?	Open-ended questions allow adolescents to present their own views
Eating	What do you like and not like about your body?	Do you think you are overweight?	Issues of body image are often complex
Activities	What do you and your friends enjoy doing?	What sports do you play?	Try not to restrict self-expression with narrow questions
Drugs	Have any of your friends experimented with tobacco, alcohol or other drugs?	Do you take drugs?	Asking about friends allows the adolescent to reveal information without implicating themselves
Sexuality	Have you ever been involved in a romantic relationship? Describe the people that you have been "seeing". Have you ever had any unpleasant sexual experiences?	Have you ever had sex?	Asking about "having sex" is an ambiguous question and avoids wider issues such as sexual preference
Suicide	Have you ever felt sad or down?	Have you ever tried to kill yourself?	These questions should focus on identifying thoughts or feelings that may lead to suicidal ideation
Safety	Are there any people or situations which make you feel unsafe?	Are you being bullied at school?	Open-ended questions are more likely to uncover issues of concern

ACKNOWLEDGEMENT Thank you to **Dr Sue Bagshaw**, General Practitioner, President of the International Association of Adolescent Health, Christchurch for expert guidance in developing this article.

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Depression in Young People

Depression in Young People is activated for patients under the age of 18 years when the Depression module is opened.

Structured clinical assessment is the key to identifying both problems and protective factors in young people.

It is desirable to offer opportunities for the young person to speak alone to the GP.

Differentiating abnormal from normal behaviour

The following criteria can be used to help distinguish normal variations in behaviour from more serious mental health problems:

- **Safety**: there is a perceived risk
- **Duration**: problems last more than a few weeks
- **Intensity**: symptoms are severe and fixed, with a loss of normal fluctuations in mood and behaviour
- **Impact**: problems impact significantly on school work, interpersonal relations, home and leisure activities
- **Hypomanic episodes**: these may indicate bipolar disorder
- **Profound hopelessness**

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Prescribing citalopram safely: an update

Evidence of adverse cardiac effects associated with citalopram has prompted a reduction in the recommended maximum daily dose to 40 mg per day in adults. It is also recommended that doses above 20 mg are avoided in people aged over 65 years or in people with hepatic impairment. These changes are due to two recent clinical studies which found that citalopram is associated with a dose dependent change in the electrical activity of the heart, potentially leading to QT interval prolongation.*

*Citalopram is not approved for use in people aged under 18 years

Why the change?

The maximum daily dose of citalopram has been reduced because evidence shows that higher doses increase the risk of QT prolongation and incidence of Torsades de Pointes (a type of ventricular tachycardia).[1–3] It is also considered that there is no treatment benefit at doses higher than 40 mg per day.[1] After reviewing the recent study and several clinical and non-clinical trials, the United States Food and Drug Administration issued a recommendation in August 2011, that the recommended maximum dose of citalopram be lowered to 40 mg.[1] In response Medsafe, in New Zealand, has asked manufacturers to amend medicine datasheets to reflect this change in dose for all preparations containing citalopram.

For full details of the FDA release see: "FDA drug safety communication: Abnormal heart rhythms associated with high doses of Celexa (citalopram)", Sept, 2011. Available from: www.fda.gov/Drugs/DrugSafety/ucm269086.htm

Indications for treatment with citalopram and recommended dosing

The recommended doses for citalopram used for the treatment of adult depression are shown in Table 1:[4]

Doses can be increased in 10 mg increments if the patient's response is limited or the severity of depression warrants it. It takes several weeks for clinically effective results to be achieved with all SSRIs so assessment of efficacy and increase in dose should only be made after two to three weeks of treatment.

For people already taking citalopram

For patients already being treated with citalopram at less than the new recommended doses there is no need for change. However, patients should be instructed to report any adverse effects and to seek immediate medical attention if they develop symptoms suggestive of arrhythmia, e.g. shortness of breath, dizziness, palpitations or feeling faint. ECG monitoring may be appropriate for patients with other risk factors for QT prolongation (over page).

Patients taking doses greater than those recommended should ideally have their dose reduced or be trialled on another medicine. In cases where the dose cannot be reduced, vigilant monitoring for adverse effects and regular ECG monitoring is required.

Patients should be counselled through any changes and the reasons for the change should be discussed. It may be helpful to explain that the new research indicates that there is no clinical advantage in taking more than 40 mg of citalopram per day and that all SSRIs have similar clinical efficacy.[1]

Escitalopram not associated with an increased risk of QT prolongation

Escitalopram is the S-enantiomer of citalopram. This means that it is the chemical mirror-image of citalopram. It is clinically very similar to citalopram except it is more potent and thus dosed at lower levels.[6–8] Escitalopram is fully funded on the New Zealand Pharmaceutical Schedule.

While the adverse effects associated with escitalopram are very similar to those with citalopram, there is no evidence to suggest that escitalopram causes QT-prolongation at high doses.[8] Medsafe considers that at standard doses, escitalopram is associated with a lower risk of QT prolongation than citalopram.

The recommended maximum daily dose of escitalopram is 20 mg for people aged 18 – 64 years (with no risk factors) and 10 mg for people aged over 65 years and those with hepatic impairment.

Table 1. Recommended doses of citalopram for the treatment of adult depressive order

Patient group	Starting dose	Maximum dose	Notes
Adults 18 – 65 years	20 mg	40 mg	People without risk factors
Adults > 65 years	10 mg	20 mg	Reduced metabolism in this age group leads to a longer half-life of citalopram
Adults with impaired hepatic function	10 mg	20 mg	Citalopram is metabolised primarily by the liver, therefore hepatic impairment can lead to increased blood levels

Patients being treated with a SSRI may experience withdrawal symptoms if the medicine is stopped abruptly or lowered significantly or rapidly. Withdrawal symptoms for citalopram include dizziness, headache, anxiety and nausea and can last between one to two weeks. Tapering the dose over one to two weeks will help to avoid these symptoms. When switching to another antidepressant a "wash-out" period may be necessary: taper citalopram over approximately one week before commencing the new medicine and in some cases, such as with venlafaxine, having an antidepressant-free period of one to two days is recommended.[5] People with severe depression may require more intensive monitoring during the change-over period, and in extreme cases this may involve hospitalisation.

 For further information on changing antidepressants see: "Pharmacological management of depression in adults", in Adult depression, BPJ Special Edition (Jul, 2009).

Other adverse effects associated with citalopram

Citalopram is associated with a number of adverse affects and contraindications in addition to QT interval prolongation.

The most significant adverse reaction is an increase in, or the emergence of, suicidal ideation and behaviour. This adverse effect is common to all SSRIs. SSRIs are also often associated with mood changes and initial worsening of depressive symptoms. It is therefore essential to discuss the possibility of these adverse effects with all patients before initiating a SSRI. Family and caregivers should be included in the discussion and made aware of the increased risks. Patients not considered to be at risk of suicide should be reviewed one to two weeks after beginning treatment. Those at risk should be assessed more frequently.

Adverse effects and interactions

Citalopram is contraindicated in people with the following risk factors:[1, 4, 6]

- Congenital long QT syndrome
- Concurrent use of a monoamine oxidase inhibitor (MAOI) – may cause serotonin syndrome
- Concurrent use of pimozide – an antipsychotic medicine which is also associated with QT-prolongation (Medicine available under section 29 only)

People who are poor CYP2C19 metabolisers, or those taking a CYP2C19 inhibitor such as cimetidine, should be limited to a maximum dose of 20 mg citalopram per day. This is because of an increased risk of QT-prolongation due to the resulting increased plasma concentrations.

Citalopram (as with any other medicine with the potential to cause QT prolongation) may not be appropriate for people with the following factors:

- People with risk factors for QT-prolongation, such as structural heart disease, bradycardia, hypokalaemia , hypomagnesaemia or hypocalcaemia
- People taking other medicines that can affect the QT interval, e.g. lithium, sotalol (for a full list of medicines see: www.azcert.org/index.cfm N.B. this is a US based reference so may not include all medicines available in New Zealand)
- People with severely reduced renal function (creatinine clearance <20 mL/minute)

Managing the risk of QT prolongation with citalopram

- Patients should be screened for other risk factors for QT prolongation prior to initiating treatment with citalopram
- Citalopram should be used with caution, and ECG monitoring should be performed in patients with other risk factors for QT prolongation - a lower risk SSRI such as escitalopram might be more appropriate
- Hypokalemia and hypomagnesaemia should be corrected before administering citalopram and electrolytes should be monitored periodically in patients at risk for electrolyte disturbance, e.g. due to use of diuretics, severe vomiting or diarrhoea
- Patients should be advised to seek medical attention immediately if they experience signs or symptoms of an

abnormal heart rate or rhythm (e.g. syncope, palpitations, new onset seizures) while taking citalopram. An ECG should be performed in all patients with these symptoms.

- Discussion with a cardiologist is recommended if significant QT prolongation (QTc > 500 ms or an increase of > 60 ms) occurs. Consideration should be given to changing to an alternative antidepressant.

For further information on medicine-induced QT prolongation and Torsades de Pointes see: **www.medsafe.govt.nz/profs/PUArticles/DrugInducedQTProlongation.htm**

ACKNOWLEDGEMENT Thank you to **Andrew McKean**, Acting Senior Pharmacist, The Princess Margaret Hospital, Christchurch and **Dr Sharon Sime**, Senior Medical Advisor, Medsafe for expert guidance in developing this article.

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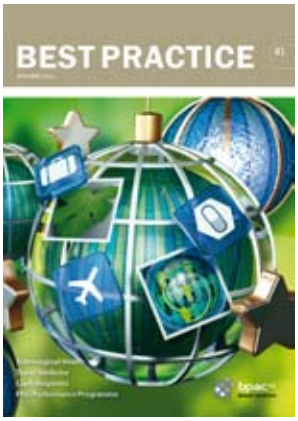

Treating migraine in a woman who is breast feeding

Dear Editor,

I have a 35 year old female patient who is generally healthy but takes frequent ondansetron and oxycodone for severe migraines which I am worried about as she is breast-feeding.

General Practitioner, Wellington

Response in brief: Neither oxycodone nor ondansetron are recommended for the treatment of migraine symptoms in anyone. Oxycodone is present in breast milk and associated with CNS depression in breast fed infants, therefore use should be avoided. Ondansetron should also be avoided during breast feeding as limited evidence suggests it is present in breast milk. Migraine prophylaxis such as a beta-blocker, tricyclic antidepressant or sodium valproate may be appropriate for this patient. If migraine relief is required, options for a woman who is breast feeding include cautious use of a NSAID, prochlorperazine or triptan (breast milk discarded 12–24 hours after dose) as required.

Migraine treatment can be complicated and requires a systematic approach to the management of predisposing factors, trigger identification and avoidance, acute symptom relief and prophylaxis.

A number of factors may increase migraine frequency in women who are breast feeding, including dehydration (increased fluid intake is essential during breast feeding), change in routine (e.g. altered sleep pattern), reduced sleep, missed meals, increased stress and postnatal depression. Although there may not always be a clear association between migraines and lifestyle factors and triggers, changes can be made where practical. A plan may need to be put in place for care of the infant (e.g. by partner, family member) if the migraines (or the sedative effects of the medicine used in treatment) are severe enough to make the mother unable to continue her daily activities. The woman may wish to consider expressing and freezing milk (e.g. at the conclusion of a normal breast feed) so that a supply is available if she cannot feed during an acute attack or if there are concerns about medicines being present in the breast milk. Taking a dose of medicine at the completion of a breast feed may allow time for metabolism and excretion of at least some of the medicine prior to the next breast feed. Expressing and discarding milk post-dose may be another option for some women. A woman with recurrent severe migraine may benefit from prophylaxis rather than frequent use of acute treatments.

Acute symptom relief usually follows a four-tiered approach, with failure of treatment at one tier on three occasions being grounds to move onto the next tier:[1]

Tier one – simple analgesic (e.g. aspirin, NSAIDs) +/- antiemetic (e.g. metoclopramide, prochlorperazine)

Tier two – rectal analgesic (e.g. diclofenac) +/- antiemetic (e.g. metoclopramide, prochlorperazine)

Tier three – specific anti-migraine medicines (e.g. sumitriptan, rizatriptan)

Tier four – combination treatment (e.g. sumatriptan with a NSAID)

However, not all of these medicines are appropriate for women who are breast feeding:

- Aspirin should be avoided in women who are breast feeding due to the possible risk of Reye's syndrome in the infant. In addition, regular use of aspirin may impair platelet function in the infant if neonatal vitamin K stores are low.[2]
- NSAIDs should be used with caution, but the amount of diclofenac, ibuprofen and naproxen in breast milk is too small to be considered harmful.[2]
- There is limited information available on the effects of antiemetics on a breast fed infant. Phenothiazine derivatives (e.g. prochlorperazine) are sometimes used for short-term treatment.[2] A small amount of metoclopramide is present in breast milk, so it is usually

avoided, however, this medicine has been used safely in women who are breast feeding to increase milk production.[2, 3]

- Triptans such as sumatriptan and rizatriptan may be used in a woman who is breast feeding, however, animal studies have shown that small amounts are excreted in the breast milk. Although the amount is probably too small to be harmful, it is suggested that breast milk is expressed and discarded for 12–24 hours after the dose of triptan.[2, 4]

Consider migraine prophylaxis

Regular use of acute migraine treatments for more than two days per week carries significant risk of initiating or escalating medication overuse headache and should be avoided. Regular requirement of acute migraine treatment for more than one day per week is an indication to evaluate how the medicine is being used, to review the diagnosis and consider migraine prophylaxis medicine.

This patient may be a good candidate for migraine prophylaxis. In general, prophylactic treatments are started at low doses and gradually increased to avoid adverse effects. Once a full dose is achieved, the medicine should be trialled for six to eight weeks. Medicines that are safe to use for migraine prophylaxis in a woman who is breast feeding include beta blockers, sodium valproate and, with caution, tricyclic antidepressants (excluding doxepin).[1, 2] If sodium valproate is prescribed, ensure the woman is using effective contraception due the increased risk of congenital malformations and developmental delay with this medicine.

Opiates and ondansetron are not recommended for migraine or while breast feeding

All opiates (including codeine) are best avoided during acute migraine as they have limited benefit, can be associated with medication overuse headache and have potential for addiction.[1,5]

The use of opioid medicines, particularly codeine and oxycodone, has been discouraged in women who are breast feeding due to reports of infant fatalities.[6, 7] Oxycodone is present, and can accumulate, in breast milk.[2] A recent retrospective cohort study has reported that symptoms of central nervous system (CNS) depression were present in 20% of infants who were breast fed by mothers who took oxycodone.[8]

Symptoms of CNS depression in an infant include increased sleepiness (more than usual), not waking for feeds, difficulty breast feeding, breathing difficulties and floppiness.[3]

Much of the evidence regarding the safety of opioids and lactation looks at the use of these medicines for post-partum analgesia, rather than ongoing use for other indications. Although intermittent use of an opioid may be relatively safe, repeated doses should be used with caution.[9] If oxycodone is used, the infant should be monitored for drowsiness, adequate weight gain, and achievement of developmental milestones, particularly if the medicine is taken on an ongoing basis.

Ondansetron is not indicated for the treatment of nausea and vomiting in acute migraine. In addition ondansetron should be avoided during breast feeding as evidence from animal studies suggests it is present in milk.[2] Although safety data is limited and some references suggest that one or two doses post-partum may be appropriate, there is no clear guidance regarding repeated use.[9]

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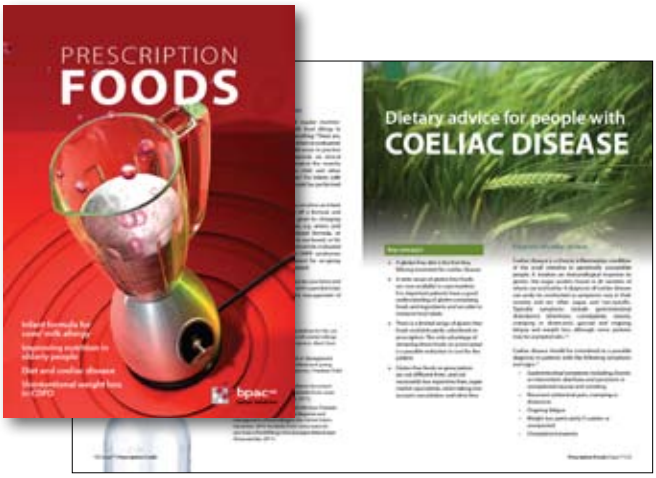

Gluten-free diets

Dear Editor,

I read with interest your article in the Prescription Foods booklet; "Dietary advice for people with coeliac disease" (May, 2011). You mention that (on Page 17) "NB; Gluten-free diets should not be trialled without confirmation of the diagnosis of coeliac disease."

I am unaware of the harms of a gluten free diet, can you enlighten me please. No test is either 100% specific or sensitive so there will always be some missed cases. Why can these people not benefit from eating food free of allergens? Some parents do not wish to put their children through a biopsy for no great benefit.

General Practitioner, Queenstown

A gluten-free diet should not be commenced without confirmation of a diagnosis of coeliac disease because serological testing (immunoglobulin A anti-tissue transglutaminase – IgA-tTG) for coeliac disease requires the patient to have been eating gluten every day for a minimum of six weeks before testing.[1] In addition, if serology is positive, gluten should remain in the diet until after a small intestinal biopsy has been performed, as despite debate in the current literature, biopsy remains the gold standard for diagnosis.[2, 3]

No test is 100% sensitive or specific, but IgA-tTG has high sensitivity (80-90%) and specificity (>95%) for coeliac disease, and is the preferred initial test.[2, 4] New Zealand laboratories routinely test total serum IgA whenever an IgA-tTG test is requested and use an IgA-tTG test if an IgA deficiency is detected. Intestinal biopsy is important to determine the degree of inflammation and villous atrophy in the gut as well as to exclude other small bowel disease. Referral for biopsy is also recommended if there is a strong clinical suspicion of coeliac disease but the patient has a negative IgA-tTG result.[1, 5] This is often the case in young children (aged less than five or six years), where IgA-tTG antibody testing may be less reliable.[4]

A delayed diagnosis or undiagnosed coeliac disease (even in patients with latent disease) can result in:[1, 4]

- Ongoing symptoms, e.g. diarrhoea, abdominal pain, bloating
- Adverse long-term complications, including osteoporosis, increased fracture risk, unfavourable pregnancy outcomes and an increased risk of malignancy, e.g. small bowel cancer, lymphoma
- Growth failure, delayed puberty and dental enamel defects in children

Strict adherence to a gluten-free diet is the only treatment for coeliac disease and is required for relief of symptoms, reversal of the small intestinal abnormalities and to reduce the risk of long-term complications.[3, 5] If the decision is made to eat a gluten-free diet without testing and biopsy, the patient will lack an accurate diagnosis and will not know if they need to strictly adhere to a gluten-free diet for life.

Maintaining a gluten-free diet can have a significant effect on quality of life for the patient and their family.[4, 6] Gluten is estimated to be in 70% of manufactured food products, e.g. as a component of thickeners, preservatives and colourings.[7] If one person in a household is eating a gluten-free diet it often means that the whole family has to alter their diet. Strict adherence to a gluten-free diet requires separate handling, preparation and storage of foods. Although gluten-free food choices are generally much easier to access now, there is still considerable variation in availability throughout New Zealand. In some situations, e.g. eating out and travelling, food choices may still be extremely limited. Gluten-free foods also tend to be more expensive. A person who does not actually have coeliac disease therefore faces unnecessary hassles and extra financial costs when this is not clinically necessary. There is no evidence that a gluten-free diet is beneficial for people who do not have coeliac disease.[4]

In addition, the exclusion of many staple foods made from wheat, rye and barley which are important dietary sources of

carbohydrate, energy, protein, iron, calcium and B vitamins means that a gluten-free diet may not be as nutritious as a gluten-containing diet, if nutritionally adequate alternatives are not included.[8] Advice from a dietitian is usually required at the time of diagnosis.

Previous articles relating to coeliac disease and gluten free foods include:

"Dietary advice for people with coeliac disease", BPJ 15 (Aug, 2008); update BPJ Special Edition (May, 2011)

"The investigation of coeliac disease: a follow up", BPJ 12 (Apr, 2008)

"Coeliac disease", Best Tests (Mar, 2010)

"Coeliac disease", BPJ 9 (Oct, 2007)

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