

INHALED CORTICOSTEROIDS | LABA FOR ASTHMA | DIMETHICONE FOR HEAD LICE

Best Practice

www.bpac.org.nz

Issue 79 September 2017

A focus on respiratory conditions:
Managing adults with asthma in primary care
Pulmonary rehabilitation for COPD
Bronchiolitis

The 2017 bpac^{nz} antibiotic guide

 **bpac^{nz}**
better medicine

EDITOR-IN-CHIEF

Professor Murray Tilyard

EDITOR

Rebecca Harris

CONTENT DEVELOPMENT

Dr Chris Booker

Mark Caswell

Dr Adrian Laurence

Assoc. Professor David Reith

Dr Sharyn Willis

Dave Woods

REPORTS AND ANALYSIS

Justine Broadley

Dr Alesha Smith

DESIGN

Michael Crawford

WEB

Ben King

MANAGEMENT AND ADMINISTRATION

Kaye Baldwin

Lee Cameron

ACKNOWLEDGEMENT

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

Professor Richard Beasley, Wellington

Professor John Kolbe, Auckland

Dr David McNamara, Auckland

Leanne Te Karu, Taupo

Dr Neil Whittaker, Nelson

Best Practice

Issue 79 September 2017

Best Practice Journal (BPJ)

ISSN 1177-5645 (Print)

ISSN 2253-1947 (Online)

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.

We develop and distribute evidence based resources which describe, facilitate and help overcome the barriers to best practice.

Bpac^{nz} Ltd is currently funded through a contract with PHARMAC.

Bpac^{nz} Ltd has six shareholders: Procure Health, South Link Health, General Practice NZ, the University of Otago, Pegasus and The Royal New Zealand College of General Practitioners

ProCARE



GENERAL PRACTICE NZ
The Heart of Health Care Networks



**The Royal New Zealand
College of General Practitioners**
Te Whare Tohu Rata o Aotearoa

The information in this publication is specifically designed to address conditions and requirements in New Zealand and no other country. BPAC NZ Limited assumes no responsibility for action or inaction by any other party based on the information found in this publication and readers are urged to seek appropriate professional advice before taking any steps in reliance on this information.

Printed in New Zealand on paper sourced from well-managed sustainable forests using mineral oil free, soy-based vegetable inks

CONTACT US:

Mail: P.O. Box 6032, Dunedin

Email: contact@bpac.org.nz

Phone: 03 477 5418

Free-fax: 0800 27 22 69

www.bpac.org.nz



3 Managing adults with asthma in primary care: the four-stage consultation

The New Zealand adult asthma guidelines were released by the Asthma and Respiratory Foundation of New Zealand in November, 2016. In the first of a series on adult asthma, this resource outlines the four-stage consultation, which is a framework for managing patients with asthma in primary care.



8 Inhaled corticosteroids for adults with asthma

A key decision in asthma management is when to initiate an inhaled corticosteroid (ICS). It is clear that patients with weekly asthma symptoms are likely to benefit from ICS treatment. However, emerging evidence suggests that patients with less frequent symptoms, e.g. monthly, will also benefit from ICS treatment, although adherence is often low in this group. It is recommended that clinicians offer an ICS to patients according to their treatment goals.

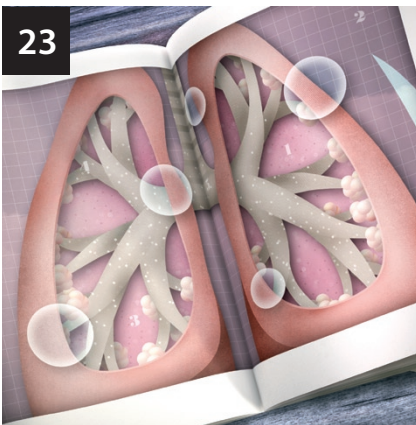
12 Adding a long-acting beta₂-agonist (LABA) to asthma treatment for adults

If a patient using an inhaled corticosteroid for asthma has symptoms which are not adequately controlled, clinicians should consider adding a LABA to their regimen in the form of a combined ICS/LABA inhaler. Use of an ICS/LABA inhaler as both reliever and preventer treatment is preferred for patients at high risk of exacerbation, known as single inhaler treatment.



18 Pulmonary rehabilitation for people with COPD

Pulmonary rehabilitation is a behavioural intervention for patients with chronic obstructive pulmonary disease (COPD) that improves symptom control and quality of life, reduces hospital admissions and teaches self-management skills. There are a variety of pulmonary rehabilitation programmes available, all of which offer supervised exercise and education to motivate patients and promote sustainable behaviour change. Health professionals in primary care can raise awareness of pulmonary rehabilitation, refer patients to programmes, recommend personalised exercise for those unable to attend formal programmes and provide ongoing support to patients who have completed programmes to help them maintain the benefits they have gained.



23 **Bronchiolitis: when to reassure and monitor, and when to refer**

Bronchiolitis is a lower respiratory tract infection, most often caused by Respiratory Syncytial Virus (RSV). In severe illness it is associated with increased respiratory effort, difficulty feeding, dehydration and cyanosis. Bronchiolitis typically affects infants aged under 12 months, with young infants or those born premature at greater risk of severe illness. For infants with mild illness and without risk factors for deterioration, caregivers can be reassured that conservative treatment is appropriate. Infants with more severe symptoms or underlying conditions which predispose them to deterioration may require referral to hospital.



28 **The bpac^{nz} antibiotic guide: 2017 edition**

The 2017 edition of the bpac^{nz} antibiotics guide; Antibiotics: choices for common infections, is now available online. There are several new features of this guideline, along with some changes in advice. The release of the guide is also an opportunity to revise recommendations for prescribing in respiratory tract infections, including strategies for managing patient expectations.



32 **4% dimethicone lotion: a subsidised treatment for head lice**

From 1 May, 2017, 4% dimethicone lotion can be prescribed fully subsidised for the treatment of head lice, which adds another treatment option to the currently subsidised 0.5% phenothrin shampoo. Lice are unlikely to develop resistance to dimethicone lotion as it is not an insecticide and instead kills lice by suffocation.

All web links in this journal can be accessed via the online version:

www.bpac.org.nz/bpj



Managing adults with asthma in primary care: the four-stage consultation

KEY PRACTICE POINTS:

- A four-stage consultation is recommended as a framework for managing patients with asthma in primary care – assess control of symptoms, consider other clinically relevant issues, adjust pharmacological treatment, complete an asthma action plan
- At each consultation the patient's level of asthma control should be assessed, along with their future risk of severe exacerbations
- The term “treatable traits” is new to asthma management literature and refers to the recognition and management of overlapping respiratory disorders, co-morbidities, environmental and behavioural factors
- A stepwise approach to asthma management is recommended whereby patients step treatment up or down to achieve and maintain symptom control and reduce their risk of exacerbations
- Personalised action plans should be offered to all patients with asthma
- Māori and Pacific peoples are more severely affected by asthma. To improve outcomes for these patients health professionals can focus on asthma education, provide personalised asthma action plans and use clinical audits to identify patients with the greatest unmet need

New Zealand adult asthma guidelines have been released

The New Zealand adult asthma guidelines were released by the Asthma and Respiratory Foundation of New Zealand in November, 2016. In the first of a series on adult asthma, this resource outlines the four-stage consultation, which is a framework for managing patients with asthma in primary care (an appendix in the Guidelines). Subsequent articles in this series provide guidance around key decisions for prescribers:

- Initiating inhaled corticosteroids – “Inhaled corticosteroids for adults with asthma”, see Page 8
- Stepping up treatment for patients with more severe asthma – “Adding a LABA to asthma treatment for adults”, see Page 12

👁️ The New Zealand adult asthma guidelines are applicable to patients aged over 16 years. The guidelines were developed independently of the pharmaceutical industry and are available from: www.nzasthmaguidelines.co.nz/adultguidelines.html


Stage one: assess asthma control

Patients who have been diagnosed with asthma (see: "A specified increase in lung function following bronchodilation is no longer required for a diagnosis of asthma") should have their level of symptom control and exacerbation risk assessed at Stage one of each consultation.¹

As patients often under-report their symptoms, the five-question Asthma Control Test (ACT) is recommended.¹ The ACT asks patients to rate:¹

- Any limitations at work, school or home
- The frequency of any dyspnoea
- The frequency of any night waking
- Their frequency of reliever medicine use
- Their own assessment of symptom control

Each question is scored from 1–5, with higher scores indicating good control and lower scores indicating poor control. A total score of 20–25 indicates the patient's asthma is well-controlled and their treatment is appropriate; a score of 16–19 indicates partial control and prompts consideration of whether treatment is sufficient; a score of 5–15 indicates poor control and the need for intensification of treatment.¹


 The asthma control test is available from: www.asthmacontrol.co.nz

Review any lung function tests

If the patient is performing peak flow monitoring or if spirometry is available in the practice, these measurements can be helpful in assessing asthma control and determining if a change in treatment is indicated.

Assess asthma severity

Asthma severity is determined by the level of treatment required for the patient to maintain good control. For example, mild asthma is well controlled with infrequent use of a short-acting beta₂-agonist (SABA) or with a standard daily inhaled corticosteroid (ICS) dose.⁷ Moderate asthma requires a "step up" in treatment to achieve good control, e.g. replacing an ICS with a combination ICS/long-acting beta₂-agonist (LABA) inhaler.⁷ Severe asthma is when symptoms are uncontrolled despite the patient being adherent to optimal treatment, taken correctly.¹

 Information on ICS treatment is available in: "Inhaled corticosteroids for adults with asthma" and information on stepping up to a LABA is available in "Adding a LABA to asthma treatment for adults", Page 12.

A specified increase in lung function following bronchodilation is no longer required for a diagnosis of asthma


A diagnosis of asthma begins with the recognition of a characteristic pattern of respiratory symptoms and signs. In many patients this pattern will have emerged during childhood. However, a diagnosis later in life is not uncommon as onset may occur at any age and asthma may remit and recur during adulthood.

To diagnose asthma, the patient's clinical history is combined with an examination and documented evidence of variable airflow limitation.¹ A therapeutic response to an inhaled bronchodilator and/or an ICS can be helpful, however, an increase in forced expiratory volume in one second (FEV₁) ≥ 12% and ≥ 200 mL from baseline following bronchodilation is no longer required for a diagnosis of asthma.¹ This is because most people with asthma will not exhibit this degree of reversibility at one assessment and reversibility is also seen in those with normal airway function as well as patients with chronic obstructive pulmonary disease (COPD).¹ A pragmatic approach is to

correlate the degree of bronchodilator reversibility or peak flow variability with the likelihood of asthma.

Adult-onset asthma is more likely than childhood asthma to be non-atopic, severe and persistent.² A known exposure to a respiratory irritant in the workplace and an improvement in symptoms when the patient is not at work make an occupational cause of asthma more likely, and this should be considered in all cases of adult-onset asthma.^{1, 3} Investigation of occupational asthma may require referral to a respiratory physician.¹


In adults with a history of smoking it can be difficult to distinguish asthma and COPD as these patients may have clinical features of both conditions, referred to as Asthma-COPD overlap.

 Further information on diagnosing COPD is available from: www.bpac.org.nz/BPJ/2015/February/copd-part1.aspx

Assess the future risk of exacerbations

Assessing the risk of future adverse outcomes is a new and important feature of the Asthma Guidelines. Patients with an increased exacerbation risk may require a step up in treatment, e.g. those with:¹

- SABA use greater than one canister per month
- The need for long-term or repeat courses of oral corticosteroids
- Under use or poor adherence to ICS treatment
- A history of sudden asthma exacerbations
- A history of unplanned consultations, emergency department visits or hospital admissions

 Further information on assessing asthma exacerbation risk is available in: "Adding a LABA to asthma treatment for adults", Page 12.

Stage two: consider other clinically relevant issues

After establishing the patient's level of symptom control and risk of exacerbation, Stage two of the consultation involves considering any other issues which can influence these factors. Checking inhaler technique and assessing adherence to prescribed medicines at each consultation is very important. Key non-pharmacological interventions for asthma management include smoking cessation and weight loss.¹ Breathing exercise programmes are reported to improve the symptoms and the quality of life of patients with asthma as well as reducing the need for bronchodilators.^{1,3}

Some form of physical exercise should be encouraged in all patients with asthma; if this triggers symptoms, treatment should be reviewed.¹ However, before prescribing additional medicines, consider if dyspnoea or wheezing during exercise may be caused by a lack of fitness or other respiratory conditions such as vocal cord dysfunction.⁷ A SABA taken immediately before exercise is the preferred treatment for exercise-induced asthma.³

Consider if the patient has any treatable traits

The concept of "treatable traits" is new to the New Zealand Asthma Guidelines. This refers to the recognition and management of overlapping disorders, co-morbidities, environmental and behavioural factors to improve asthma care. This approach is most likely to benefit patients with asthma who have poor respiratory health despite optimal asthma treatment.

Disorders that may overlap with asthma


Overlapping respiratory disorders that may exacerbate

Improving asthma care for Māori and Pacific peoples

Māori and Pacific peoples are more severely affected by asthma than New Zealand Europeans. Māori are almost three times, and Pacific peoples over 3.5 times more likely to be hospitalised due to asthma than people of other ethnicities.⁴ The most recent data (2006 – 2011), shows that mortality rates due to asthma per 100,000 people in New Zealand were 5.4 for Māori and 6.5 for Pacific peoples, compared to 1.3 for people of Asian ethnicity and 1.1 for people of other ethnicities, including New Zealand Europeans.⁴ Despite this, Māori children are less likely to be prescribed an ICS;⁵ this may also apply to Māori adults.


Primary care clinicians can improve outcomes for Māori and Pacific peoples with asthma. Methods to achieve this include:⁶

- Focusing on expanding one aspect of the patient's understanding of asthma at every consultation – asthma education is an ongoing process
- Information about asthma being matched to the patient's stage of health literacy – always check that the key points have been delivered in a way that the patient understands
- Performing clinical audits to identify patients who are likely to benefit from intensification of asthma management – identify those most at risk
- Using single inhaler treatment (also known as SMART) – preferred for patients at risk of severe exacerbations
- Using asthma action plans – this improves outcomes in those more severely affected

 Information on improving asthma education for Māori and Pacific peoples is available from: www.bpac.org.nz/BPJ/2015/September/asthma.aspx

 The Health Quality and Safety Commission (HQSC) has ethnicity data on childhood hospital admissions in New Zealand due to asthma by DHB, available from: www.hqsc.govt.nz/assets/Health-Quality-Evaluation/Atlas/asthmaDF5Jul/atlas.html

symptoms in patients with asthma include, chronic obstructive pulmonary disease (COPD), allergic bronchopulmonary aspergillosis (ABPA), bronchiectasis and dysfunctional breathing, i.e. breathing too deeply and/or too rapidly.¹ Patients with features of COPD may benefit from treatment with a long-acting muscarinic antagonist (LAMA).¹ ABPA can progress to bronchiectasis and is suggested by worsening asthma and a productive cough with mucus plugs and fever.⁸ Diagnosis of ABPA involves chest X-ray or CT scan, allergy skin testing and/or blood tests.⁸ Chest physiotherapy and the prompt use of antibiotics for exacerbations are the mainstays of bronchiectasis management. Dysfunctional breathing is generally managed by a physiotherapist with breathing retraining techniques.


 Further information on bronchiectasis is available from: www.bpac.org.nz/BPJ/2012/september/bronchiectasis.aspx

Manage co-morbidities to improve quality of life

Chronic rhinosinusitis is associated with an increased frequency of asthma exacerbations.⁹ Intranasal corticosteroids may reduce the symptoms of asthma in patients with chronic rhinosinusitis,⁷ e.g. intranasal fluticasone 100 micrograms (two sprays of 50 micrograms) into each nostril every morning, increasing to twice daily if required.¹⁰ A saline sinus rinse may remove sticky secretions from the upper airways in patients with upper airway disease.

Patients with asthma who are obese may have respiratory symptoms that are harder to control.⁷ They are also less likely to respond to ICS treatment, compared with lean individuals with asthma.¹¹ A reduction in weight of 10% or more is likely to result in improved respiratory symptoms.¹¹

Gastro-oesophageal reflux disease (GORD) is often present in patients with asthma and is associated with an increased frequency of exacerbations.⁹ This may be due to microaspiration of gastrointestinal secretions during sleep.⁹ Prescribing a proton pump inhibitor (PPI) will improve symptoms of GORD, and therefore in theory reduce asthma exacerbations. However, a PPI has no effect on lung function.¹²

 Further information on the treatment of GORD is available from: www.bpac.org.nz/BPJ/2014/June/gord.aspx

Environmental factors that may exacerbate asthma


Consider factors in the patient's environment such as occupational exposure to irritants, smoking and the use of medicines such as aspirin, other non-steroidal anti-inflammatory medicines and beta-blockers, which may be contributing to ongoing asthma symptoms despite optimal pharmacological treatment.¹

Assess behavioural factors

The New Zealand Asthma Guidelines emphasise the importance of checking and demonstrating inhaler technique and assessing treatment adherence at Stage two of every consultation.¹ A collaborative approach between practice nurses, pharmacists and general practitioners ensures that key asthma education messages are repeated in different ways from multiple sources.

The use of a spacer with a metered dose inhaler (MDI) is strongly recommended for the routine administration of ICS, ICS/LABA and SABA during acute exacerbations.¹ Patients can be instructed to:^{1,3}

- Remove the cap of the inhaler, shake and insert it into the spacer
- Administer one dose of the medicine at a time into the spacer, followed quickly by an inhalation
- Medicine can be inhaled by either taking one deep, slow breath and holding it for ten seconds or by taking five or six tidal breaths

 Spacers which fit all subsidised pressured MDIs in New Zealand are subsidised under Practitioners Supply Order (PSO). These e-chamber spacers are made from anti-static material and do not have to be primed before use.

Peak flow monitoring is not routinely required

Peak flow monitoring may be incorporated into the self-management plan of any patient with asthma who wishes to record their lung function. However, this approach is now generally only recommended for patients with severe asthma or for those with an impaired ability to perceive worsening airflow limitation.^{3,7}


Stage three: decide if an increase or decrease in maintenance treatment is required

As a patient's symptom control and exacerbation risk can vary, it may be necessary at times to adjust treatment; this is Stage three of the asthma consultation.

Asthma treatment may be stepped up for patients with uncontrolled symptoms or a recent exacerbation, e.g. adding an ICS or escalating to an ICS/LABA combination.¹ Before doing this (as per Stage two of the consultation):

- Confirm adherence to treatment and correct inhaler technique
- Consider modifiable factors, e.g. smoking cessation
- Consider if the patient's symptoms could be caused by an overlapping respiratory condition or co-morbidity; one study of over 700 adults with physician-diagnosed asthma found that a diagnosis of asthma could not be subsequently established in one-third of participants.¹³

It may be appropriate to step down treatment, e.g. withdraw a LABA or reduce the ICS dose, in patients with symptoms that have been well-controlled for three months who also have a low exacerbation risk.¹ A step down in asthma treatment is regarded as a therapeutic trial and patients should be provided with an action plan (Stage four of the consultation) and instructions on how to step up treatment if their condition deteriorates.⁷


 Information on ICS and LABA treatment is available in: “Inhaled corticosteroids for adults with asthma”, Page 8 and “Adding a LABA to asthma treatment for adults”, Page 12.

Stage four: complete the asthma action plan

Asthma action plans form the basis for patient self-management and are known to improve health outcomes.¹ The New Zealand Guidelines recommend that every patient with asthma should be offered a written and personalised action plan at Stage four of the consultation.^{1,3}

Asthma action plans help identify deteriorating asthma and provide patients with instructions on how this can be managed. The plan may be based on symptoms, with or without peak flow measurements.¹ Action plans should evolve over time and can be modified according to patient and prescriber experience.¹

The Asthma and Respiratory Foundation provides three templates; a three and a four stage plan and a plan for patients using single inhaler treatment (referred to as SMART in this plan). The four stage asthma plan provides the option of increasing the frequency of ICS use in response to worsening symptoms.

 Asthma action plans are available from: www.asthmafoundation.org.nz/resources/asthma-action-plans

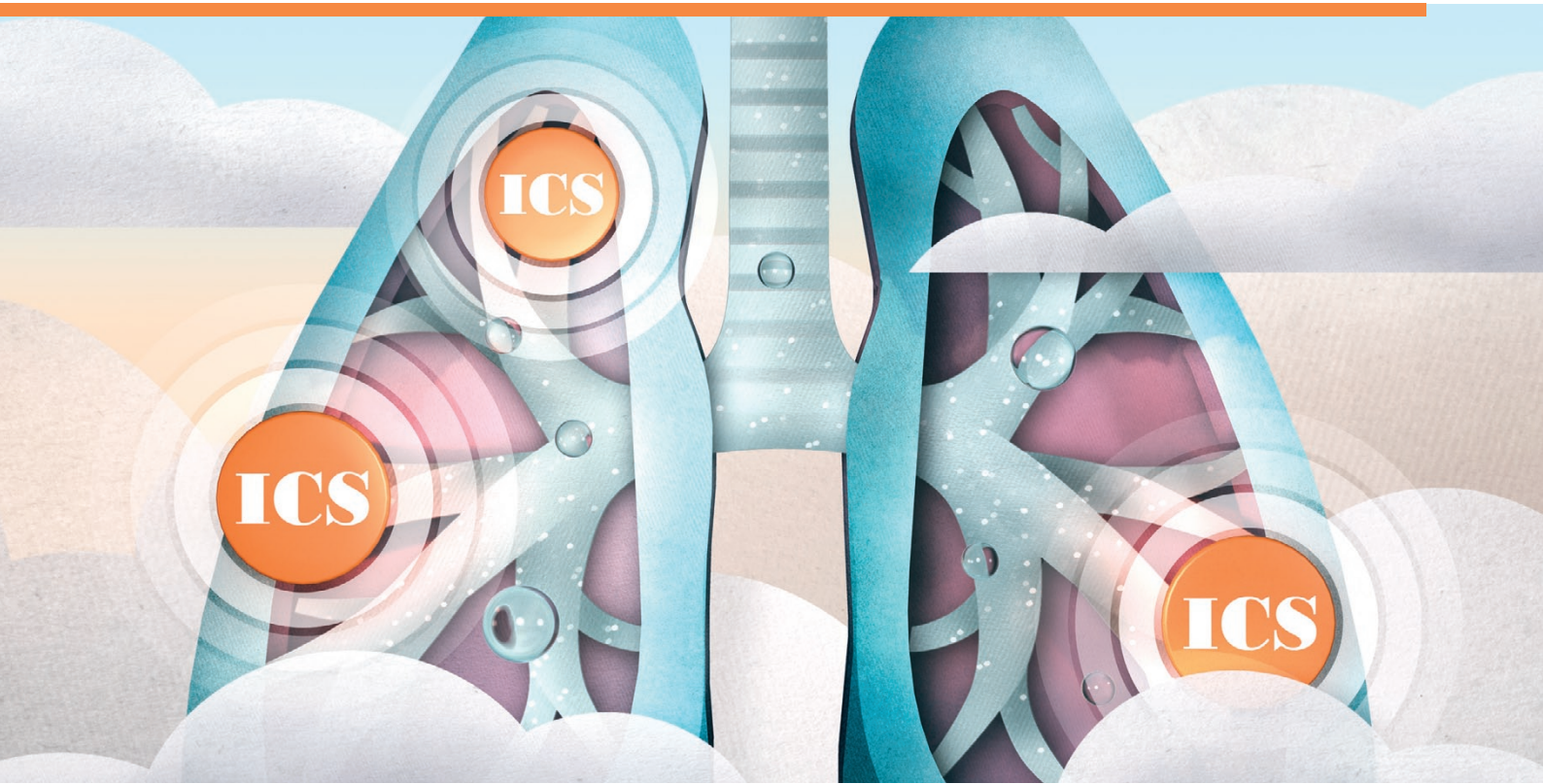
Acknowledgement: Thank you to **Professor Richard Beasley**, Respiratory Physician, Director of the Medical Research Institute of New Zealand, Wellington for expert review of this article.

References

1. Beasley R, Hancox RJ, Harwood M, et al. Asthma and Respiratory Foundation NZ adult asthma guidelines: a quick reference guide. *N Z Med J* 2016;129:83–102.
2. Abramson MJ, Perret JL, Dharmage SC, et al. Distinguishing adult-onset asthma from COPD: a review and a new approach. *Int J Chron Obstruct Pulmon Dis* 2014;9:945–62. doi:10.2147/COPD.S46761
3. British Thoracic Society, Scottish Intercollegiate Guidelines Network. British guideline on the management of asthma: A national clinical guideline. 2016. Available from: www.brit-thoracic.org.uk/document-library/clinical-information/asthma/bttsign-asthma-guideline-2016 (Accessed Apr, 2017).
4. Barnard L, Baker M, Pierse N, et al. The impact of respiratory disease in New Zealand: 2014 update. 2015. Available from: www.asthmafoundation.org.nz/research/the-impact-of-respiratory-disease-in-new-zealand-2014-update (Accessed Apr, 2017).
5. Gillies TD, Tomlin AM, Dovey SM, et al. Ethnic disparities in asthma treatment and outcomes in children aged under 15 years in New Zealand: analysis of national databases. *Prim Care Respir J* 2013;22:312–8. doi:10.4104/pcrj.2013.00068
6. Jones B, Ingham T, Reid S, et al. He Māramatanga Huangō: Asthma Health Literacy for Māori Children in New Zealand. 2015. Available from: <https://www.asthmafoundation.org.nz/research/he-maramatanga-huangō-asthma-health-literacy-for-māori-children-in-new-zealand> (Accessed Apr, 2017).
7. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2017. Available from: <http://ginasthma.org/2017-gina-report-global-strategy-for-asthma-management-and-prevention> (Accessed Apr, 2017).
8. American Academy of Allergy Asthma and Immunology. Allergic bronchopulmonary aspergillosis (ABPA). 2017. Available from: www.aaaai.org/conditions-and-treatments/related-conditions/allergic-bronchopulmonary-aspergillosis (Accessed Apr, 2017).
9. Denlinger LC, Phillips BR, Ramratnam S, et al. Inflammatory and Comorbid Features of Patients with Severe Asthma and Frequent Exacerbations. *Am J Respir Crit Care Med* 2017;195:302–13. doi:10.1164/rccm.201602-0419OC
10. New Zealand Formulary (NZF). NZF v57. 2017. Available from: www.nzf.org.nz (Accessed Mar, 2017).
11. Baffi CW, Winnica DE, Holguin F. Asthma and obesity: mechanisms and clinical implications. *Asthma Res Pract* 2015;1:1. doi:10.1186/s40733-015-0001-7
12. Chan WW, Chiou E, Obstein KL, et al. The efficacy of proton pump inhibitors for the treatment of asthma in adults: a meta-analysis. *Arch Intern Med* 2011;171:620–9. doi:10.1001/archinternmed.2011.116
13. Aaron SD, Vandemheen KL, FitzGerald JM, et al. Reevaluation of Diagnosis in Adults With Physician-Diagnosed Asthma. *JAMA* 2017;317:269–79. doi:10.1001/jama.2016.19627



This article is available online at:
www.bpac.org.nz/2017/asthma.aspx



Inhaled corticosteroids for adults with asthma

A key decision in asthma management is when to initiate an inhaled corticosteroid (ICS). It is clear that patients with weekly asthma symptoms are likely to benefit from ICS treatment. However, emerging evidence suggests that patients with less frequent symptoms, e.g. monthly, will also benefit from ICS treatment, although adherence is often low in this group. It is recommended that clinicians offer an ICS to patients according to their treatment goals.

KEY MESSAGES:

- As part of the four-stage consultation framework for managing patients with asthma in primary care, pharmacological treatment is adjusted according to the patient's symptoms and risk of exacerbations (Stage three of the consultation)
- ICS are the most effective class of medicine available to control asthma symptoms and reduce exacerbation risk
- Offer an ICS to all patients who have had symptoms on two or more occasions in the past week, or an exacerbation in the past year that required oral corticosteroids. However, patients who have less frequent symptoms that they consider troublesome may also wish to begin ICS treatment.
- Daily ICS treatment can begin at a standard dose

(previously referred to as low dose), i.e. 400 micrograms beclomethasone dipropionate, 200 micrograms beclomethasone dipropionate extrafine, 400 micrograms budesonide or 200 micrograms fluticasone propionate

- A "step up" in treatment to an ICS/LABA should be considered for patients with symptoms that are not controlled by a standard ICS dose, once adherence, inhaler technique and "treatable traits" have been assessed
- A "step down" to a lower dose of an ICS may be considered for patients with well-controlled asthma who have a low risk of exacerbations

Inhaled corticosteroids underpin the pharmacological treatment of asthma

Long-term inflammation of the airways with eosinophil infiltration is a hallmark of asthma, even in patients who experience infrequent symptoms.¹ An inhaled corticosteroid (ICS) is the most practical and effective medicine to control airway inflammation, reduce symptoms and prevent exacerbations in patients with asthma.¹ Delivery by inhalation results in a higher concentration of medicine in the airways and fewer systemic adverse effects than systemic administration of corticosteroids.²

The mechanism of ICS action

At a molecular level an ICS switches off activated genes that encode for inflammatory proteins such as cytokines, adhesion molecules and enzymes.¹ This results in reduced eosinophil numbers in the airways and sputum, as well as reductions in the number of activated T cells and mast cells in the airway mucosa.¹ Patients with asthma may experience improvements in symptoms and lung function several days after beginning ICS treatment, however, it may take a number of months to achieve a maximal reduction in airway hyper-responsiveness.¹ Withdrawal of an ICS is often associated with a deterioration in asthma control.¹

When to initiate an ICS

The New Zealand Asthma Guidelines recommend an ICS for patients at Step 2 in the five-step treatment model for asthma management (Figure 1).

The optimal point at which to initiate ICS treatment in patients with asthma is not conclusively known. However, following an assessment of asthma severity (Stage one of the asthma consultation), and the identification of any contributing factors (Stage two of the consultation), consideration should be given to initiating an ICS for patients not already on this treatment (Stage three of the consultation).

- The New Zealand Asthma Guidelines recommend beginning ICS treatment when patients have symptoms of asthma on two or more occasions in the previous week.³
- The Asthma Guidelines also acknowledge that people with less frequent symptoms may benefit from treatment with an ICS (see: “The START study”, over page).³
- The Global Initiative for Asthma (GINA) recommends initiating an ICS for patients with asthma who require a SABA between twice a month and twice a week or

for those who wake due to asthma symptoms once a month.²

- If the patient has had an asthma exacerbation requiring oral corticosteroids in the past year, this also suggests that ICS treatment is appropriate.³

Discuss the benefits of ICS treatment and the risks

When considering initiating ICS treatment it is necessary to balance the potential benefits with the reality that adherence is often poor in people with mild asthma.⁴ Some patients may judge the inconvenience of daily treatment and the possibility of adverse effects to be more important than the benefits of early ICS treatment.⁵ Discuss any concerns patients might have about ICS treatment (e.g. adverse effects, “steroid stigma”) and where appropriate reassure them that systemic adverse effects at standard doses are relatively uncommon (see Page 11).

👁️ A safety fact sheet for patients taking inhaled corticosteroids is available from the Asthma and Respiratory Foundation: www.asthmafoundation.org.nz/resources/safety-of-inhaled-corticosteroids-ics

ICS treatment begins with a trial to assess the patient’s response

Treatment with an ICS should begin as a trial with the patient’s response assessed at their next consultation. It is recommended that a follow-up appointment be scheduled eight weeks after ICS treatment begins.³ Patients with mild asthma have symptoms that are well controlled with a standard daily ICS dose. Patients with moderate asthma are likely to require a step up to an ICS/LABA.²

👁️ Information on assessing asthma severity is available in: “Managing adults with asthma in primary care: the four-stage consultation”, Page 3.

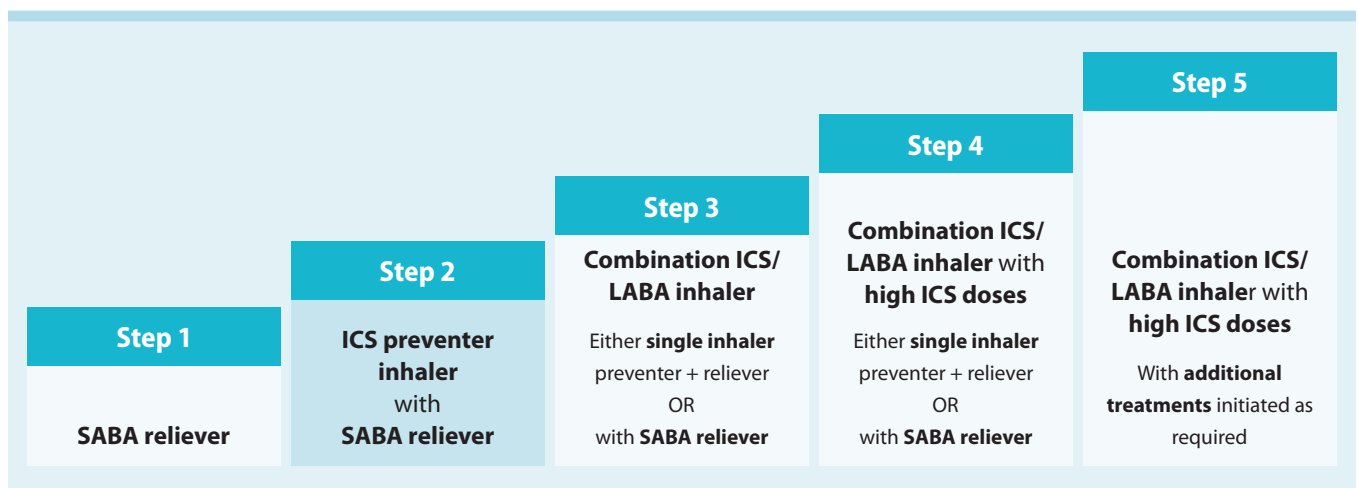


Figure 1: The stepwise treatment of adult asthma, adapted from Beasley *et al*, 2016.³

Which ICS regimen is most effective?

There is a lack of well designed studies comparing different types of ICS in the treatment of asthma. All ICS subsidised in New Zealand are broadly considered to be equally effective when taken at clinically equivalent doses, i.e. beclomethasone dipropionate and budesonide are approximately equivalent to fluticasone propionate taken at half the dose.⁵ Patient preference for inhaler devices and clinical experience are the main factors in determining ICS selection.

Choosing a starting dose for an ICS

Patients with asthma can begin treatment with an ICS at a standard dose (Table 1).³ The term “standard dose” has replaced the term low dose that was used in previous guidance. Standard doses provide patients with 80 – 90% of the maximum obtainable benefit of ICS treatment.³ It is recommended that ICS be initiated with twice daily dosing, as this is slightly more effective than once daily dosing.⁵

“Stepping up” asthma treatment

Patients who do not have adequate symptom control after an eight-week trial with a standard ICS dose may require a longer period to determine if they will respond to ICS treatment or they may be switched to an ICS/LABA combination inhaler.³

The START study

The Steroid Treatment As Regular Therapy (START) study assigned 7,138 patients aged 4 – 66 years with mild asthma, diagnosed in the past two years, to either once daily budesonide 400 micrograms or placebo. Post-hoc analysis of the START trial found that budesonide halved the risk of asthma-related adverse events, decreased lung function decline and improved symptom control across all groups of patients.⁶ This included patients with symptoms occurring zero to one times per week.⁶ The rate of adverse events of patients taking budesonide in START was similar to those taking placebo.⁷ These results suggest that many patients with asthma will benefit from earlier initiation of ICS treatment than is recommended by many guidelines.

The ICS component of combination treatment may be increased once the patient’s response to an ICS/LABA has been assessed.


 Information on initiating LABA treatment is available in the article “Adding a LABA to asthma treatment for adults”, Page 12.

Table 1: Recommended clinically equivalent standard daily doses of ICS for adults with asthma^{8,9}

| Type of ICS and standard starting dose | Dose per inhalation (micrograms) | Patients should take | Subsidised brand and inhaler type |
|--|----------------------------------|-------------------------------|--|
| Beclomethasone dipropionate 400 – 500 micrograms/day | 50 | Four inhalations, twice daily | Beclazone metered dose inhaler (MDI) |
| | 100 | Two inhalations, twice daily | |
| | 250 | One inhalation, twice daily | |
| Beclomethasone dipropionate extrafine 200 micrograms/day* | 50 | Two inhalations, twice daily | Qvar MDI |
| | 100 | One inhalation, twice daily | |
| Budesonide 400 micrograms/day | 100 | Two inhalations, twice daily | Pulmicort dry powder inhaler (DPI) |
| | 200 | One inhalation, twice daily | |
| | 400 | One inhalation, once daily | |
| Fluticasone propionate 200 – 250 micrograms/day | 50 | Two inhalations, twice daily | Flixotide DPI, Flixotide and Floair MDIs |
| | 100 | One inhalation, twice daily | |
| | 125 | One inhalation, twice daily | |

* Aerosol droplets are on average approximately ten times smaller than droplets in beclomethasone dipropionate

Managing any adverse effects of ICS treatment

Treatment with an ICS can cause local or systemic adverse effects. At standard doses the risk of clinically significant adverse effects is relatively low, although the risk is increased in patients who are also taking potent topical corticosteroids.⁵ At standard doses dysphonia and oral candidiasis are the most common adverse effects of ICS treatment.⁵ Oral rinsing after taking an ICS reduces the risk of ICS-related adverse effects.² It is advisable to check the inhaler technique of any patient who may be experiencing adverse effects. Poor inhaler technique is associated with an increased risk of: poor asthma control, hospitalisation, courses of oral steroids and use of antibiotics.¹⁰ Errors that are frequently seen in patients using inhalers include not holding their breath after an inhalation, inhaling too early, not exhaling before actuation and not shaking the inhaler.¹⁰

The extent of systemic ICS absorption is dependent on the inhaler device, particle size, deposition and the individual properties of the active ingredient.¹¹ Anxiety, depression, sleep disturbances, behavioural changes, e.g. hyperactivity and irritability, hyperglycaemia, skin thinning and bruising have been reported in patients taking inhaled corticosteroids.¹² There may also be a small increased risk of glaucoma in some patients.¹² Hypersensitivity reactions, e.g. rash and angioedema, to ICS treatment are uncommon and paradoxical bronchospasm is a very rare adverse event.¹² A reduction in bone mineral density following long-term ICS use at high doses may increase the risk of osteoporosis in some patients.¹² There is no clear guidance on when to consider a bisphosphonate for a patient taking long-term high-dose ICS,¹³ however, this decision can be guided by a risk assessment including the patient's age, history and results of dual-energy X-ray absorptiometry (DEXA).

"Stepping down" the ICS regimen

The risk of ICS-related adverse effects can be decreased by reducing the dose. This may be appropriate for patients with asthma symptoms that have been well-controlled for three months who have a low exacerbation risk.³ A 50% ICS dose reduction can be trialled, regardless of the patient's starting dose and dose tapering is not required. This can be achieved by either:

- Halving the number of inhalations, e.g. beclomethasone dipropionate, 100 micrograms TWO inhalations twice daily is reduced to ONE inhalation, twice daily; or
- Taking an ICS only in the evening, e.g. budesonide* 400 micrograms, daily (two inhalations of a 100 microgram inhaler, twice daily) becomes budesonide 200 micrograms, daily (two inhalations of a 100 microgram inhaler, in the evening).

* Budesonide is the only ICS subsidised in New Zealand that is licensed for once-daily dosing.¹²

Complete withdrawal of ICS treatment is not recommended,³ as this is likely to result in an exacerbation. However, a temporary withdrawal may be appropriate for patients with seasonal symptoms with treatment resuming at the first onset of symptoms.

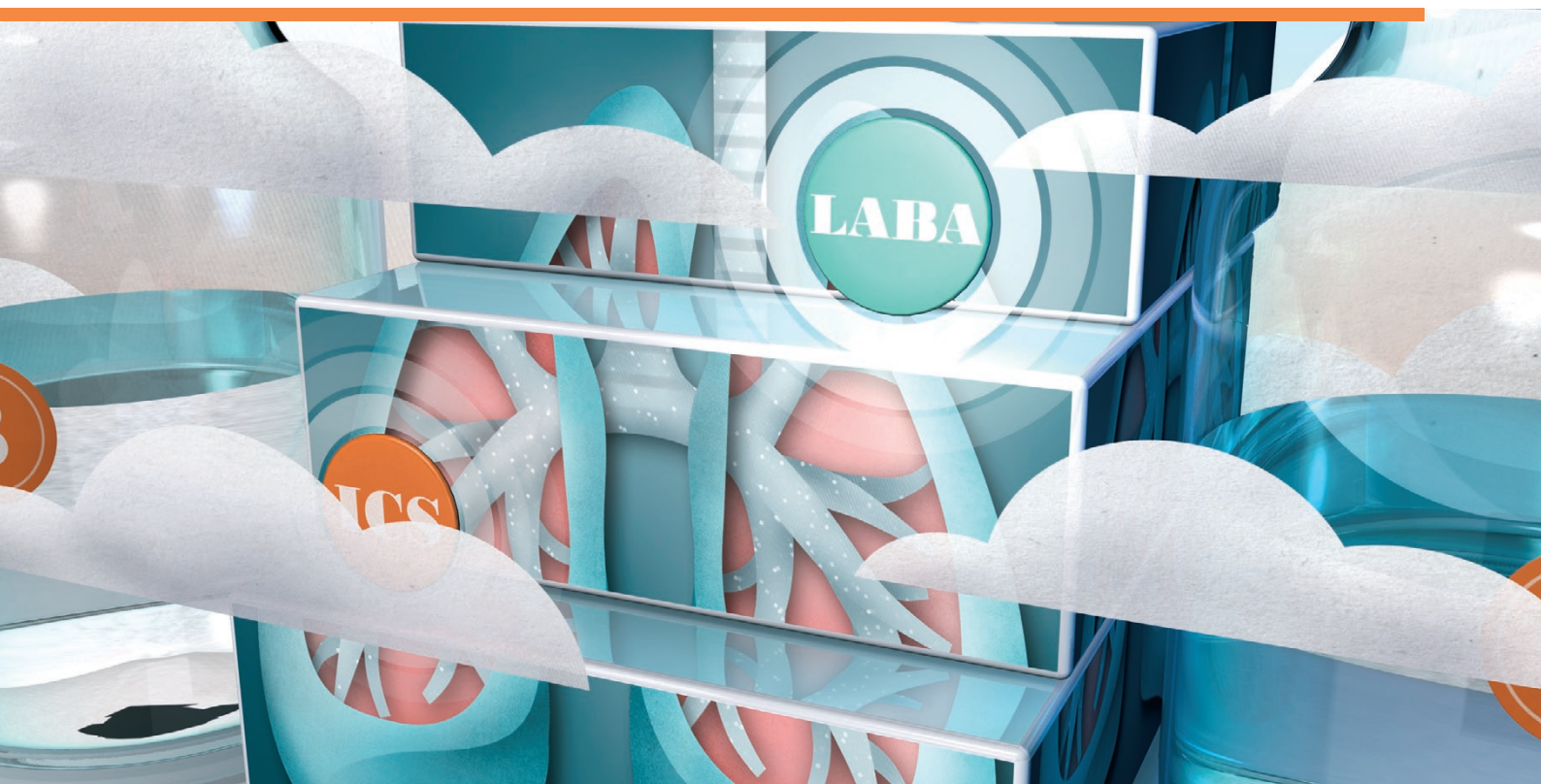
Acknowledgement: Thank you to **Professor Richard Beasley**, Respiratory Physician, Director of the Medical Research Institute of New Zealand, Wellington for expert review of this article.

References

1. Barnes P. Diseases of the respiratory system. In: Harrison's principles of internal medicine. McGraw-Hill 2015. 1669–80.
2. Global Initiative for Asthma. Global strategy for asthma management and prevention. 2017. Available from: <http://ginasthma.org/2017-gina-report-global-strategy-for-asthma-management-and-prevention> (Accessed Apr, 2017).
3. Beasley R, Hancox RJ, Harwood M, et al. Asthma and Respiratory Foundation NZ adult asthma guidelines: a quick reference guide. *N Z Med J* 2016;129:83–102.
4. Bärnes CB, Ulrik CS. Asthma and adherence to inhaled corticosteroids: current status and future perspectives. *Respir Care* 2015;60:455–68. doi:10.4187/respcare.03200
5. British Thoracic Society, Scottish Intercollegiate Guidelines Network. British guideline on the management of asthma: A national clinical guideline. 2016. Available from: www.brit-thoracic.org.uk/document-library/clinical-information/asthma/btssign-asthma-guideline-2016 (Accessed Apr, 2017).
6. Reddel HK, Busse WW, Pedersen S, et al. Should recommendations about starting inhaled corticosteroid treatment for mild asthma be based on symptom frequency: a post-hoc efficacy analysis of the START study. *Lancet Lond Engl* 2017;389:157–66. doi:10.1016/S0140-6736(16)31399-X
7. Pauwels RA, Pedersen S, Busse WW, et al. Early intervention with budesonide in mild persistent asthma: a randomised, double-blind trial. *Lancet Lond Engl* 2003;361:1071–6. doi:10.1016/S0140-6736(03)12891-7
8. Holt S, Suder A, Weatherall M, et al. Dose-response relation of inhaled fluticasone propionate in adolescents and adults with asthma: meta-analysis. *BMJ* 2001;323:253–6.
9. Masoli M, Holt S, Weatherall M, et al. Dose-response relationship of inhaled budesonide in adult asthma: a meta-analysis. *Eur Respir J* 2004;23:552–8.
10. Melani AS, Bonavia M, Cilenti V, et al. Inhaler mishandling remains common in real life and is associated with reduced disease control. *Respir Med* 2011;105:930–8. doi:10.1016/j.rmed.2011.01.005
11. Tattersfield AE, Harrison TW, Hubbard RB, et al. Safety of inhaled corticosteroids. *Proc Am Thorac Soc* 2004;1:171–5. doi:10.1513/pats.200402-016MS
12. New Zealand Formulary (NZF). NZF v57. 2017. Available from: www.nzf.org.nz (Accessed Mar, 2017).
13. Chee C, Sellahewa L, Pappachan JM. Inhaled corticosteroids and bone health. *Open Respir Med J* 2014;8:85–92. doi:10.2174/1874306401408010085



This article is available online at:
www.bpac.org.nz/2017/ics.aspx



Adding a long-acting beta₂-agonist (LABA) to asthma treatment for adults

If a patient using an inhaled corticosteroid for asthma has symptoms which are not adequately controlled, clinicians should consider adding a LABA to their regimen in the form of a combined ICS/LABA inhaler. Use of an ICS/LABA inhaler as both reliever and preventer treatment is preferred for patients at high risk of exacerbation, known as single inhaler treatment.

KEY PRACTICE POINTS:

- The four-stage consultation framework for managing patients with asthma in primary care recommends that pharmacological treatment is regularly reviewed, and if necessary adjusted, according to the patient's symptoms and risk of exacerbations (Stage three of the consultation)
- If patients have inadequately controlled asthma symptoms while using a standard dose ICS inhaler, add a LABA to their treatment regimen rather than increasing the ICS dose
- Prescribe a combination ICS/LABA inhaler, rather than separate ICS and LABA inhalers
- Patients should initiate a combination ICS/LABA inhaler with a dose of ICS equivalent to the dose they were using with their ICS inhaler
- Single inhaler treatment (also known as SMART) is recommended for patients at risk of severe exacerbations

management of asthma. Adult patients with asthma who have been prescribed an inhaled corticosteroid (ICS) preventer (Step 2), but still have poorly or partly controlled symptoms, may require the addition of a long-acting beta₂-agonist (LABA) to their treatment regimen, either at Step 3 or 4 (Figure 1).

Use the four-stage asthma consultation process

Adjustments to treatment based on the patient's control of symptoms and risk of exacerbations are recommended at Stage three of the four-stage asthma consultation plan presented in the New Zealand Adult Asthma Guidelines.¹ An escalation of treatment from an ICS preventer should only be done after assessing asthma control (Stage one of the consultation) and considering whether other clinical issues or treatable traits are contributing to a patient's symptoms (Stage two). After adjusting treatment, the patient's asthma action plan should be updated (Stage four).

The New Zealand Adult Asthma Guidelines recommend a stepwise treatment model for the pharmacological

👁️ For further information, see: "Managing adults with asthma in primary care: the four-stage consultation", Page 3.

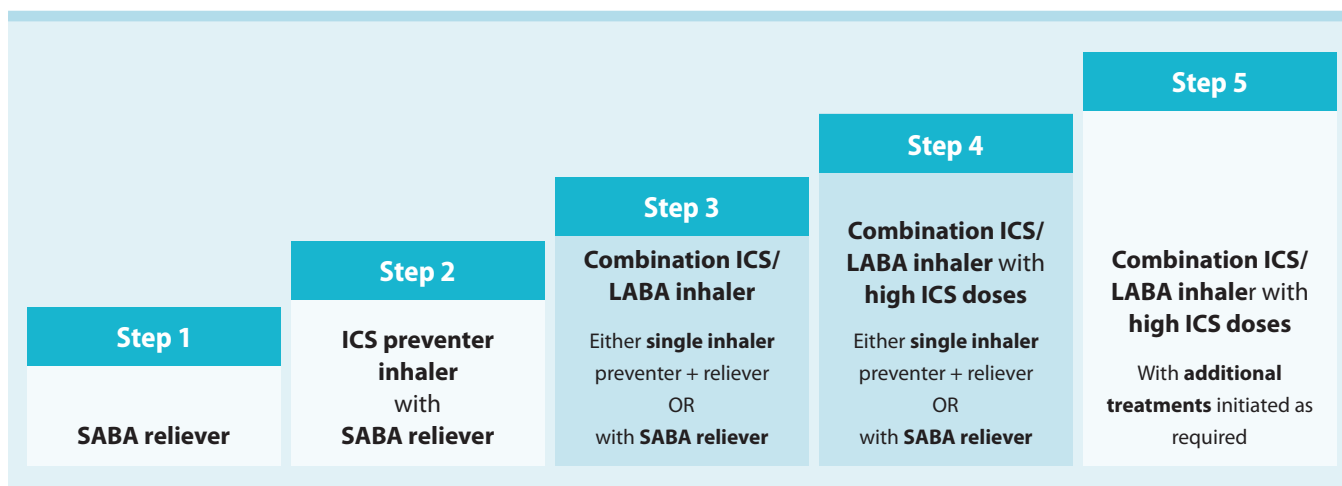


Figure 1: Patients with asthma inadequately controlled with an ICS preventer inhaler (Step 2) may require the use of a combination ICS/LABA inhaler (Steps 3 and 4). Adapted from Beasley *et al*, 2016.¹

Escalating treatment from an ICS preventer inhaler to an ICS/LABA inhaler

A patient with asthma using an ICS at the recommended standard dose will receive 80 – 90% of the maximum obtainable benefit of an ICS.^{2,3} Therefore, if patients require a step-up of treatment they should have a LABA added to their regimen rather than increasing the ICS dose.^{1,4,5} Regular use of a LABA provides long-acting bronchodilation and results in improved lung function, reduced symptoms and a reduced risk of exacerbations.⁴

Prescribe a combination ICS/LABA inhaler

A LABA should be added to treatment by prescribing a combination ICS/LABA inhaler and discontinuing the previously used ICS inhaler. Patients who are prescribed separate ICS and LABA inhalers could potentially have poor adherence to their ICS inhaler and in effect be using LABA monotherapy. LABA monotherapy is associated with a small but significant increase in the risk of asthma-related mortality, and therefore this practice is not recommended.⁶ Combination ICS/LABA inhalers can be prescribed fully subsidised without patients needing to first trial separate ICS and LABA inhalers.

N.B. Combination inhalers containing ICS and long-acting muscarinic agonists (LAMAs) are not indicated or recommended for the treatment of asthma.

Maintain an equivalent dose of ICS when starting patients on an ICS/LABA inhaler

When patients are stepped up from an ICS preventer inhaler to an ICS/LABA inhaler, their dose of ICS should remain the same (or equivalent if a different ICS is used).¹ Therefore:

- Patients using a standard daily dose of an ICS preventer inhaler can initially be prescribed any ICS/LABA inhaler at the doses shown in Step 3 of the New Zealand Adult

Asthma Guidelines pharmacological treatment model (Tables 1 and 2)

- Patients using high doses of an ICS preventer inhaler can be commenced at Step 4 (Tables 1 and 2)

Patients can be switched from any of the subsidised ICS preventer inhalers to any of the subsidised combination ICS/LABA inhalers, and do not necessarily need to continue on the same ICS.

👁 For further information on clinically equivalent standard doses of ICS, see: “Inhaled corticosteroids for adults with asthma”, www.bpac.org.nz/2017/ics.aspx

Choosing a reliever treatment: SABA or single inhaler treatment?

When patients are escalated to a combination ICS/LABA inhaler, a key clinical decision is whether they continue to use their short-acting beta₂-agonist (SABA) reliever, or whether they use an ICS/LABA inhaler as both a preventer and reliever, without SABA use; referred to as single inhaler treatment or SMART (Single inhaler Maintenance And Reliever Therapy).

👁 See: “Clarifying the use of acronyms”, Page 15, for further information on the use of single inhaler or SMART terminology in this series of articles.

Single inhaler treatment is recommended for patients at high risk of severe exacerbations (see: “Risk factors for asthma exacerbations”, Page 16).^{1,4} For other patients, either a single inhaler treatment or ICS/LABA + SABA regimen can be used, and the choice may depend on the patient’s preference of inhaler devices (Tables 1 and 2).⁷

The use of single inhaler treatment may allow patients to self-titrate their ICS dose to achieve the best symptom control. This regimen may also be particularly useful for patients with

Table 1: Subsidised inhaler options for adding a LABA to an ICS as single inhaler treatment.^{1,7}

| Active ingredients | Dose per inhalation | Patients should take | | Subsidised inhaler brand and type |
|--|-------------------------------|------------------------------|----------------------------|-----------------------------------|
| | | As daily preventer treatment | As reliever when necessary | |
| Initial doses – Step 3 of the New Zealand Adult Asthma Guidelines | | | | |
| Budesonide + formoterol | 100 micrograms + 6 micrograms | Two inhalations, twice daily | One inhalation * | Symbicort DPI † |
| | 200 micrograms + 6 micrograms | One inhalation, twice daily | One inhalation * | Symbicort DPI † |
| Higher doses – Step 4 or 5 of the New Zealand Adult Asthma Guidelines | | | | |
| Budesonide + formoterol ** | 200 micrograms + 6 micrograms | Two inhalations, twice daily | One inhalation * | Symbicort DPI † |

† Symbicort is the only brand of inhaler registered by Medsafe for use as single inhaler treatment

* Additional inhalations can be taken, one at a time, if symptoms persist after a few minutes. Patients should take no more than six inhalations for relief of acute symptoms.¹³

** Budesonide + formoterol, 400 micrograms + 12 micrograms, is not recommended for patients with asthma

Table 2: Subsidised treatment options for adding a LABA to an ICS, with ongoing use of a SABA reliever inhaler.⁷

| ICS + LABA as preventer inhaler | | | | SABA reliever inhaler | |
|--|----------------------------------|--------------------------------|-----------------------------------|--|--|
| Active ingredients | Dose per inhalation | Patients should take | Subsidised inhaler brand and type | | |
| Initial doses – Step 3 of the New Zealand Adult Asthma Guidelines | | | | | |
| Fluticasone propionate + salmeterol | 50 micrograms + 25 micrograms | Two inhalations, twice daily | RexAir MDI Seretide MDI | One or two inhalations of a SABA inhaler, as necessary | |
| | 100 micrograms + 50 micrograms | One inhalation, twice daily * | Seretide DPI | | |
| Budesonide + formoterol | 100 micrograms + 6 micrograms | Two inhalations, twice daily | Vannair MDI Symbicort DPI | | |
| | 200 micrograms + 6 micrograms | One inhalation, twice daily | Vannair MDI Symbicort DPI | | |
| Higher doses – Step 4 or 5 of the New Zealand Adult Asthma Guidelines | | | | | |
| Fluticasone propionate + salmeterol | 125 micrograms + 25 micrograms | Two inhalations, twice daily | RexAir MDI Seretide MDI | | One or two inhalations of a SABA inhaler, as necessary |
| | 250 micrograms + 50 micrograms † | One inhalation, twice daily * | Seretide DPI | | |
| Budesonide + formoterol ** | 200 micrograms + 6 micrograms | Two inhalations, twice daily | Vannair MDI Symbicort DPI | | |
| | Fluticasone furoate + vilanterol | 100 micrograms + 25 micrograms | One inhalation, once daily | Breo Ellipta DPI | |

MDI = Metered Dose Inhaler. The use of a spacer is recommended with a metered dose inhaler.¹ DPI = Dry Powder Inhaler

* No more than two doses per day⁷

** Budesonide + formoterol, 400 micrograms + 12 micrograms, is not recommended for patients with asthma

† Fluticasone propionate 250 micrograms + salmeterol 25 micrograms in a metered dose inhaler is not subsidised

poor adherence to their ICS preventer treatment, since they will be receiving ICS when they use their inhaler for relief of acute symptoms.⁸

Single inhaler treatment can reduce the risk of exacerbations

A reliever inhaler requires a rapid onset of action to be effective; patients with asthma are initially prescribed a SABA (e.g. salbutamol) to provide quick relief of acute symptoms. Formoterol is a LABA with a rapid onset of action, and it can be used as a reliever medicine, in addition to its use as a preventer medicine. A combination ICS/LABA inhaler containing formoterol produces a 15% improvement in forced expiratory volume over one second (FEV₁) within five to ten minutes, which is similar to that observed with salbutamol.⁹

Using an ICS/formoterol inhaler as both a preventer and reliever has been shown to reduce the risk of severe exacerbations in patients at risk. Randomised controlled trials in patients who had at least one exacerbation in the previous year, and who were taking regular high dose ICS preventer treatment and in need of regular use of a SABA reliever inhaler, found that initiating budesonide + formoterol as single inhaler treatment reduced the risk of severe exacerbations and resulted in less use of oral corticosteroids during exacerbations, than initiating an ICS/LABA inhaler as a preventer with a SABA reliever inhaler.¹⁰

Symbicort (budesonide + formoterol) is used in a single inhaler treatment regimen

There are two fully subsidised brands of inhalers containing budesonide + formoterol: Symbicort (dry powder inhaler) and Vannair (metered dose inhaler). Both devices have proven efficacy in reducing severe exacerbations; however, currently only Symbicort is registered by Medsafe for use as single inhaler treatment.¹

Vilanterol is another LABA with a quick onset of action, however, ICS/LABA inhalers containing vilanterol have not

been studied as single inhaler treatment and are not indicated for this use.¹¹ Combination ICS/LABA inhalers containing salmeterol cannot be used as a reliever inhaler as salmeterol has a slow onset of action.

Key prescribing points for single inhaler treatment or LABA/ICS + SABA regimens

For initiating a patient on single inhaler treatment:¹

- Symbicort is the only brand of inhaler currently registered for use as single inhaler treatment
- Patients should not be prescribed a SABA inhaler
- Emphasise to patients the change in approach to acute symptom relief:
 - Patients will be familiar with using an ICS preventer and SABA reliever inhaler. A change to one inhaler for both uses will be a new concept.
 - Patients will already have a SABA reliever, and possibly additional repeats of SABA inhalers from previous prescriptions. Advise patients not to use or collect these inhalers and only use the combination ICS/LABA inhaler for symptom relief.
- When used as a reliever, patients should only take **one inhalation at a time**, unlike SABA relievers where two inhalations may be used. If symptoms persist an additional inhalation can be taken.
- Patients should be advised to contact their general practice if they are using their inhaler as a reliever more than six times per day

For initiating a patient on an ICS/LABA inhaler with SABA reliever:¹

- Emphasise to patients that they should discontinue using their previous ICS inhaler, not collect any remaining repeats of ICS inhaler prescriptions, and instead use the newly prescribed ICS/LABA inhaler
- Patients should continue with the same approach to reliever treatment

Clarifying the use of acronyms

Many clinicians will be familiar with the term “SMART” in relation to asthma treatment; however this term has various meanings in clinical practice and research.

SMART is used as an abbreviation for Single inhaler Maintenance And Reliever Therapy, which is also sometimes referred to as Symbicort Maintenance And Reliever Therapy or Maintenance And Reliever Therapy (MART).¹² The SMART trial was an important clinical trial in the field of asthma management which compared salmeterol or placebo treatment for patients with asthma

(i.e. it did not study single inhaler treatment). In the future, inhalers that incorporate technology, such as audio reminders of missed doses and synchronisation with computer or phone software, are likely to become commonplace in asthma treatment. These devices are known as Smart Inhalers, which does not refer to single inhaler treatment.

Given the diverse use of the term “Smart” in asthma, the phrase “single inhaler treatment” is used in this article to describe using an ICS/LABA inhaler as both preventer and reliever treatment, to avoid any confusion.


- Patients should be advised to contact their general practice if they are using their reliever inhaler more than six times per day

Managing any adverse effects of ICS/LABA treatment

The most common adverse effects in patients using ICS/LABA inhalers in clinical trials are headache, nasopharyngitis, sinusitis and upper respiratory tract infections, which occur in up to 10% of patients; however, these are no more common than in patients taking ICS alone.^{14,15} Patients may also experience fine tremor of the hands, muscle cramps or palpitations with LABA use.⁷

LABAs cause an increase in blood glucose levels of approximately 1 mmol/L within two to three hours of administration, and may influence blood glucose management in patients with diabetes.^{7,16} Using a LABA may increase the risk of hypokalaemia, particularly in patients who are already predisposed, e.g. taking other medicines which also reduce serum potassium such as thiazide and loop diuretics, oral or injectable hydrocortisone or theophylline.^{7,13}


In patients using ICS/LABA inhalers who have well controlled asthma symptoms for three months or more and are at low risk of exacerbations, stepping down treatment is an option which can reduce the risk of adverse effects.¹

 For further information on adverse effects, contraindications and cautions for LABAs, see the NZF: www.nzf.org.nz/nzf_1705

Provide patients with an appropriate asthma action plan

All patients with asthma should be provided with an asthma plan corresponding to their prescribed medicines and agreed approach to managing their symptoms (Stage four of the asthma consultation). This plan should be updated whenever the patient's treatment regimen is altered:

- For patients initiating single inhaler treatment, provide them with a completed action plan (referred to as SMART in this plan): www.nzasthmaguidelines.co.nz/uploads/8/3/0/1/83014052/smart_asthma_action_plan.pdf
- For patients initiating an ICS/LABA inhaler with SABA reliever provide them with a completed three stage Asthma Action Plan: www.nzasthmaguidelines.co.nz/uploads/8/3/0/1/83014052/3_stage_asthma_action_plan.pdf

 For further information on Asthma Action Plans, see: "Managing adults with asthma in primary care: the four-stage consultation", Page 3.

Follow up of patients prescribed an ICS/LABA inhaler

The duration of treatment required for a patient's asthma control to improve after adding a LABA can depend on the characteristics of their asthma and the reasons for escalating treatment. Patients with frequent nocturnal awakenings may improve within days to weeks, whereas it may take six weeks or more for good control to be established in patients using

Risk factors for asthma exacerbations.

Adapted from Beasley *et al.**

Features related to asthma:

- Poor symptom control, e.g. an Asthma Control Test Score* of ≤ 15
- Hospitalisation or emergency department visit in the last year, or ever having been admitted to intensive care or intubated for treatment of an asthma attack
- SABA use of > 1 canister per month
- Underuse or poor adherence to ICS treatment
- The use of a home nebuliser
- History of sudden asthma attacks
- $FEV_1 < 60\%$ predicted
- Raised blood eosinophil count
- The need for long-term or repeated courses of oral corticosteroids
- Occupational asthma

Co-morbidities:

- Smoking
- Misuse of alcohol or drugs
- Use of psychotropic medicines
- Sensitivity to aspirin or non-steroidal anti-inflammatory medicines

Other factors:


- Māori or Pacific ethnicity
- Socioeconomic disadvantage
- Discontinuity of medical care
- Major psychosocial problems

* The Asthma Control Test comprises five questions and can be conducted with the patient to assess their level of symptom control. Each question is scored from 1 – 5, with higher scores indicating good control: www.asthmacontrol.co.nz

oral corticosteroids after a severe asthma attack who have not previously used an ICS/LABA inhaler.⁴

If patients have ongoing poorly or partly controlled asthma with the use of an ICS/LABA inhaler

At any point in treatment, if patients with asthma have inadequate control of symptoms, as assessed by the Asthma Control Test, clinicians should consider whether other clinically relevant issues are contributing to a patient's symptoms (Stage two of the four-stage asthma consultation process). This can include factors such as a patient's inhaler technique or adherence, co-morbidities or exposure to factors in the home or work environment which are provoking a worsening of asthma control. Attention to correct inhaler technique is particularly important if patients have switched to a different type of inhaler when initiating ICS/LABA treatment. For some patients it may be appropriate to consider whether the diagnosis of asthma should be re-evaluated.

 For further information see "Managing adults with asthma in primary care: the four-stage consultation", Page 3.


If symptoms have not improved

Occasionally, patients may have no improvement in symptoms despite appropriate use of an ICS/LABA inhaler. If this is the case, the ICS/LABA inhaler can be discontinued and patients should be prescribed a high dose ICS preventer inhaler.⁴

If symptoms have improved but asthma control remains suboptimal

Treatment can be escalated by increasing the daily dose of ICS in the combination ICS/LABA inhaler, according to Step 4 of the New Zealand Adult Asthma Guidelines pharmacological treatment model (Tables 1 and 2). Emphasise to patients that their dose of preventer treatment is being increased but they should use the same doses for relief of acute symptoms as before. A subsidised combination ICS/LABA inhaler containing fluticasone furoate and vilanterol (Breo Ellipta) can be prescribed at Step 4 of the New Zealand Adult Asthma Guidelines. Fluticasone furoate is more potent than fluticasone propionate and at Step 4 is prescribed at a dose of 100 micrograms per day, compared to 500 micrograms per day of fluticasone propionate.

Patients who have ongoing symptoms at Step 4 may need to be initiated on additional treatments, such as sodium cromoglicate, sodium nedocromil, montelukast, theophylline or tiotropium; consider discussing these patients with a respiratory physician if they are not already receiving outpatient management.¹

 Patient information sheets for ICS/LABA inhalers are available from the New Zealand Formulary:

- Budesonide + formoterol: www.mymedicines.nz/home/sheet/Budesonide-and-formoterol
- Fluticasone + salmeterol: www.mymedicines.nz/home/sheet/Fluticasone-and-salmeterol

Acknowledgement: Thank you to **Professor Richard Beasley**, Respiratory Physician, Director of the Medical Research Institute of New Zealand, Wellington for expert review of this article.

References:

1. Beasley R, Hancox RJ, Harwood M, et al. Asthma and Respiratory Foundation NZ adult asthma guidelines: a quick reference guide. *N Z Med J* 2016;129:83–102.
2. Masoli M, Holt S, Weatherall M, et al. Dose-response relationship of inhaled budesonide in adult asthma: a meta-analysis. *Eur Respir J* 2004;23:552–8. doi:10.1183/09031936.04.00076604
3. Holt S, Suder A, Weatherall M, et al. Dose-response relation of inhaled fluticasone propionate in adolescents and adults with asthma: meta-analysis. *BMJ* 2001;323:253–6.
4. British Thoracic Society, Scottish Intercollegiate Guidelines Network (SIGN). British guideline on the management of asthma. 2016. Available from: www.sign.ac.uk/pdf/SIGN153.pdf (Accessed Mar, 2017).
5. Global Initiative for Asthma (GINA). Global strategy for asthma management and prevention. 2016. Available from: www.ginasthma.org (Accessed Feb, 2017).
6. Chowdhury BA, Dal Pan G. The FDA and safe use of Long-Acting Beta-Agonists in the treatment of asthma. *N Engl J Med* 2010;362:1169–71. doi:10.1056/NEJMp1002074
7. New Zealand Formulary (NZF). NZF v57. 2017. Available from: www.nzf.org.nz (Accessed Mar, 2017).
8. Thomas M, Pavord I. Single inhaler maintenance and reliever therapy (SMART) in general practice asthma management: where are we? *Prim Care Respir J* 2012;21:8–10. doi:10.4104/pcrj.2012.00022
9. Palmqvist M, Arvidsson P, Beckman O, et al. Onset of bronchodilation of budesonide/formoterol vs. salmeterol/fluticasone in single inhalers. *Pulm Pharmacol Ther* 2001;14:29–34. doi:10.1006/pupt.2000.0260
10. Kew KM, Karner C, Mindus SM, et al. Combination formoterol and budesonide as maintenance and reliever therapy versus combination inhaler maintenance for chronic asthma in adults and children. *Cochrane Database Syst Rev* 2013;12:CD009019. doi:10.1002/14651858.CD009019.pub2
11. Braithwaite I, Williams M, Power S, et al. Randomised, double-blind, placebo-controlled, cross-over single dose study of the bronchodilator duration of action of combination fluticasone furoate/vilanterol inhaler in adult asthma. *Respir Med* 2016;119:115–21. doi:10.1016/j.rmed.2016.09.006
12. National Institutes for Health and Care Excellence (NICE). Chronic asthma: management. Draft guidance. 2016. Available from: www.nice.org.uk/guidance/indevelopment/gid-cgwave0743/documents (Accessed Mar, 2017).
13. AstraZeneca Ltd. Symbicort. New Zealand data sheet. 2016. Available from: www.medsafe.govt.nz/profs/datasheet/s/Symbicortinh.pdf (Accessed Mar, 2017).
14. Brown RW, O'Brien CD, Martin UJ, et al. Long-term safety and asthma control measures with a budesonide/formoterol pressurized metered-dose inhaler in African American asthmatic patients: a randomized controlled trial. *J Allergy Clin Immunol* 2012;130:362–367.e9. doi:10.1016/j.jaci.2012.03.028
15. Corren J, Mansfield LE, Pertseva T, et al. Efficacy and safety of fluticasone/formoterol combination therapy in patients with moderate-to-severe asthma. *Respir Med* 2013;107:180–95. doi:10.1016/j.rmed.2012.10.025
16. Bremner P, Woodman K, Burgess C, et al. A comparison of the cardiovascular and metabolic effects of formoterol, salbutamol and fenoterol. *Eur Respir J* 1993;6:204–10.



This article is available online at:
www.bpac.org.nz/2017/laba.aspx



Pulmonary rehabilitation for people with COPD

KEY PRACTICE POINTS:

- Pulmonary rehabilitation is an umbrella term for a structured programme which offers supervised exercise and education to patients with COPD, usually over a period of eight weeks
- Pulmonary rehabilitation is known to relieve dyspnoea and fatigue, improve mental health and quality of life, and increase the sense of control that patients with COPD have over their health, while reducing their risk of hospitalisation
- All symptomatic patients with COPD will benefit from pulmonary rehabilitation, particularly:
 - At diagnosis
 - After discharge from hospital following an exacerbation
 - When symptoms are progressively deteriorating
- Health professionals may need to use creative strategies to adapt the basic components of pulmonary rehabilitation for patients unable to attend formal programmes

Pulmonary rehabilitation is a behavioural intervention for patients with chronic obstructive pulmonary disease (COPD) that improves symptom control and quality of life, reduces hospital admissions and teaches self-management skills. There are a variety of pulmonary rehabilitation programmes available, all of which offer supervised exercise and education to motivate patients and promote sustainable behaviour change. Health professionals in primary care can raise awareness of pulmonary rehabilitation, refer patients to programmes, recommend personalised exercise for those unable to attend formal programmes and provide ongoing support to patients who have completed programmes to help them maintain the benefits they have gained.

Pulmonary rehabilitation is an essential part of COPD management

People with chronic obstructive pulmonary disease (COPD) undergo a variable but progressive functional decline that causes muscle de-conditioning, reduces their quality of life and increases their risk of hospitalisation and death.^{1,2} Pulmonary rehabilitation refers to the use of non-pharmacological

interventions to improve the physical and psychological health of these patients by encouraging sustainable self-management skills. The interventions are part of a structured programme which is typically delivered by a physiotherapist in an outpatient setting over eight weeks. Physical exercise is always included in pulmonary rehabilitation programmes to improve strength and endurance of limbs and respiratory muscles. Education, smoking cessation, breathing exercises, nutritional advice, energy conservation strategies and psychological support can also be included. Following completion of a programme, patients should be encouraged to continue to exercise regularly in order to maintain the health benefits they have gained.

Rehabilitation programmes reduce symptoms and improve quality of life

A systematic review of 65 randomised controlled trials found overwhelming evidence that pulmonary rehabilitation programmes benefit patients.² Patients who complete these programmes are likely to have:²⁻⁴

- An increased sense of control and reduced breathlessness (self-reported)
- Improved fitness and energy levels
- Increased quality of life
- A reduced risk of hospitalisation due to exacerbations and a reduced risk of admission to hospital following an exacerbation

Compared to the use of inhaled medicines alone, pulmonary rehabilitation results in greater improvements in quality of life and functional exercise capacity for patients with COPD.²

Many patients with COPD have co-morbidities, e.g. cardiovascular disease, depression, diabetes,¹ which are also likely to improve following participation in pulmonary rehabilitation programmes.

Exercise is known to decrease dyspnoea by increasing respiratory volume and reducing dynamic hyperinflation.² Muscle function and exercise tolerance are also increased with regular physical activity, while fatigue is delayed.² The education component of a pulmonary rehabilitation programme aims to improve decision-making and help patients better manage their condition.²

When to consider pulmonary rehabilitation

The key times for referral when symptomatic patients are likely to gain the most benefit from pulmonary rehabilitation are:¹

1. At diagnosis
2. Immediately following discharge from hospital for an exacerbation; typically, pulmonary rehabilitation has been offered to patients when they are stable, however, the Australian and New Zealand Pulmonary Rehabilitation Guidelines now recommend that patients

who are hospitalised due to a COPD exacerbation should attend supervised pulmonary rehabilitation within two weeks of being discharged (often patients will be initiated on a programme while in hospital).³

3. If the patient's symptoms are progressively deteriorating

Find a local rehabilitation programme

Details of regional pulmonary rehabilitation programmes can be provided by DHBs or local branches of the Asthma and Respiratory Foundation, see: www.asthmafoundation.org.nz/about-us/regional-support

More referrals, more programmes and improved attendance is needed

Despite being a key component of COPD management, referrals to formal rehabilitation programmes are low, and approximately half of patients in New Zealand who are referred do not complete programmes.⁵

A lack of programmes, variation in the type of programmes offered, transportation issues and low referral rates are widely acknowledged barriers to participation in pulmonary rehabilitation.³ Some patients may also feel reluctant to attend programmes because they have limited respiratory function, have never exercised, have had negative experiences with previous programmes, e.g. felt uncomfortable in the group, or they are worried that they will be blamed for their condition because they are still smoking.

Overcoming barriers to participation

There are no proven strategies for improving participation in pulmonary rehabilitation programmes and health professionals in primary care will need to tailor their approach to the individual patient and the community they practice in. A reasonable starting point is to discuss any concerns or barriers that may prevent attendance so that solutions can be explored.

Patients with moderate to severe symptoms may need extra encouragement to participate. These patients can be reassured that the intensity level will be tailored to their fitness, and persistence with the programme will allow them to slowly extend the boundaries of what they are able to achieve.

Patients who strongly prefer not to exercise may be encouraged to start with other activities. For example, Sing Your Lungs Out* is a community-based singing group for people with lung disease, with a weekly attendance rate of 85%.⁶

Patients who continue to smoke can be advised that they will still benefit from pulmonary rehabilitation and that the programme focus is on improving quality of life and outcomes, and anything they do towards this is a step in the right direction.

Local DHBs or branches of the Asthma and Respiratory Foundation may offer rehabilitation programmes that are tailored for Māori or Pacific patients.

Patients who decline offers of referral to rehabilitation programmes, e.g. those reluctant to participate in group activities, will still benefit from self-directed exercise programmes which can be supported in primary care (see below).

* The original group is based in Wellington, but groups are now forming in other areas around the country, see: www.mrinz.ac.nz/pdfs/How_to_set_up_SYLO.pdf

Offering the basics of pulmonary rehabilitation in primary care

In regions where rehabilitation programmes are not accessible or, if despite encouragement and facilitation, patients do not wish to participate in a group programme, health professionals can provide extended support to patients with COPD in primary care. Many practices will be unable to offer supervision of exercise, specialised dietary advice, counselling or physiotherapy, but patients can be assessed to determine an appropriate level and type of exercise, and be provided with lifestyle advice, support and encouragement. Some practitioners around the country are finding innovative ways to support patients with COPD in their communities, e.g. helping to facilitate kapa haka and swimming roopu (groups), and providing classes for patients to learn about COPD and meet others with the same condition.

Assessing exercise capacity

Before beginning an exercise regimen the patient should be assessed to determine what level of exercise is safe and appropriate.¹

Exercise may not be safe for patients with a history of unstable cardiovascular disease, e.g. unstable angina, unstable pulmonary valve disease, aortic valve disease.⁷ Patients with musculoskeletal conditions, severe peripheral vascular disease or neurological disorders may have a limited ability to exercise; this can be discussed with a physiotherapist.

Establish a baseline of functional capacity


The patient's baseline level of fitness is used to measure improvements in functional capacity. The simplest way to assess this is to ask the patient to report their level of symptom severity when performing an everyday activity, e.g. walking to the end of the driveway. Improvements in symptoms with the same exercise can then be recorded at follow-up consultations.

In formal pulmonary rehabilitation programmes, the distance a patient is able to walk on a flat, hard surface in six minutes is often used as a standardised measure of functional

capacity. The patient's progress can then be measured as they participate in the exercise programme and increase the distance they can walk in this time.

Start low, go slow...but GO!

Encourage the patient to think of an exercise that is enjoyable, can be easily incorporated into their day and is tailored to their level of activity, e.g. going for a morning walk, parking a block away, going to a swimming pool, doing grocery shopping. Patients can progressively extend the length of time that they exercise for as their fitness improves. An ideal goal is to exercise for 30 minutes a day, four to five times per week,⁸ but this may not be realistic for all patients.

 Green prescriptions can provide patients with an exercise facilitator who will encourage physical activity via phone calls and face-to-face meetings. See: www.health.govt.nz/our-work/preventative-health-wellness/physical-activity/green-prescriptions/green-prescription-contacts

Walking is the first-line exercise for all patients with COPD


All pulmonary rehabilitation programmes should include lower limb endurance training.⁸ Walking is an ideal activity as it can be incorporated into daily routines, does not require any special equipment or cost and results in real-life functional improvements for the patient, e.g. being able to make it around the whole supermarket.⁸ Cycling, or using an exercise bike, is another good example of lower limb endurance training, but may be less suitable.⁸

Upper limb endurance training should also be incorporated into the patient's exercise regimen.⁸ This may also be more practical for patients with mobility issues and those with more severe disease who have difficulty walking due to shortness of breath. Repetitive upper limb exercises, e.g. lifting arms to shoulder height or above the head, also improves exercise capacity and is a movement that is used in daily living, e.g. hanging out the washing.⁹

Strength training increases the benefits of exercise

Patients are likely to gain greater benefits if they are able to include strength training two to three times per week in their exercise regimen, in addition to lower limb endurance training.¹

Strength exercises typically comprise three sets of ten repetitions with less than two minutes rest between sets.⁸ Stair climbing or going up and down a step will increase lower leg strength,⁸ but this may be unrealistic for patients with reduced muscle mass. Upper limb exercises, e.g. bicep curls with a small weighted object such as a can, can be performed in a seated position with the back supported and the patient breathing in as they move their arms up and breathing out as they move their arms down.⁸

 Examples of upper and lower body strength exercises for patients with COPD are available from pulmonaryrehab.com.au/importance-of-exercise/exercise-prescription-and-training/strength-upper-limb/mode and pulmonaryrehab.com.au/importance-of-exercise/exercise-prescription-and-training/strength-lower-limb

Managing breathlessness when exercising

It may be necessary for the patient to rest briefly while exercising. Breathing in through the nose and out through pursed lips can assist their recovery. The use of a wheeled walker may help those with severe breathlessness as this causes fixation of the shoulder girdle and a forward leaning posture, the combination of which can increase ventilatory capacity and walking distance.¹⁰ Patients should be instructed to stop exercising if they experience dizziness, nausea or light-headedness and should seek medical assistance if they experience palpitations or chest, neck or arm pain of unknown origin.⁸ Exercising within one to two hours of eating may lead to increased breathlessness in some patients.⁸

Teaching the active cycle of breathing

Pulmonary rehabilitation encompasses more than just exercise. Hypersecretion of mucus in the airways can cause coughing, which can be tiring and increase breathlessness for patients with more advanced COPD.¹¹ The active cycle of breathing is an efficient method of clearing sputum for patients with a productive cough.


The active cycle of breathing techniques includes breathing control, deep breathing and huffing, performed in a cycle for approximately ten minutes until the patient feels their chest is clear:¹¹

1. **Breathing control** – patients breathe in and out through their nose, using as little effort as possible. Pursed lip breathing may help patients who cannot breathe through their nose. Breathing should gradually slow as tension in the body reduces; patients may find closing their eyes helps.
2. **Deep breathing** – patients take one long, slow, deep inhalation, through their nose if possible, while their chest and shoulders are relaxed. This is followed by a slow exhalation, like a long sigh. This should be repeated three to five times. Patients may find holding their breath for two to three seconds before each exhalation helps.

3. **Breathing control** – repeat before moving onto huffing
4. **Huffing** – patients exhale quickly through an open mouth. Patients can be told to breathe like they wish to “mist up” a mirror or their glasses. The technique should not cause wheezing or chest tightness. Small huffs with a long exhale, until the lungs are empty, are performed first to move sputum deep in the lungs. Big huffs with a short and rapid exhale are then performed to remove sputum from the airways once the patient feels the sputum is ready to move. Huffing should make the patient feel like their chest is rumbling or rattling. Although this is intended to circumvent the need for coughing, some patients may still need to cough. The cycle is then repeated, starting again at number one with breathing control.

The breathing control and deep breathing techniques can also be helpful for patients during a period of anxiety and breathlessness.

Breathing techniques may be performed when patients are seated or in a position of postural drainage, e.g. lying down if secretions are in the lower lungs or propped up to clear secretions in the upper airways. Maintaining good oral hydration may help reduce the viscosity of mucus and allow for easier sputum clearance.

 An instructional video on the active cycle of breathing is available from: www.youtube.com/watch?v=XvorhwGZGm8

Patient education is an important part of rehabilitation

Respiratory education is an ongoing process for patients with COPD, and health professionals are encouraged to expand an aspect of the patient's knowledge at every consultation. It is important that patients understand that interventions they can undertake themselves, such as smoking cessation and regular exercise can reduce their symptoms and increase their quality of life, and can be just as important as the medicines they take. Ideally, inhaler technique and treatment adherence should be assessed at every consultation to ensure patients are receiving the maximum benefit.¹² Education should also cover topics such as COPD terminology, basic pathophysiology, pharmacological treatments, how to manage an exacerbation, when to seek help and nutritional advice.

Further reading

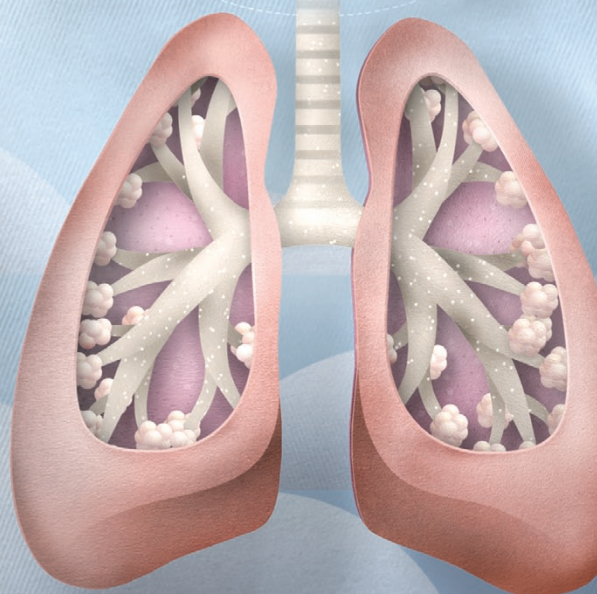
General practices who are interested in developing their own pulmonary rehabilitation programmes can access the Pulmonary Rehabilitation Toolkit:

www.pulmonaryrehab.com.au/

For information on the pharmacological management of COPD, see: "The optimal management of patients with COPD – Part 2: Stepwise escalation of treatment", available from: www.bpac.org.nz/BPJ/2015/February/copd-part2.aspx

A podcast on the non-pharmacological management of COPD is available from: www.goodfellowunit.org/podcast/non-pharmacological-management-copd-fiona-horwood

The Asthma and Respiratory Foundation NZ offer an online training course on the fundamentals of asthma and COPD for health professionals, see: <https://cpd.whitireia.ac.nz/local/moodec/pages/product.php?id=8>



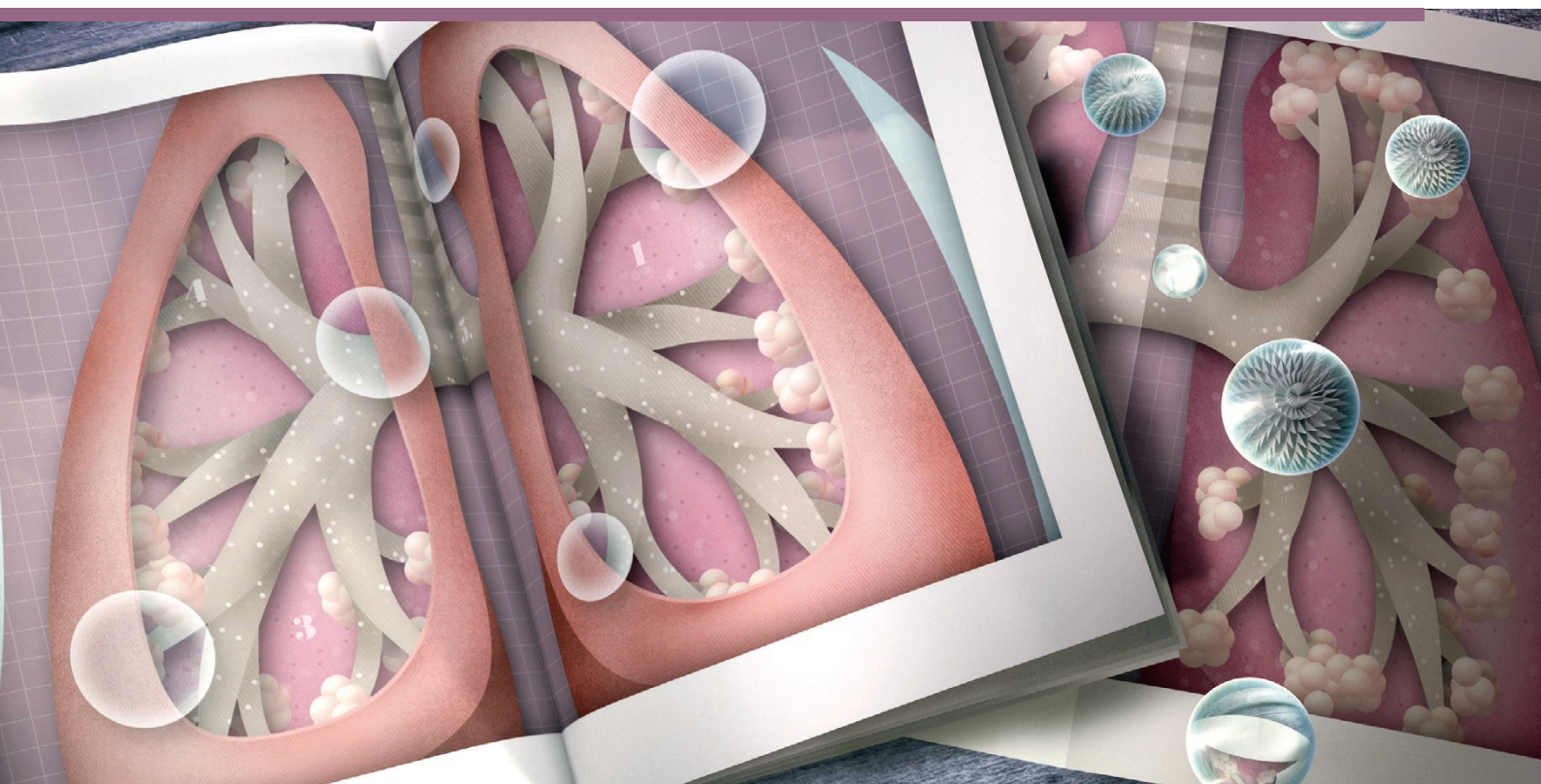
Acknowledgement: Thank you to **Professor John Kolbe**, Respiratory Medicine Physician, University of Auckland and Auckland DHB for expert review of this article.



This article is available online at:
www.bpac.org.nz/2017/copd.aspx

References

1. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. 2017. Available from: <http://goldcopd.org/gold-2017-global-strategy-diagnosis-management-prevention-copd/> (Accessed May, 2017).
2. McCarthy B, Casey D, Devane D, et al. Pulmonary rehabilitation for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev* 2015;:CD003793. doi:10.1002/14651858.CD003793.pub3
3. Alison J, McKeough Z, Johnston K. Australia and New Zealand pulmonary rehabilitation clinical practice guidelines. 2017. Available from: <http://lungfoundation.com.au/wp-content/uploads/2017/03/LFATSANZ-PulmonaryRehabGuidelines-Feb2017-final-edit.pdf> (Accessed May, 2017).
4. Puhan MA, Gimeno-Santos E, Cates CJ, et al. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev* 2016;12:CD005305. doi:10.1002/14651858.CD005305.pub4
5. Levack WMM, Weatherall M, Reeve JC, et al. Uptake of pulmonary rehabilitation in New Zealand by people with chronic obstructive pulmonary disease in 2009. *N Z Med J* 2012;125:23–33.
6. McNaughton A, Aldington S, Williams G, et al. Sing Your Lungs Out: a qualitative study of a community singing group for people with chronic obstructive pulmonary disease (COPD). *BMJ Open* 2016;6:e012521. doi:10.1136/bmjopen-2016-012521
7. Lung Foundation Australia. Pulmonary rehabilitation toolkit: who is the program for? 2016. Available from: <http://pulmonaryrehab.com.au/introduction/who-is-the-program-for/> (Accessed May, 2017).
8. Lung Foundation Australia. Pulmonary rehabilitation toolkit: exercise prescription. 2016. Available from: <http://pulmonaryrehab.com.au/importance-of-exercise/exercise-prescription-and-training/> (Accessed May, 2017).
9. Kathiresan G, Jeyaraman SK, Jaganathan J. Effect of upper extremity exercise in people with COPD. *J Thorac Dis* 2010;2:223–36. doi:10.3978/j.issn.2072-1439.2010.11.4
10. Bott J, Blumenthal S, Buxton M, et al. Guidelines for the physiotherapy management of the adult, medical, spontaneously breathing patient. *Thorax* 2009;64 Suppl 1:i1-51. doi:10.1136/thx.2008.110726
11. Association of chartered physiotherapists in respiratory care. The active cycle of breathing techniques. 2011. Available from: www.acprc.org.uk/Data/Publication_Downloads/GL-05ACBT.pdf (Accessed May, 2017).
12. Yang I, Dabscheck E, George J, et al. The COPD-X Plan: Australian and New Zealand Guidelines for the management of Chronic Obstructive Pulmonary Disease. 2016. Available from: <http://copdx.org.au/copd-x-plan/> (Accessed May, 2017).



Bronchiolitis: when to reassure and monitor, and when to refer

KEY PRACTICE POINTS:

- Bronchiolitis should be diagnosed clinically; blood tests, analysis of sputum, testing for the underlying virus or chest X-rays are not routinely recommended
- Bronchiolitis is managed with supportive care; there are no medicines or interventions that can be administered in primary care which are effective at reducing symptoms or the likelihood of deterioration. Ongoing research and clinical trials confirm that there is no role for bronchodilators, corticosteroids or antibiotics.
- When management at home is appropriate, provide caregivers with information regarding the course of the disease, ensure they understand red flags which suggest urgent review is necessary and reinforce messages such as avoiding smoking around the infant
- Infants with symptoms of moderate severity may require referral to hospital after taking into account factors such as the time course of illness, risk factors for more severe illness and home circumstances
- Infants with severe symptoms should be sent to hospital via ambulance

Bronchiolitis is a lower respiratory tract infection, most often caused by Respiratory Syncytial Virus (RSV). In severe illness it is associated with increased respiratory effort, difficulty feeding, dehydration and cyanosis. Bronchiolitis typically affects infants aged under 12 months, with young infants or those born premature at greater risk of severe illness. For infants with mild illness and without risk factors for deterioration, caregivers can be reassured that conservative treatment is appropriate. Infants with more severe symptoms or underlying conditions which predispose them to deterioration may require referral to hospital.

Bronchiolitis: an increasing problem in New Zealand

Rates of hospitalisation for bronchiolitis in New Zealand have increased by approximately 50% since 2000.¹ Between 2009 – 2013, approximately 6000 children per year were hospitalised with bronchiolitis.² Hospitalisation rates are four to five times higher for children of Māori or Pacific ethnicity than children of European ethnicity, and five times higher for children from the lowest socioeconomic areas than children from the highest socioeconomic areas.¹

A number of risk factors predispose infants to more severe bronchiolitis

Risk factors for developing more severe bronchiolitis include:^{1,3,4}

Young age or prematurity:

- Age under 10 weeks
- Premature birth (under 37 weeks)

Co-morbidities:

- Chronic lung disease
- Congenital heart disease
- Cystic fibrosis
- Immunodeficiency
- Down syndrome
- Neuromuscular disorders

Other risk factors:

- Household members who smoke
- Breast fed for less than two months
- Lower socioeconomic living circumstances
- Māori or Pacific ethnicity

Diagnosis and assessing severity

Bronchiolitis is a lower respiratory tract infection, usually caused by Respiratory Syncytial Virus. It is characterised by cough, wheezing and in more severe cases, increased respiratory effort.

Diagnosis of bronchiolitis is based on symptoms and signs (Table 1*). During a clinical examination, clinicians will be forming a diagnosis and simultaneously assessing severity based on the presence and extent of symptoms and signs.

The course of illness in infants with bronchiolitis can vary, although it often begins with symptoms similar to a cold, lasting approximately three days, which worsen as the infection spreads into the lower respiratory tract. Symptoms usually peak after three to five days of illness and then resolve over the following week. Infants can have an ongoing cough for up to three weeks.^{3,4}

Infants with mild bronchiolitis characteristically have cough, wheezing, nasal discharge, and chest recession with wheeze and crackles audible on chest auscultation.^{3,5} In more severe cases, infants can have signs of increased respiratory effort such as nasal flaring and the use of accessory breathing

muscles, as well as reduced oxygen saturation and cyanosis (Table 1). Increased respiratory effort in infants with more severe bronchiolitis can result in difficulty feeding, reduced fluid intake and dehydration.³

Age is also a key factor in establishing a diagnosis of bronchiolitis, as 85% of cases in New Zealand are in infants aged under 12 months.² Clinicians should consider a diagnosis of bronchiolitis in an infant aged under 12 months with symptoms of lower respiratory tract infection during winter.^{3,4} There is less diagnostic certainty in children aged over 12 months.⁴

The symptoms and signs of bronchiolitis can overlap with other conditions

Features which may indicate that an infant has a condition other than bronchiolitis include:^{3,6}

- Cough as the **predominant** symptom; a number of conditions could cause cough without the changes in respiratory effort, nasal discharge or findings on chest auscultation characteristic of bronchiolitis^{7,8}
- Differences from the usual onset of symptoms:
 - Infants with a sudden onset of wheeze may have a foreign body blocking the airways
 - In infants with slow onset, persistent or prolonged symptoms, consider signs such as a cardiac murmur, failure to thrive or pulmonary oedema which could suggest congestive heart failure
- Recurrent wheezing, or previous diagnoses of recurrent bronchiolitis; consider whether another diagnosis, such as aspiration, bronchiectasis, immune deficiency or cystic fibrosis may better explain recurrent symptoms and signs

Distinguishing bronchiolitis from pneumonia or asthma

A high fever (> 39°C) and focal crackles on chest auscultation are consistent with the infant having pneumonia rather than bronchiolitis.³ Wheeze is less common in infants with pneumonia, however, the presence or absence of wheeze alone is insufficient to distinguish between bronchiolitis and pneumonia.⁹

If infants have wheeze without crackles on chest auscultation then clinicians may wonder if a diagnosis of asthma is appropriate. However, for infants aged under 12 months with wheeze, bronchiolitis is the most likely diagnosis, rather than asthma. Asthma becomes increasingly possible with older age, and children are likely to have persistent wheeze which lasts longer than would be expected for a diagnosis of bronchiolitis, a history of recurrences and a family history of atopy.³ If there is diagnostic uncertainty in children aged over 12 months, clinicians may consider a trial of salbutamol to assist diagnosis; a bronchodilator would not improve symptoms in a child with bronchiolitis.³⁻⁵

* Table 1 shows the framework advocated in the Australasian Bronchiolitis Guideline by the Paediatric Research in Emergency Departments International Collaborative (PREDICT).⁴ Other similar frameworks are in use in clinical practice, such as the Bronchiolitis Assessment Tool (BAT).

Table 1: Symptoms and signs of mild, moderate and severe bronchiolitis. Adapted from the Paediatric Research in Emergency Departments International Collaborative (PREDICT) research network and Turner *et al.*^{4,6}

| | Mild* | Moderate* | Severe* |
|---|--|--|--|
| Behaviour | Normal behaviour | Some or intermittent irritability | Increasing irritability or lethargy Fatigue |
| Respiration | | | |
| Respiratory rate | Normal to mild tachypnoea | Increased respiratory rate | Marked increase or decrease in respiratory rate |
| Signs of increased respiratory effort | No to mild chest wall retraction | Moderate chest wall retraction Tracheal tug Nasal flaring | Marked chest wall retraction Marked tracheal tug Marked nasal flaring |
| Oxygen saturation (SpO ₂) in room air | > 92% | 90 – 92% | < 90% |
| Apnoeic episodes | None | May have brief apnoea | Increasingly frequent or prolonged apnoea |
| Feeding and hydration** | Normal | May have difficulty with or reduced feeding, minor dehydration | Reluctant or unable to feed Marked dehydration e.g. < 50% of normal fluid intake, no wet nappy for 12 hours |
| Initial management | Management at home by caregivers is usually appropriate. Referral may be appropriate for infants in the early stages of illness with risk factors for deterioration | Either referral to hospital or management at home may be appropriate; see text for details | Send infant to hospital via ambulance Monitor infant until ambulance arrives‡ |

* Criteria can be used to stratify severity; infants with a larger number of symptoms and signs in the moderate and severe categories are more likely to develop severe disease and require treatment in secondary care

** Examine the infant for signs such as dry nappy, dry mucosa and eyes, capillary refill time, sunken eyes or fontanelle and altered skin elasticity³

‡ If infants are in rural areas, or there is likely to be a delay in reaching hospital, discuss initial management options with a paediatrician or emergency department physician

Investigations are unnecessary

The management of bronchiolitis is the same regardless of the causative virus. Blood tests or analysis of sputum samples are not recommended.⁴ Chest X-ray is not routinely recommended, nor is it recommended to distinguish bronchiolitis from pneumonia as radiographic findings can be similar between infants with these conditions.³

Referral, or reassurance and monitoring?

Infants with severe symptoms or signs should be sent to hospital via ambulance. This includes moderate to severe dehydration, apnoea (either observed by a health professional or reported by caregivers) or symptoms which cannot be managed in primary care, e.g. an oxygen saturation (SpO₂) of less than 92% on room air (Table 1).^{4,5}

Infants with mild to moderate symptoms or signs may be able to be managed at home or may require referral to hospital, depending on their specific circumstances and the likelihood of deterioration.

The decision of whether an infant can be managed at home should take into account the following factors:³

- Severity at clinical examination
- The timing of the clinical examination in relation to the course of illness
- Risk factors for severe illness (see above)
- The circumstances of the caregiver and whether they can provide adequate care for the infant
- Distance from or access to healthcare if the infant's condition were to deteriorate
- Living circumstances, e.g. whether the family live in cold or overcrowded housing, the presence of smokers in the household, whether they have a phone

Management of infants being cared for at home

Management is largely supportive

There are no medicines or interventions that can be administered in primary care which are effective at reducing symptoms or the likelihood of deterioration. This includes bronchodilators, inhaled or oral corticosteroids, nebulised saline or adrenaline, montelukast or chest physiotherapy; these have been studied in clinical trials and found to be ineffective.^{4,10-12}

Antibiotics are not indicated

Infants with a viral syndrome such as bronchiolitis are reported to have a less than 1% chance of concurrent bacterial infection.¹³

The use of antibiotics in infants with bronchiolitis does not improve rates of complications or the length of illness.^{3,5}

Providing a “safety net” for diagnostic uncertainty and to reassure caregivers

To ensure infants who deteriorate receive appropriate medical support, discuss with caregivers:

1. Advice for caring for the infant and the expected course of illness
2. Signs of worsening illness which warrant further action
3. Follow-up and additional contact

1. Management advice and expected time course


Some parents or caregivers may express concern that they are being “sent home” with a sick child without enough clinical intervention or investigation. Reassure caregivers that antibiotics are not an appropriate treatment for a virus, that there are no medicines which can be prescribed to hasten the resolution of symptoms, and that laboratory tests or chest X-rays are not recommended.^{3,4,6}

Smaller, more frequent milk feeds or meals can help infants with mild illness maintain adequate hydration and nutritional intake. Ask if there are any smokers in the household and highlight that exposure to smoke increases the infant's risk of developing severe symptoms; use this opportunity to encourage smoking cessation.³

Inform caregivers that symptoms typically last one to two weeks and the infant may have a cough which continues for up to three weeks.³ Paracetamol or ibuprofen can be used for infants with fever and discomfort, if necessary. See NZFC for dosing guidance:

- Ibuprofen: www.nzfchildren.org.nz/nzf_5524
- Paracetamol: www.nzfchildren.org.nz/nzf_2439

Bronchiolitis is highly infectious. Keeping hands clean is the most important step caregivers can take to reduce the risk of transfer to others in the house. Alcohol-based rubs are the preferred method (soap and water is an acceptable alternative), and should be used frequently, such as before and after handling the infant or contact with objects such as toys.¹³

 Information for caregivers of infants with bronchiolitis is available at: www.healthnavigator.org.nz/health-a-z/b/bronchiolitis

2. Ensure caregivers are aware of signs of worsening or severe illness

Discuss signs of worsening or severe illness with caregivers (Table 1). They should seek urgent assistance if the infant has:^{3,6,14}

- No wet nappy or a fluid intake of less than half of normal over 12 hours

- Periods of irregular breathing or pauses in breathing
- Nasal flaring, grunting or marked chest recession during breathing
- Signs of cyanosis, such as blue lips or tongue
- Are difficult to wake or do not respond normally to cues

Encourage caregivers to contact the general practice if they are concerned about worsening symptoms or symptoms which are not improving in the expected timeframe.

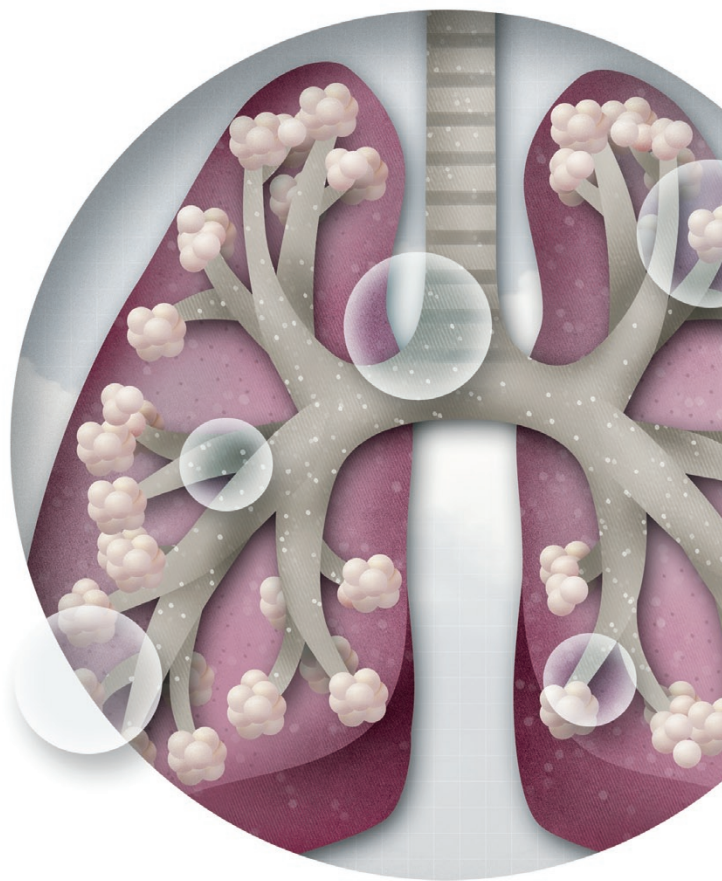
3. Arrange follow-up and additional contact for reassurance

Arranging a review or phone follow-up, e.g. in one to two days, is a useful strategy to mitigate the clinical uncertainty of whether an infant will deteriorate, as well as provide reassurance to caregivers.⁶

Acknowledgement: Thank you to **Dr David McNamara**, Paediatric Respiratory Specialist, Starship Hospital, Auckland for expert review of this article.

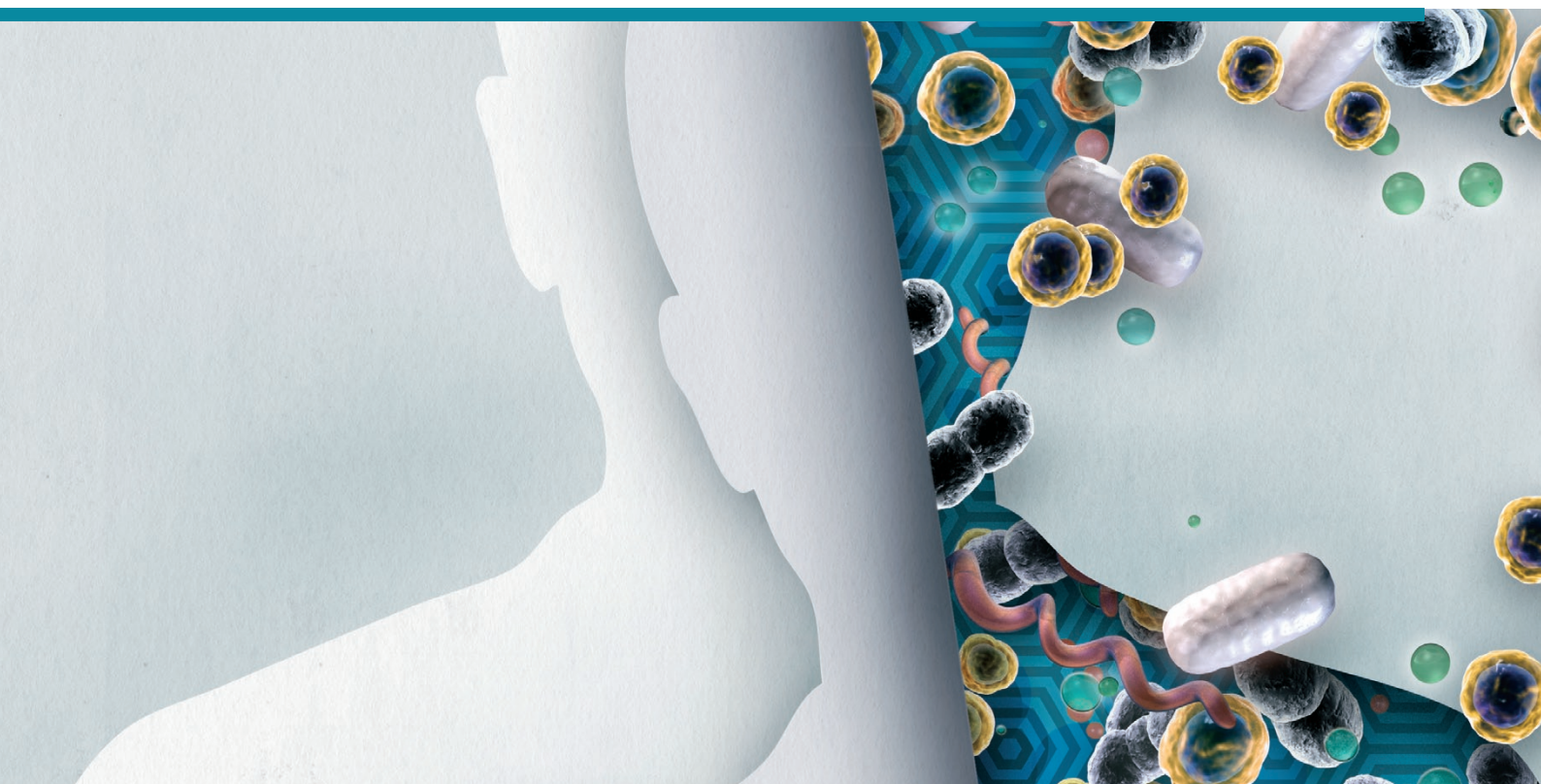


This article is available online at:
www.bpac.org.nz/2017/bronchiolitis.aspx



References:

1. Barnard LT, Zhang J, Asthma and Respiratory Foundation of New Zealand. The impact of respiratory disease in New Zealand: 2016 update. 2017. Available from: www.asthmafoundation.org.nz/research/the-impact-of-respiratory-disease-in-new-zealand-2016-update (Accessed Apr, 2017).
2. Simpson J, Reddington A, Craig E, et al. The determinants of health for children and young people in New Zealand (2014). 2016. Available from: <https://ourarchive.otago.ac.nz/handle/10523/6383> (Accessed Apr, 2017).
3. National Institutes for Health and Care Excellence (NICE). Bronchiolitis in children: diagnosis and management. 2015. Available from: www.nice.org.uk/guidance/ng9 (Accessed Apr, 2017).
4. Paediatric Research in Emergency Departments International Collaborative (PREDICT). Australasian bronchiolitis guideline. 2016. Available from: www.predict.org.au/download/Australasian-bronchiolitis-guideline.pdf (Accessed Apr, 2017).
5. Starship Children's Health. Starship clinical guidelines. Bronchiolitis. 2010. Available from: www.starship.org.nz/for-health-professionals/starship-clinical-guidelines/b/bronchiolitis/ (Accessed Apr, 2017).
6. Turner T, Wilkinson F, Harris C, et al. Evidence based guideline for the management of bronchiolitis. *Aust Fam Physician* 2008;37:6–13.
7. Gibson PG, Chang AB, Glasgow NJ, et al. CICADA: Cough in Children and Adults: Diagnosis and Assessment. Australian cough guidelines summary statement. *Med J Aust* 2010;192:265–71.
8. Chang AB, Glomb WB. Guidelines for evaluating chronic cough in pediatrics: ACCP evidence-based clinical practice guidelines. *Chest* 2006;129:2605–2835. doi:10.1378/chest.129.1_suppl.2605
9. Wang K, Gill P, Perera R, et al. Clinical symptoms and signs for the diagnosis of *Mycoplasma pneumoniae* in children and adolescents with community-acquired pneumonia. *Cochrane Database Syst Rev* 2012;10:CD009175. doi:10.1002/14651858.CD009175.pub2
10. Gadomski AM, Scribani MB. Bronchodilators for bronchiolitis. *Cochrane Database Syst Rev* 2014;6:CD001266. doi:10.1002/14651858.CD001266.pub4
11. Fernandes RM, Bialy LM, Vandermeer B, et al. Glucocorticoids for acute viral bronchiolitis in infants and young children. *Cochrane Database Syst Rev* 2013;6:CD004878. doi:10.1002/14651858.CD004878.pub4
12. Roqué i Figuls M, Giné-Garriga M, Granados Rugeles C, et al. Chest physiotherapy for acute bronchiolitis in paediatric patients between 0 and 24 months old. *Cochrane Database Syst Rev* 2016;2:CD004873. doi:10.1002/14651858.CD004873.pub5
13. Ralston SL, Lieberthal AS, Meissner HC, et al. Clinical practice guideline: the diagnosis, management, and prevention of bronchiolitis. *Pediatrics* 2014;134:e1474-1502. doi:10.1542/peds.2014-2742
14. Kidshealth. Bronchiolitis. 2011. Available from: www.kidshealth.org.nz/bronchiolitis (Accessed Apr, 2017).



The bpac^{nz} antibiotic guide: 2017 edition

The 2017 edition of the bpac^{nz} antibiotics guide; “Antibiotics: choices for common infections”, is now available online. There are several new features of this guide, along with some changes in advice. The release of the guide is also an opportunity to revise recommendations for prescribing in respiratory tract infections, including strategies for managing patient expectations.

bpac^{nz} is pleased to present the 2017 edition of “Antibiotics: choices for common infections”. The bpac^{nz} antibiotic guide was first published in 2011 as a supplement to Best Practice Journal. A revised version of the printed booklet was published in 2013, with minor updates online. The Antibiotic Guide holds the record for our most popular resource – every month it is accessed online approximately 7000 times.

The 2017 version is available electronically only; we know that many of you prefer the printed booklet form and have faithfully kept hold of dog-eared copies, but an online version allows us to make updates as necessary, given the rapidly changing landscape of antibiotic choices. We have included the option for individuals to print a copy from the most current online version, but we recommend that you regularly check the online version to see if any revisions have been made.

What is new?

The bpac^{nz} Antibiotics Guide aims to give clear guidance on the antibiotic treatment of infections most frequently seen in primary care in New Zealand. This includes guidance on the clinical circumstances that indicate when an antibiotic is required, and the most appropriate choice, dose and duration of treatment.

Since the Guide was first published, we have seen a trend towards shorter courses of antibiotics, more intensive dosing regimens and reserving use of broader spectrum antibiotics for very specific clinical scenarios. Choices of antibiotics change over time in response to growing antimicrobial resistance – this may be because the conventional choice is no longer effective due to high resistance levels or the need to preserve use of that antibiotic to ensure that it remains a viable option when needed.

Key changes in the 2017 Antibiotics Guide include:

- Management sections have been updated to reflect current evidence and practice
- The “Antibiotic treatment” header within each condition gives information on when antibiotics are required, e.g. “severe infection”, “with risk factors”

- Some dose ranges have increased to reflect that treatment is only given if moderate to severe infection is present, e.g. sinusitis
- Combination medicines are expressed as total doses for consistency with the New Zealand Formulary and more straightforward dosing regimens, e.g. co-trimoxazole oral liquid 40 + 200 mg/5 mL is now referred to as trimethoprim + sulfamethoxazole oral liquid 240 mg/5 mL, and amoxicillin + clavulanic acid 500 + 125 mg tablets are now referred to as amoxicillin clavulanate 625 mg tablets
- Antiseptic choices are now included for the first-line treatment of impetigo
- The “Recurrent skin infections” section has been removed as the scope of this topic is more suited to a detailed education resource
- Urinary tract infection is now grouped together and listed under “cystitis: adult”, “cystitis: child” and “pyelonephritis”
- Cefalexin moves to a second-line choice when indicated, due to the need to preserve use of this important antibiotic
- Roxithromycin dispersible tablets are now available on the Pharmaceutical Schedule, making this a treatment option for children < 12 years who previously could not take roxithromycin due to its available formulations


Azithromycin is a suitable first-line option for both children and adults with pertussis

When azithromycin was first subsidised on the community Pharmaceutical Schedule, there was concern that unrestricted prescribing would result in increased resistance levels and a diminishing of its usefulness for treating conditions such as pertussis. Although not a prescribing requirement, azithromycin was initially recommended only for children for the treatment of pertussis, and erythromycin was recommended for use in adults. However, the 14 day regimen required for erythromycin, compared to the five day regimen for azithromycin, may result in adherence issues for some people. It is now the expert consensus that it is reasonable to prescribe azithromycin to both children and adults, for the benefit of ensuring that treatment is completed and reducing the risk of pertussis being transmitted to others. Erythromycin remains an alternative treatment, and trimethoprim + sulfamethoxazole may be used for those allergic to macrolides.

Immunisation against pertussis remains the first-line of defence for protecting young infants who are not yet fully immune. Ensure that infants and children are vaccinated on time, encourage pregnant women to receive a subsidised booster vaccination and discuss vaccination with other family members who will have regular contact with an infant.

There are very few reasons to prescribe fusidic acid

Fusidic acid should not be in a prescribers “antibiotic arsenal”. Inappropriate use of topical antibiotics has played a major role in increasing rates of antibacterial resistance in *Staphylococcus aureus*. Fusidic acid once was recommended for treating impetigo, but this is now not considered to be best practice. In many cases, impetigo can be managed by simple skin hygiene measures alone. Topical antiseptics such as hydrogen peroxide or povidone-iodine can be applied to small areas of localised lesions (\leq three lesions) – if infection is any more extensive, and skin hygiene techniques have not worked, an oral antibiotic is appropriate.

 For further information, see: www.bpac.org.nz/2017/topical-antibiotics-2.aspx

Trimethoprim + sulfamethoxazole is an alternative for complicated skin infections

Flucloxacillin is the recommended first-line treatment for superficial skin infections that require antibiotic treatment, such as mild to moderate cellulitis, boils with complicating factors and extensive impetigo. Previously, trimethoprim + sulfamethoxazole was reserved as a second-line option for these infections if methicillin-resistant *S. aureus* (MRSA) was found to be present. However, expert opinion now is that trimethoprim + sulfamethoxazole is a useful second-line alternative to flucloxacillin if any atypical organisms are present (e.g. symptoms not resolving despite treatment with flucloxacillin or confirmed sensitivity after microbiological analysis) or if the patient is allergic to penicillins. Erythromycin also remains a second-line alternative to flucloxacillin.

Treat cellulitis for five days

It was previously recommended to treat mild to moderate cellulitis with flucloxacillin for seven days. However, newer treatment guidelines recommend a shorter duration of antibiotic treatment, based on evidence of comparable cure rates. It is now recommended that cellulitis is treated with antibiotics for five days.



See the 2017 bpac^{nz} Antibiotic Guide here:
www.bpac.org.nz/antibiotics/guide.aspx

Prescribing antibiotics for respiratory tract infections: do you?

Most respiratory tract infections are viral in origin and self-limiting and therefore do not require antibiotic treatment. However, it is estimated that more than half of antibiotics dispensed in the community are for respiratory tract infections. Antibiotic treatment is appropriate for patients with bacterial respiratory tract infections, such as community-acquired pneumonia, or for patients with a suspected bacterial infection for whom there is a high risk of complications or if the infection is not resolving. In practice, this is not always a straightforward decision.

Many factors can influence a prescriber's decision about whether or not to prescribe antibiotics. History and examination can provide clues to the probable cause of the patient's symptoms but it is often difficult to distinguish clinically between viral and bacterial infections. If there is clinical uncertainty, many clinicians will err on the side of caution and prescribe, due to concern about potentially missing a diagnosis. In some cases, this may be a reasonable response, particularly if the risk of not doing so is high, e.g. non-specific respiratory symptoms and signs in a younger infant. Sometimes clinical guidance recommends that an antibiotic is appropriate when the diagnosis is only suspected, e.g. a child with a sore throat who has risk factors for rheumatic fever.


Expectation and pressure from the patient may also factor into the decision of whether to prescribe an antibiotic. Other considerations include the timing of the consultation, e.g. can the patient seek treatment at night or in the weekend, and special circumstances, e.g. the patient is leaving town the next day. Previous negative experiences around prescribing that have affected either the clinician or the patient can also influence decisions.

The key factor here is communication between the prescriber and patient, as to why the decision to prescribe, or not to prescribe, has been made.


The following points may be useful to discuss with patients regarding their expectations for an antibiotic for a respiratory tract infection:

- Most respiratory tract infections are viral and self-limiting and do not require antibiotic treatment

- Even if the infection was bacterial, antibiotics usually do not alter the course of illness in a non-complicated respiratory tract infection
- The unnecessary prescribing of antibiotics contributes to antibiotic resistance, which means that antibiotics might not work when they are needed; this not only affects the patient, but the whole community
- Antibiotics are associated with adverse effects, e.g. diarrhoea, nausea, and in rare cases more serious outcomes such as allergic reaction
- Being prescribed an antibiotic in the past for a respiratory tract infection does not necessarily mean that one is required now
- Reassure patients that they made the right decision to seek assessment and just because they do not require an antibiotic, it does not mean that their symptoms are not legitimate

 Patients can be given a leaflet or referred to a patient information website to reinforce the information that has been discussed with them, e.g. Health Navigator: www.healthnavigator.org.nz/health-a-z/c/cold-or-the-flu/

Providing a delayed, or “back pocket”, prescription, is a strategy that some prescribers use to overcome clinical uncertainty or address issues such as a Friday consultation or a patient who is unlikely to return if their symptoms deteriorate. A problem with this strategy is that it can undermine the conversation that has just taken place about why an antibiotic is not currently needed. If a delayed prescription is offered, it is important to ensure that the patient understands the circumstances under which it should be filled. To avoid the problem of patients filling delayed prescriptions immediately, some prescribers will make an arrangement with the patient that they can phone the practice nurse if their symptoms deteriorate or do not resolve, and a prescription is given at no further cost (or follow up arranged if necessary).

 For further information about delayed prescriptions, see: www.bpac.org.nz/BPJ/2015/june/delayed.aspx

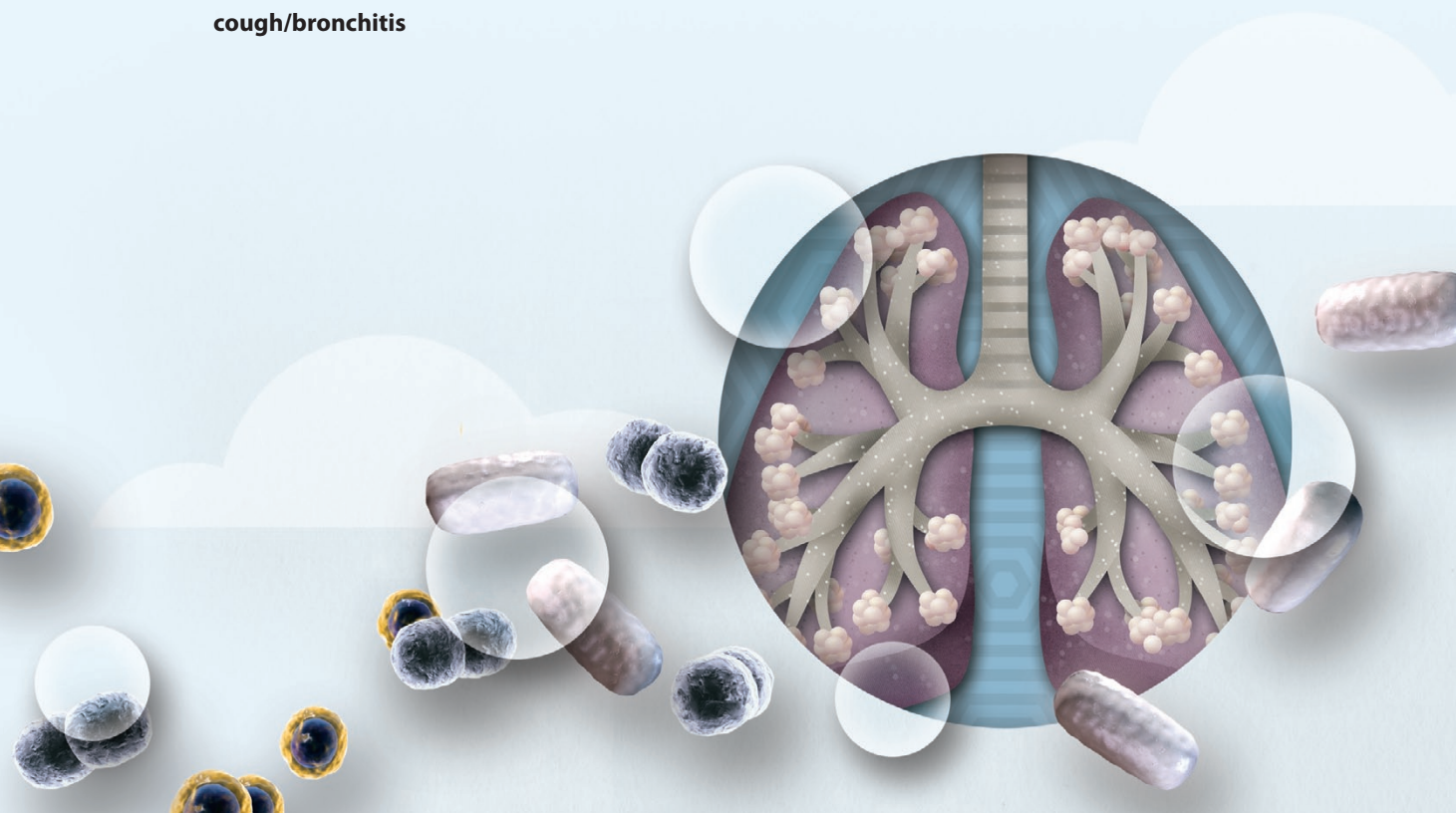
Reminders for prescribers for managing respiratory tract, ear, nose and throat infections:

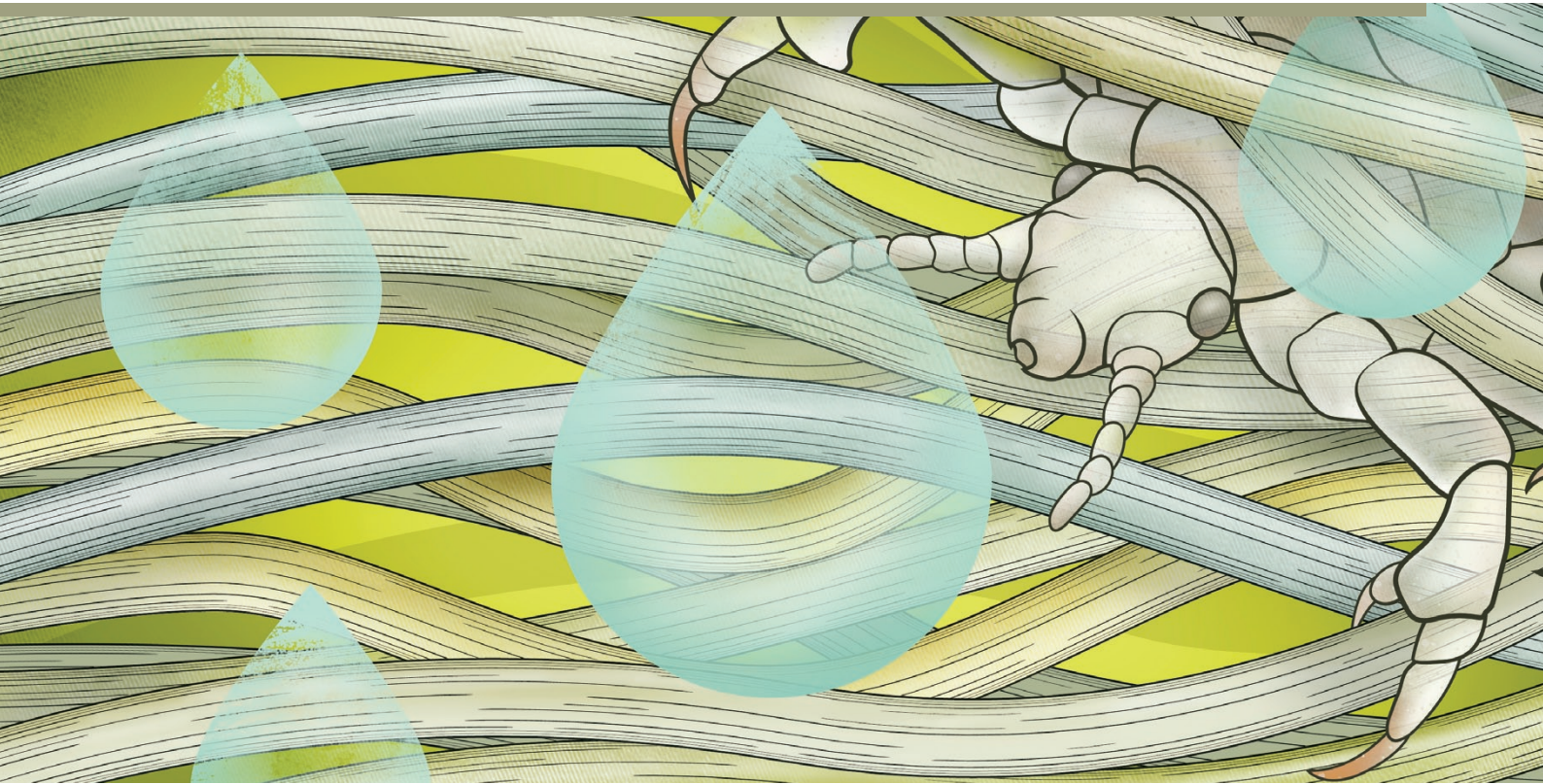
- Antibiotics are usually not necessary for patients with **otitis media** as most infections are self-limiting. The circumstances when antibiotics may be considered include: age under six months, age under two years with severe or bilateral infection, recurrent infections (≥ 3 in six months) or no improvement within 48 hours.
- It is not necessary to treat patients with **pharyngitis** with antibiotics unless they have a high risk of rheumatic fever: personal, family or household history of rheumatic fever or two or more of the following criteria – Māori or Pacific ethnicity, age 3 – 35 years, living in crowded circumstances or in lower socioeconomic areas
- It is not necessary to treat patients with **sinusitis** with antibiotics unless infection is severe (e.g. fever, facial pain for > 3 days) or persistent (> 10 days)
- Antibiotic treatment is not necessary for patients with **conjunctivitis** unless they have severe symptoms of a likely bacterial origin (usually characterised by purulent discharge)
- Antibiotics are not required for patients with **acute cough/bronchitis**

- **Bronchiolitis** is not treated with antibiotics as it is caused by respiratory viruses
- Antibiotic treatment is appropriate for all patients with suspected **pneumonia**; referral to hospital may be required if there are risk factors
- Any patients with suspected **pertussis** should be given an antibiotic if it is within three weeks of onset of cough (or if the duration of cough is unknown). The antibiotic will not alter the course of illness, unless given within the first few days of infection, but it will reduce the risk of transmission to others. Prophylactic antibiotics are also recommended for any high risk contacts, e.g. infants, pregnant women.

Clinical circumstances which might alter a “no antibiotic” prescribing strategy include: if the patient is systemically very unwell, the presence of co-morbidities such as significant respiratory or cardiovascular disease, immunosuppression, young infants (especially if born prematurely) and frail elderly people.

👁 Further reading: Respiratory tract infections (self-limiting) – reducing antibiotic prescribing, available from: <http://www.bpac.org.nz/guidelines/1/>





4% dimethicone lotion: a subsidised treatment for head lice

From 1 May, 2017, 4% dimethicone lotion can be prescribed fully subsidised for the treatment of head lice, which adds another treatment option to the currently subsidised 0.5% phenothrin shampoo. Lice are unlikely to develop resistance to dimethicone lotion as it is not an insecticide and instead kills lice by suffocation.

KEY PRACTICE POINTS:

- Ensure that parents and caregivers are aware that subsidised head lice treatments are available on prescription
- Dimethicone is a highly effective head lice treatment, with a low risk of adverse effects: two applications of dimethicone one week apart results in successful eradication in at least 70% of patients
- Dimethicone is not an insecticide. It kills lice by suffocation and disrupting their ability to regulate water. Products with this mechanism of action may become the preferred treatment for head lice as it is unlikely lice will develop resistance, which can occur with insecticide-based treatments
- After successful treatment, non-viable eggs and empty egg casings may remain in the hair, but can be combed out to reduce possible embarrassment and stigmatisation of children


Head lice infestation is a perennial problem in New Zealand, mainly affecting children. An infestation can easily spread to other members of the household, friends or classmates. Head lice often cause itching or irritation of the scalp, which may result in discomfort and disruption of sleep. In some children with a heavy infestation, scratching of the scalp can result in bacterial skin infection.¹

People often first notice itching and visible eggs

An itchy scalp is often the first symptom of a head lice infestation. Pruritus results from a delayed hypersensitivity reaction after repeated exposures to louse saliva during feeding (see: "Head lice biology: know your enemy").² However, head lice infestation is not always accompanied by itch.³ The first time a person's hair is infested with lice, the infestation is likely to be initially asymptomatic, with pruritus developing

after approximately four to six weeks.^{1,2} Pruritus is then likely to develop earlier during any subsequent infestations, and may persist even after successful treatment.

Most people will initially notice eggs rather than live lice in the hair. The hairline behind the ears and at the nape of the neck are often the best sites for locating and identifying eggs.² Lice can be more difficult to observe and children usually have less than 20 lice on the scalp at a time during an infestation.¹ Detection combing is recommended to check for live lice.

 Instructions on how to perform detection combing are available at: www.bpac.org.nz/BPJ/2008/June/headlice.aspx

Treatment with a lice-killing product may not be necessary for people with eggs only in their hair, as these may be non-viable eggs or empty egg casings, possibly from a previous infestation.^{1,2} Consider whether the person has had a previous infestation, whether they combed out eggs after treatment, and how far from the scalp the eggs are, i.e. over 1 cm, to help decide if these may be non-viable eggs or egg casings (see: “Head lice biology: know your enemy”).

If live lice are found, check other members of the household.

All members of the household should be checked and treated if live lice are identified.

Dimethicone has a different mechanism of action to insecticides

Dimethicone is derived from silicone oil.⁵ It is not an insecticide, but eradicates adult and nymph lice via disruption of water homeostasis and suffocation (see: “Head lice biology: know your enemy”).⁶ Due to the mechanism of action of dimethicone, it is thought to be highly unlikely that lice will develop resistance. This may make it a preferable treatment option to insecticide-based treatments, to which lice can develop resistance. Increasing rates of resistance have limited the effectiveness of insecticide-based treatments in other countries.⁷

Adverse effects from using a dimethicone lice treatment are unlikely; in clinical trials of 4% dimethicone lotion, itching or irritation of the scalp or neck was reported by less than 2% of participants.⁵ Advise caregivers to avoid lotion dripping into the child’s eyes, which can cause irritation; this was reported by less than 1% of participants in clinical trials.⁵ Dimethicone

Head lice biology: know your enemy

Eggs

Lice lay their eggs close to the scalp as they require body heat to incubate, and usually hatch after eight to nine days.² Eggs are approximately 1 mm in size, and are visible to the naked eye, although it can be difficult to distinguish viable eggs from empty egg casings. As the hair grows, eggs or egg casings will move progressively away from the scalp, and it is generally thought that eggs found further than 1 cm from the scalp are likely to be hatched or non-viable.⁴ Non-viable eggs or empty egg casings can remain attached to the hair for up to a year, if not successfully combed out.

Young and adult lice

After hatching, young lice (nymphs) mature over 9–12 days to become adult lice, at which point they are able to reproduce. Adult head lice are approximately the size of a sesame seed. They feed by sucking blood from the scalp and are unlikely to survive beyond 48 hours if detached from a human host.² Lice can appear grey to white in colour when unfed, or dark if filled with blood after feeding.



Louse and egg images adapted from Gilles, San-Martin – www.flickr.com

lotion is also used in emollients and cosmetics, and is not absorbed via the skin.^{5,8}

4% dimethicone lotion successfully eradicates lice in the majority of people, with little risk of adverse effects

Clinical trials of 4% dimethicone lotion report cure rates of 69–92% after two applications one week apart, compared to cure rates of 75% for phenothrin and 33% for malathion.^{5,9,10}

It is likely that 4% dimethicone lotion has some ability to kill eggs before they hatch.^{11,12} However, two applications are recommended, one week apart, in order to treat any nymphs (young lice) which hatch from surviving eggs. This interval means that the second application can kill any newly hatched nymphs before they reach the adult stage of development and are able to reproduce. Occasionally some eggs can hatch after a longer interval, resulting in treatment failure in a small number of cases.¹³

Instructions for treating head lice with 4% dimethicone lotion⁵

- Apply the lotion to dry hair, covering the full length of hair and working systematically around the head
- Use enough product to thoroughly moisten the hair and scalp
- Once applied to the whole head of hair, combing the hair with an ordinary comb can ensure even coverage and distribution of the lotion
- Leave the product to dry naturally and wait at least eight hours before washing the hair with usual shampoo
- Covering the hair with a wrap is not necessary to increase effectiveness or prevent lice escaping. Head lice become immobilised within a minute of being covered with 4% dimethicone lotion.⁶
- A fine-toothed comb can be used to remove remaining eggs after treatment and any dead lice which were not washed out; a specialised “head lice comb” can be used for this purpose but is not essential. Eggs are firmly attached to the hair shaft and need to be manually removed regardless of the treatment used. Applying conditioner or water to the hair before combing loosens the eggs from the hair shaft and makes combing easier.¹⁴
- Repeat the application process in seven days

What if treatment does not work?

Treatment failure could occur for a number of reasons, including incorrect use of the product, re-infestation, or some eggs hatching after the second application. If treatment with two applications of 4% dimethicone lotion is ineffective, the treatment can be repeated with two further applications. Ask patients or caregivers about how they used the product and emphasise applying sufficient amounts to thoroughly coat hair, waiting the recommended time before washing hair, and taking steps to avoid re-infestation (see below). Other treatment options include subsidised 0.5% phenothrin shampoo or an unsubsidised over-the-counter product from a pharmacy. Repeated detection combing can also be used as a means of manually removing lice; however, this method requires a substantial time investment. Success rates for repeated detection combing as a method of eradication have been reported to range from 38–53%.¹⁵


Preventing transmission and re-infestation

Head lice are wingless and do not fly, hop or jump. Transmission occurs by lice crawling from one person’s hair to another’s.² Humans are the only known host for head lice and pets are not thought to be an intermediary.²

Fomite transmission or re-infestation, e.g. via items such as hair brushes, combs, clothing, bedding or towels, is less likely than direct transmission from person-to-person, as head lice require regular feeding from the scalp to remain alive.² Although not necessary, if caregivers wish to decontaminate these items to reduce any risk of transmission, they can be instructed to wash items used in the previous 24 to 48 hours in water which is at least 55°C to kill lice or eggs.² Items that cannot be washed can be sealed inside a plastic bag and left for two weeks, by which time any viable eggs would have hatched and the lice would have died.²

Tips for caregivers to reduce transmission if someone in their household has a lice infestation include:⁴

- Clean combs after using on an affected person’s hair; soak them in hot water which is at least 55°C for five to ten minutes
- Advise children not to share combs or brushes
- Keep long hair tied up to reduce the chance of lice being transmitted from one person’s hair to another
- Avoid sharing frequently worn hats, hair accessories or sports headgear
- Avoid taking closely grouped photos with anyone who has an active infestation, e.g. selfies with friends

 Further information on head lice for caregivers is available at: www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/head-lice

References:

1. Cummings C, Finlay J, MacDonald N, et al. Head lice infestations: a clinical update. 2016. Available from: www.cps.ca/documents/position/head-lice (Accessed May, 2017).
2. Devore CD, Schutze GE, Council on School Health and Committee on Infectious Diseases, American Academy of Pediatrics. Head lice. *Pediatrics* 2015;135:e1355-1365. doi:10.1542/peds.2015-0746
3. Mumcuoglu KY, Klaus S, Kafka D, et al. Clinical observations related to head lice infestation. *J Am Acad Dermatol* 1991;25:248-51.
4. Centers for Disease Control and Prevention. Parasites - Lice - Head lice. 2013. Available from: www.cdc.gov/parasites/lice/head (Accessed May, 2017).
5. Burgess IF, Brown CM, Lee PN. Treatment of head louse infestation with 4% dimeticone lotion: randomised controlled equivalence trial. *BMJ* 2005;330:1423. doi:10.1136/bmj.38497.506481.8F
6. Burgess IF. The mode of action of dimeticone 4% lotion against head lice, *Pediculus capitis*. *BMC Pharmacol* 2009;9:3. doi:10.1186/1471-2210-9-3
7. Tebruegge M, Pantazidou A, Curtis N. What's bugging you? An update on the treatment of head lice infestation. *Arch Dis Child Educ Pract Ed* 2011;96:2-8. doi:10.1136/adc.2009.178038
8. Nair B, Cosmetic Ingredients Review Expert Panel. Final report on the safety assessment of stearoxy dimethicone, dimethicone, methicone... *Int J Toxicol* 2003;22 Suppl 2:11-35.
9. Kurt Ö, Balcioglu IC, Burgess IF, et al. Treatment of head lice with dimeticone 4% lotion: comparison of two formulations in a randomised controlled trial in rural Turkey. *BMC Public Health* 2009;9:441. doi:10.1186/1471-2458-9-441
10. Burgess IF, Lee PN, Matlock G. Randomised, controlled, assessor blind trial comparing 4% dimeticone lotion with 0.5% malathion liquid for head louse infestation. *PLoS ONE* 2007;2:e1127. doi:10.1371/journal.pone.0001127
11. Heukelbach J, Sonnberg S, Becher H, et al. Ovicidal efficacy of high concentration dimeticone: a new era of head lice treatment. *J Am Acad Dermatol* 2011;64:e61-62. doi:10.1016/j.jaad.2010.04.003
12. Gallardo A, Mougabure-Cueto G, Vassena C, et al. Comparative efficacy of new commercial pediculicides against adults and eggs of *Pediculus humanus capitis* (head lice). *Parasitol Res* 2012;110:1601-6. doi:10.1007/s00436-011-2668-x
13. Burgess IF, Brunton ER, Burgess NA. Single application of 4% dimeticone liquid gel versus two applications of 1% permethrin creme rinse for treatment of head louse infestation: a randomised controlled trial. *BMC Dermatol* 2013;13:5. doi:10.1186/1471-5945-13-5
14. Ortega-Insaurralde I, Toloza AC, Picollo MI, et al. Influence of the formulations in removing eggs of *Pediculus humanus capitis* (Phthiraptera: Pediculidae). *Parasitol Res* 2014;113:3439-44. doi:10.1007/s00436-014-4012-8
15. Mumcuoglu KY, Barker SC, Burgess IE, et al. International guidelines for effective control of head louse infestations. *J Drugs Dermatol* 2007;6:409-14.



This article is available online at:
www.bpac.org.nz/2017/dimethicone.aspx

HAZARDS TO HEALTH

GPs are able to use e-notification to inform the Medical Officer of Health about hazardous substances-related diseases and injuries.

Examples of cases that should be reported:



A fireworks injury



Ingestion of cleaning products or cosmetics



Agrichemical poisoning (including spray drift)



Carbon monoxide poisoning



Illness caused by exposure to solvents or chlorine



Chemical contact dermatitis



'Huffing' (inhaling) of butane

Hazardous Substances Notifications

By law, diseases and injuries caused by hazardous substances, lead absorption and poisoning arising from chemical contamination of the environment (including from agrichemical spray drift) are required to be notified.

How to notify

Look for 'Hazardous Substances & Lead Notifications' on the Module list of your BPAC dashboard or contact your local public health unit.

www.ehinz.ac.nz



Need more CPD?

Four steps to meeting your Continuing Professional Development requirements

1

Reading Best Practice Journal is a RNZCGP endorsed Continuing Professional Development (CPD) activity. Every hour spent reading articles earns one Continuing Medical Education (CME) credit. General Practitioners can enter a record of their activity using a Learning Reflection Form, available from the RNZCGP website: www.rnzcgp.org.nz

2

Audits are endorsed by the RNZCGP as a CQI activity for allocation of MOPS credits for General Practitioners:

www.bpac.org.nz/audits

CLINICAL AUDIT

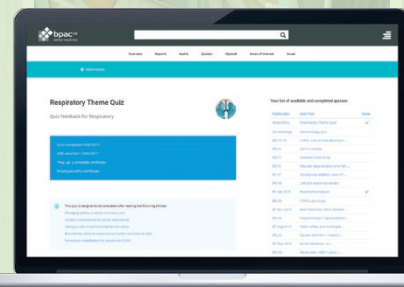
Optimising **asthma management** in high risk patients



3

Interactive quizzes and case studies are based on material found on the bpac^{nz} website, and are also endorsed as a CPD activity:

www.bpac.org.nz/quizzes



4

Peer group discussions are based on material previously published by bpac^{nz}. They include a brief summary along with discussion points to take to your next peer group meeting:

www.bpac.org.nz/peergroup

Respiratory Theme

The following questions can be used as discussion points for peer groups or self-reflection of practice. The questions relate to topics within a respiratory theme. It is recommended that the linked article is read before considering the questions.

Bronchitis

1. What aspects do you find most challenging when managing patients with bronchitis?
2. In your opinion, what are the main features that dictate how you will manage a patient with bronchitis?
3. Do you use an objective scoring system to assess severity or do you tend to rely on clinical judgement? If a scoring system is used, what is it and why?
4. What are some ways that you have found useful in your own practice to reassure parents that their child can be managed at home?

Managing adults with asthma in primary care

1. What are some of the most challenging aspects of managing asthma in adults?
2. Many and Pacific people are more severely affected by asthma. How do you address ethnic inequalities in asthma management in your practice?
3. Have you used the Asthma Control Test in clinical practice? What is helpful or not?
4. How do you normally address smoking cessation in

Adding a long-acting beta₂-agonist

1. If a patient taking an ICS at a standard dose is unable to achieve good control of their symptoms, it is recommended that, after checking adherence and managing co-morbidities, a LABA is added to their treatment regimen rather than increasing the dose of ICS. Does this reflect your current practice? What is your approach to escalating treatment?
2. When you add a LABA to a patient's treatment regimen, what are your main strategies for doing this?
 - Change the ICS inhaler to a LABA/ICS combination inhaler and continue with the SABA inhaler or
 - Change the ICS inhaler to a LABA/ICS combination inhaler and use this as 'single inhaler treatment'; discontinue the SABA inhaler.Do you have a preference when prescribing for either ICS/LABA inhaler with a SABA reliever or single inhaler treatment? What do you find that patients prefer?
3. The use of a single inhaler ICS-LABA as both preventer and reliever can sometimes cause confusion in patients accustomed to also using a SABA. What strategies have you found successful when helping patients transition to single inhaler treatment?

Pulmonary rehabilitation for people with COPD

1. Before reading this article, were you familiar with the concept of pulmonary rehabilitation for patients with COPD? What is your understanding of what pulmonary rehabilitation is?



Rata GP is a not-for-profit organisation owned by bpac^{nz} providing permanent and locum recruitment services to general practitioners and practices throughout New Zealand.

We provide doctors unique benefits including direct contact with the hiring practices. We offer advice for you around roles, practices, locations, pay, shifts and anything else you may need to know before making your decisions. We work hard to make the best match for you and your family.

Working with a not-for-profit organisation benefits you as a doctor. We do not charge you anything for our services, and the practices we work with enjoy low recruitment fees. Unlike traditional agencies, we have no reason to push a vacancy or practice your way. We would rather find out what you want and match the right role for you so that you stay long term.

We listen to you to find out your interests, specialisations, family needs, lifestyle requirements and even hobbies to ensure we make suggestions for the best match for you.

Our experienced consultants will ensure the process is run smoothly, in a timely fashion and works to your own deadlines. We know moving location is stressful and we want to make this an easy transition for you.

If you are thinking of a change we encourage you to make contact and start asking questions about your options. We work with a large number of practices throughout New Zealand and would love to speak to you about how we can best fit your needs.

Email us: contact@ratagp.co.nz

Call us on: **0800 728 247**

www.ratagp.co.nz

visit us at www.bpac.org.nz

Call us on **03 477 5418** Email us at contact@bpac.org.nz Freefax us on **0800 27 22 69**