Asthma management
Part 2: medication, action plans and education

The six-step asthma management plan remains the blueprint for outlining the principles of asthma management in Australia. Optimising medication, writing an action plan, and educating and regularly reviewing patients form the last three steps of this plan; they are discussed in the final part of this article on the general practice management of asthma.

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Asthma is the sixth most frequently encountered problem in general practice. It is vital that GPs optimally manage patients with asthma, thereby improving patients' quality of life and long term outcomes and reducing the risks of poorly controlled disease.

In the first part of this article, published in last month's issue of *Medicine Today*, I reviewed the importance of assessing asthma severity, achieving best lung function and identifying and avoiding triggers. These comprise the first three steps of the Australian six-step asthma management plan (see the box on page 29). In this part, I discuss the final three steps. The sixth step – educate (Figure 1) and review regularly – has been shown to result in better outcomes for patients with asthma. This recommendation is a crucial element in asthma management: it enshrines the core principles around which optimum therapy can further improve outcomes. It also forms the basis of the Federal Government's Practice Incentives Program for the proactive management of patients with moderate to severe asthma.

Step 4. Maintain best lung function – optimise medication

'Preventive medications' are those that modify the inflammatory process in the airways to an extent that results in improved asthma control. Although short acting β_2-agonists can modify cellular processes that may affect inflammatory pathways (e.g. by inhibition of mast cell mediator

IN SUMMARY

- Effective asthma treatment reduces the morbidity and mortality associated with asthma, improves quality of life and helps maintain lung function by controlling the underlying inflammatory process in the airways.
- In moderate to severe asthma, inhaled corticosteroids are the medications of greatest efficacy. Long acting bronchodilators have an important role in addition to inhaled corticosteroids in the management of moderate to severe asthma.
- Recent evidence indicates that ownership of a written action plan is associated with a reduced risk of death from asthma and that verbal information alone does not confer similar benefit.
- Patients should participate in the process of formulating an action plan, tailored to their preferences – either peak flow or symptom based – and to their previous history.
- Asthma education is a long term process – it is not simply a matter of giving information at a single visit, but of enhancing patients' ability to manage their asthma to their best advantage, optimising medication use and control of trigger factors.

release), they are not preventive medications because they do not result in improved asthma control when taken as regular therapy. Similarly, long acting β_2-agonists can affect histamine and interleukin release, as well as plasma protein extravasation and mucosal oedema, but are not effective preventive therapy.

Preventive medications include:

- sodium cromoglycate (Cromese Sterinebs, Intal, Intal Forte CFC-Free)
- nedocromil sodium (Tilade CFC-Free)
- leukotriene receptor antagonists
- inhaled corticosteroids.

Each group of medications is used for mild asthma, but in moderate to severe disease, inhaled corticosteroids are the medications of greatest efficacy. Long acting bronchodilators have an important role in addition to inhaled corticosteroids in the management of moderate to severe asthma. The term 'combination therapy' generally refers to an inhaled corticosteroid plus a long acting bronchodilator.

Sodium cromoglycate and nedocromil

Sodium cromoglycate was the earliest true preventive medication for asthma and can protect against the bronchoconstriction induced by allergens, exercise and a range of indirect triggers such as sulfur dioxide, hyperventilation, and osmotic challenges. Sodium cromoglycate has anti-inflammatory properties that include stabilisation of mast cell membranes, inhibition of histamine release and inhibition of eosinophil accumulation in bronchial walls. It reduces bronchial hyper-reactivity to nonspecific stimuli (histamine and methacholine) and can prevent the increase in bronchial hyper-reactivity seen after exposure to an allergen.

Sodium cromoglycate has been the preventive medication of first choice in children, although low dose inhaled corticosteroids are a safe and effective alternative. In adults, sodium cromoglycate is not as effective as inhaled corticosteroids for achieving asthma control.

Sodium cromoglycate is extremely well tolerated and has very few side effects (mild coughing, transient bronchoconstriction or throat irritation after inhalation occur in fewer than 5% of patients).

There have been no studies testing the benefit of sodium cromoglycate in the context of asthma exacerbations induced by upper respiratory tract infections.

Cromoglycate is effective for the prevention of exercise-induced asthma, and 10 to 40 mg (one to four puffs) can be taken five to 10 minutes before exercise, alone or in conjunction with a short acting β_2-agonist. It may also be used before anticipated allergen exposure.

At present, the CFC-free formulation of sodium cromoglycate tends to obstruct the orifice of the plastic holder, which should be washed every night. The protocol includes running hot water through it for one minute, then a further minute in the opposite direction, tapping the holder to remove water droplets, and allowing it to dry overnight before reuse. This is clearly cumbersome and has the potential to greatly reduce patients' adherence to regular treatment.

Nedocromil sodium has similar efficacy to sodium cromoglycate in adults, although some studies suggest it is marginally more effective in preventing asthma symptoms triggered by irritants and sulfur dioxide. It has inhibitory effects on upper airway sensory nerve endings ('C fibres') and may have a more rapid effect in reducing asthmatic cough than sodium cromoglycate or inhaled corticosteroids.

In the past, sodium cromoglycate and nedocromil were used as add-on therapy to inhaled corticosteroids, but there are now superior alternatives (such as adding a long acting β_2-agonist) to achieve reduction in corticosteroid dose or improved asthma control.

Leukotriene receptor antagonists

Leukotriene receptor antagonists have anti-inflammatory properties as a result of specific antagonism at the leukotriene D4 receptor on bronchial and vascular smooth muscle. This receptor is the common site of action of several leukotrienes: leukotriene C4, D4 and E4. The leukotrienes are products of arachidonic acid metabolism and are released from eosinophils and mast cells. They are potent mediators that enhance chemotaxis and contribute to bronchoconstriction, increased vascular permeability and airway hypersecretion.

The leukotriene receptor antagonists montelukast (Singulair) and zafirlukast (Accolate) improve lung function and reduce asthma symptoms, and are suitable first-line agents in mild asthma. In clinical trials lasting from six weeks to one year they have been shown to be as efficacious as beclomethasone 400 µg daily in improving asthma control. Further studies are required to ascertain whether they have long term benefit in reversing the inflammatory changes in the airways, reducing bronchial hyperresponsiveness and preventing lung function decline. Montelukast reduces exercise-induced asthma and may permit a reduction in inhaled corticosteroid dose in moderate asthma.[1] However, not

The six-step asthma management plan

Step 1
Assess asthma severity
Step 2
Achieve best lung function
Step 3
Maintain best lung function: identify and avoid triggers
Step 4
Maintain best lung function: optimise medication
Step 5
Develop an action plan
Step 6
Educate and review regularly

continued

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Figure 1. Asthma education is a long term process. Practical skills need to be taught carefully and reviewed regularly. Education and regular medical review are crucial elements in asthma management.

all patients respond to leukotriene receptor antagonists and an objective assessment of benefit should be made after a four to six week trial.

Leukotriene receptor antagonists are not as effective as inhaled corticosteroids combined with a long acting β_2-agonist,[2] but they offer a simple once-daily oral alternative for control of mild asthma. They are well tolerated, although zafirlukast has several important drug interactions – especially with erythromycin, warfarin and cimetidine. At doses over 40 mg daily zafirlukast has been associated with abnormal liver function tests and the unmasking or development of Churg-Strauss syndrome.

Inhaled corticosteroids

The inhaled corticosteroids are the most effective anti-inflammatory medications available for the long term management of asthma in adults. They have direct effects on the bronchial epithelium, mucosal inflammatory cells and submucosa. They have a high topical to systemic anti-inflammatory ratio, thus conferring potent local anti-inflammatory activity and low systemic potency.

Studies of airway inflammation show that inhaled corticosteroids reduce epithelial mast cells, eosinophils and lymphocytes in the epithelial layer and submucosa, and *in vitro* studies indicate they have potent effects on eosinophil traffic and activation. They restore epithelial integrity and reduce desquamation.

The inhaled corticosteroids vary in their potency and bioavailability, but in practice, beclomethasone dipropionate (Becloforte, Becotide, Respocort) and budesonide (Pulmicort) are of similar efficacy on a µg for µg basis, while fluticasone propionate (Flixotide) is about twice as potent. The CFC-free preparation of beclomethasone (Qvar) has a finer particle size than other beclomethasone preparations. This results in increased intrapulmonary deposition, and hence the administered dose should be about half the dose of CFC-containing preparations of beclomethasone.

Topical potency, steroid receptor affinity, receptor half-life, plasma half-life, biotransformation in lung and liver, pulmonary deposition and topical to systemic ratio are all determinants of the efficacy and safety of each inhaled corticosteroid. The relative contribution of each of these properties is the focus of considerable debate and the clinical significance of pharmacological differences between the inhaled corticosteroids is still not fully understood. A recent meta-analysis found no evidence for any difference between the administration of inhaled corticosteroid by aerosol and dry powder devices in symptoms, lung function and airway reactivity. Additionally, there was no difference between different devices in the development of systemic effects, hoarse voice or oral thrush, although these studies were of a maximum of 12 weeks' duration.

Clinically, inhaled corticosteroids improve symptom control, lung function, bronchial hyper-reactivity and asthma exacerbation rate, and reduce the risk of hospital admission and death from asthma.[3] These effects are dose related and increase from 400 µg up to 1200 µg daily (beclomethasone equivalent, i.e. half this for fluticasone). Most of the benefit occurs at the lower end of the dose response curve – 90% occurring with 250 µg fluticasone daily and peaking at 500 µg daily.[4]

Inhaled corticosteroids have been shown to reduce the rate of decline of lung function, and this effect is diminished if there is delay between diagnosis and the start of treatment. Delays of many years have been shown to be associated with a poorer response to inhaled corticosteroid and a limit to the achievement of normal lung function.

There are no dose-response studies for doses over 1200 µg daily. There is evidence, however, that bronchial hyperresponsiveness improves more rapidly with doses over 1200 µg daily: several studies have shown different rates of improvement (and decline on inhaled corticosteroid withdrawal) of symptom control, lung function and bronchial hyper-responsiveness (in that order).

Systemic effects of inhaled corticosteroids are related to dose, and clinical

evidence of systemic activity is seen infrequently in adults taking less than 800 µg daily. Sensitive tests of inhaled corticosteroid systemic effects can demonstrate dose-related suppression of adrenal function in adults at doses below 1000 µg/day, but the clinical significance of this is uncertain and clinically significant adrenal suppression is extremely rare.

The most common systemic side effects that cause patients concern are bruising and skin thinning. Reduction in bone density and cataracts are the most serious side effects of long term therapy described. Although inhaled corticosteroids do alter indices of bone metabolism, osteoporosis has not been shown to result from inhaled corticosteroid therapy alone. Long term studies of osteodensitometry are currently being undertaken, and it may take several more years before the effect of duration of treatment is evident, particularly in adults who started taking inhaled corticosteroids in childhood.

In children, growth slowing is related to dose and does not occur with doses under 500 µg daily (beclomethasone equivalent). Higher doses of inhaled corticosteroids may result in a delayed achievement of predicted height, but rarely in shortened stature.[5]

Local side effects are hoarseness and oropharyngeal candidiasis, occurring in 30 to 40% and 5% of patients, respectively. They are seldom a reason for ceasing therapy. Use of a large volume spacer, reduction in dosing schedule (twice daily rather than three or four times daily), reduced number of actuations (one 400 µg actuation rather than four 100 µg actuations) and mouth rinsing, spit and gargle can all help to reduce the risk of these side effects.

Long acting bronchodilators

Long acting bronchodilators have been the single most important addition to asthma therapy in the last 10 years.

Both eformoterol (Foradile, Oxis Turbuhaler) and salmeterol (Serevent) have a 12-hour duration of action and, in combination with an inhaled corticosteroid, both produce superior clinical outcomes to doubling the dose of steroid in patients with symptomatic asthma.

Eformoterol has a rapid onset of action, similar to that of short acting β_2-agonists. Clinically significant bronchodilatation occurs in one to three

Table 1. Assessment of asthma severity*†

Symptoms	Mild	Moderate	Severe
Wheeze, tightness, cough, dyspnoea	Occasional, e.g. with viral infection or exercise	More than 2–3 times a week but not daily	Most days
Symptoms on waking	Absent	Infrequent	>Once/week
Nocturnal symptoms	Absent	Infrequent or only with respiratory tract infection	>Once/week
Hospital admission or emergency visit in last 12 months	No	Usually not	Usually
Life threatening asthma attack or ICU admission in last 12 months	No	Usually not	Usually
Bronchodilator use	Infrequent, <2 times/week	2–3 times/week in addition to during exercise	>2–3 times/week in addition to during exercise
FEV_1, % predicted	Normal	Occasionally abnormal	Persistently abnormal
Minimum waking PEF	>90% best	80–90% best	<80% best
Min%max over 2 weeks	>90%	80–90%	<80%

* Adapted from the National Asthma Council's *Asthma Management Handbook*.[9]
† Any one of these features assigns the patient's asthma overall to the category of severity in which it is described.

Table 2. A guide to starting doses of inhaled corticosteroids*

Very mild asthma
Inhaled corticosteroid intermittently <400 µg daily

Mild asthma
Low dose inhaled corticosteroid continuously ≤400 µg daily

Moderate asthma
Inhaled corticosteroid 400–1000 µg daily

Severe asthma
Inhaled corticosteroid ≥1000 µg daily†

* Doses are beclomethasone/budesonide equivalent; fluticasone is given at approximately half these dosages.
† As recommended in the *Asthma Management Handbook*.[9]

minutes and maximum bronchodilatation in 30 minutes. Salmeterol reaches maximum bronchodilatation in 30 to 60 minutes but has a slower onset of action than eformoterol. Both are well tolerated but have similar side effects to short acting β_2-agonists – predominantly tremor and tachycardia. More rarely, headaches, muscle cramps and insomnia occur.

The primary role of long acting β_2-agonists is to achieve better symptom control than is produced with inhaled corticosteroids alone. Several studies, at different doses of inhaled corticosteroids (from 200 to 1000 µg daily) show that long acting β_2-agonists achieve more rapid and better asthma control when added to inhaled corticosteroids than is achieved by doubling the steroid dose.[6-8] They may enable a reduction in the inhaled corticosteroid dose in subjects with well controlled asthma, and enable good control to be achieved without increasing the steroid to doses that are associated with systemic activity.

Most importantly, long acting β_2-agonists added to inhaled corticosteroids significantly reduce asthma exacerbation rates. Because long acting β_2-agonists produce prolonged bronchodilatation (up to 12 hours), they can be combined with inhaled corticosteroids and given in a twice-daily dosing regimen. They should not be used as monotherapy.

The combination of a long acting β_2-agonist and an inhaled corticosteroid should be considered when:

- symptoms or suboptimal lung function persist on inhaled corticosteroid alone
- it is desirable to reduce the current dose of inhaled corticosteroid while maintaining optimal asthma control
- initiating asthma treatment in a patient in whom rapid symptom improvement is needed.

For patients already using a fixed dose combination therapy, the way the medication should be used in an acute exacerbation of asthma awaits further studies. The traditional practice of doubling the patient's usual inhaled corticosteroid dose would also increase the dose of the long acting β_2-agonist. There is limited evidence to support the practice of doubling the inhaled corticosteroid dose for exacerbations, and there are too few studies to make firm recommendations for combination therapy. However, it is acknowledged that the most practical and cost-effective option for patients may be to double their fixed dose combination therapy while seeking medical advice. Fluticasone propionate plus salmeterol (Seretide) is a fixed dose combination therapy currently available; a budesonide plus eformeterol combination (Symbicort) is expected to become available in the future.

An approach to starting and changing treatment for asthma

When should treatment be started?

Currently, all international asthma guidelines advocate long term preventive treatment for mild persistent asthma. Treatment should be initiated if:

- symptoms require β_2-agonist use more than three times a week, excluding that needed for exercise
- FEV_1 is less than 90% best lung function (post-bronchodilator in a stable phase)
- morning peak expiratory flow (PEF) is less than 90% best post-bronchodilator PEF
- nocturnal asthma occurs (apart from during a respiratory tract infection)
- diurnal variability of PEF is greater than 6% without bronchodilator, or greater than 12% including post-bronchodilator PEF.

Which anti-inflammatory medication?

Inhaled corticosteroids are the treatment of choice for adults with asthma. In mild asthma, they have a high benefit to risk ratio because they are highly efficacious with a very low incidence of side effects at low doses. They are the only preventive medication that has been shown to slow the rate of decline of lung function, and to inhibit airway inflammation *in vivo*. They may be given once daily in patients with mild asthma, which aids adherence and reduces the risk of local side effects.

Choice of anti-inflammatory medication should be tailored to the patient's lifestyle and concerns. Despite reassurances about the safety of low dose inhaled corticosteroids, many patients remain uncomfortable about using them, and this may affect long term adherence. These patients may, therefore, comply more closely with maintenance preventive treatment if prescribed cromones or leukotriene receptor antagonists. Whichever medication is used, it is essential that optimal control is achieved.

What should the starting dose be?

It is not known whether it is more efficacious to begin with a high dose of inhaled corticosteroid and reduce it, or a lower dose and maintain this for longer. The *Asthma Management Handbook* suggests starting doses that depend on severity as defined in Table 1.[9] Therefore, the first step

is to assess severity and then determine the dose of inhaled corticosteroid. There is no persuasive evidence for increased benefit of daily doses over 500 µg of fluticasone or equivalent (1000 µg beclomethasone or budesonide). Suggested starting doses of inhaled corticosteroids are given in Table 2.

How should response be assessed?

In response to inhaled corticosteroid therapy, symptoms and FEV_1 improve first, usually within one to three weeks of starting therapy. Further lung function improvements occur over several months and bronchial hyper-reactivity may take two to three years to reach a plateau (Figure 2). These effects are related to dose and duration of therapy. Thus dose reductions should not be undertaken too soon after achieving a clinical benefit as it may take many more months for airway inflammation to resolve fully.

If response is suboptimal, should preventive medication be increased?

Before the advent of long acting bronchodilators, it was conventional practice to increase the dose of inhaled corticosteroid until benefit was achieved. While there is a dose response for inhaled corticosteroids, it is unclear where a plateau occurs – and it is possible that this varies for different individuals. Consideration should first be given to adding a long acting β_2-agonist.

With regard to efficacy, safety and economic costs, it is appropriate to add a long acting β_2-agonist when symptoms persist at daily inhaled corticosteroid doses of 500 µg beclomethasone or budesonide, or 250 µg fluticasone.

How should preventive medication be reduced?

All asthma guidelines emphasise the achievement of optimal control, as defined by minimal symptoms and reliever use, best lung function and absence of exacerbations, before dose reduction is undertaken. The Canadian Guidelines suggest inhaled corticosteroid dose reduction can begin after a three- to six-month period of stable, ideally controlled asthma. The British Thoracic Society Guidelines suggest a similar approach, although a shorter period (six weeks) of stability is required. These different recommendations reflect the lack of data from clinical trials on the most appropriate timing.

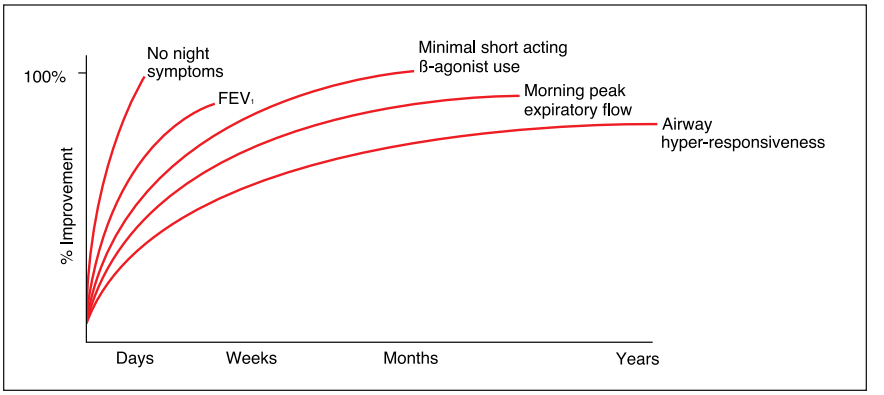

Figure 2. Time course of effects of inhaled corticosteroids on asthma control.

It has been suggested that a reduction of 25% of the daily dose at three-month intervals is appropriate, down to 200 µg beclomethasone or budesonide or 125 µg fluticasone daily. If the patient is taking a long acting β_2-agonist, it can then be ceased, and if asthma is optimally controlled on a low dose of inhaled corticosteroid alone, cessation of the steroid could be the next step. Most adults with asthma that has been persistent are unable to maintain optimal asthma control if they cease preventive medication completely.

The likelihood of remission is related to younger age of onset of asthma, milder degree of airway obstruction and early intervention. Following treatment cessation, it may be many weeks before symptoms return and lung function deteriorates. Hence close monitoring is important over an extended period.

Ideally, patients will understand that sustained treatment cessation is only possible in a minority, and that there is a contract to remain under close review, with frequent lung function assessments (conducted at least every three months in the first year). Patients should be given a new action plan when they cease medication to help them identify and manage appropriately any deterioration in their asthma.

Step 5. Develop (write) an action plan

The uptake and use of action plans are variable, but in most recent Australian surveys about 35% of patients have a written action plan. Ownership is as low as 20% of both adults and children in some surveys, and up to 50% in others. More importantly, many patients do not use their plans when needed, and simply handing patients a written plan without engaging them in the process of optimal self-management will not achieve better outcomes.

Ideally, patients should participate in the process of formulating a plan, tailored to their preferences – either peak flow or symptom based – and to their previous history. It is important to take into account whether the patient is someone who characteristically leaves it too late to initiate treatment changes or, alternatively, is prone to over-reacting and increasing treatment unnecessarily.

Action plans can be written in any format – but should be kept clear and simple,

tailored to the patient's level of literacy, visual acuity and understanding. A 'traffic light' system – green for usual medication, amber for warning (increased medication) and red for emergency – is user friendly and effective for many patients.

The Commonwealth Department of Health and Ageing, with the assistance of the National Asthma Council and Asthma Australia, has recently produced a new written asthma action plan, combining both symptoms and PEF values (see a summary of this in the box below).

The general approach to writing a PEF-based plan for adults involves four simple steps:

- **First step.** Establish the patient's best post-bronchodilator PEF. Any value above 80% of best is acceptable asthma control.
- **Second step.** If PEF falls to 60 to 80% of this value, write down the PEF values and advise the patient to increase treatment – usually double the dose of inhaled corticosteroid – and take a short acting reliever medication four hourly as needed.
- **Third step.** If PEF falls to below 60% of the best PEF, oral corticosteroids should be started. An appropriate adult

An example of a written asthma action plan*

When my asthma is well controlled

- No regular wheeze, or cough or chest tightness at night time, on waking or during the day
- Able to take part in normal physical activity without wheeze, cough or chest tightness
- Need reliever medication less than three times a week (except if it is used before exercise)
- Peak flow† above _____

What should I do?

Continue my usual treatment as follows:

Preventer

_____

Reliever

_____

Symptom controller

_____

Combination medication

_____

Always carry my reliever puffer

When my asthma is getting worse

- At the first sign of a cold
- Waking from sleep due to coughing, wheezing or chest tightness
- Using reliever puffer more than three times a week (not including before exercise)
- Peak flow† between _____ and _____

What should I do?

Increase my usual treatment as follows:

_____

_____

_____

_____

_____

_____

_____

See my doctor to talk about my asthma getting worse

When my asthma is severe

- Need reliever puffer every three hours or more often
- Increasing wheezing, coughing, chest tightness
- Difficulty with normal activity
- Waking each night and most mornings with wheezing, coughing or chest tightness
- Feel that asthma is out of control
- Peak flow† between _____ and _____

What should I do?

Start oral prednisolone (or other steroid) and increase my usual treatment as follows:

_____

_____

_____

_____

_____

_____

_____

See my doctor for advice

How to recognise life-threatening asthma

Dial 000 and/or 112 from a mobile phone for an ambulance if you have any of the following danger signs:

- extreme difficulty breathing
- little or no improvement from reliever puffer
- lips turn blue

and follow the Asthma First Aid Plan below while waiting for ambulance to arrive.

A serious asthma attack is also indicated by:

- symptoms getting worse quickly
- severe shortness of breath or difficulty in speaking
- you are feeling frightened or panicked
- peak flow† below _____

Should any of these occur, follow the Asthma First Aid Plan below.

Asthma First Aid Plan

1. Sit upright and stay calm.
2. Take four separate puffs of a reliever puffer (one puff at a time) via a spacer device. Just use the puffer on its own if you don't have a spacer. Take four breaths from the spacer after each puff.
3. Wait four minutes. If there is no improvement, take another four puffs.
4. If little or no improvement CALL AN AMBULANCE IMMEDIATELY (DIAL 000 and/or 112 from mobile phone) and state that you are having an asthma attack. Keep taking four puffs every four minutes until the ambulance arrives.

See your doctor immediately after a serious asthma attack.

* Based, with permission, on the Commonwealth Department of Health and Ageing's written asthma action plan. † Not recommended for children under 12 years.

dose is 37.5 to 50 mg of prednisolone daily for 7 to 10 days. A tapering dose (to enable adrenal recovery) is not necessary for courses under three weeks. Inhaled corticosteroids should not be ceased during exacerbations. Further increases in bronchodilator dosage may also be prescribed. It is not necessary to give nebulised bronchodilators – increased doses should be administered by puffer and spacer if improved delivery over inhaler alone is required.

- **Fourth step.** If PEF falls to under 50% of best and does not respond to short acting bronchodilator, or if reliever medication does not last three hours, urgent medical attention must be sought. Clear instructions regarding these arrangements should be written on the plan (e.g. phone 000, local hospital casualty or the GP's on-call number).

A symptom-based plan follows similar steps, based on escalation of symptoms – particularly increasing reliever use. Recognition of signs of deterioration is an important aspect of effective asthma self-management and doctors should be at pains to reinforce these regularly with patients. The most important indicators are the following:

- night waking
- increasing reliever use
- difficulty performing usual activities.

There is no difference in benefit between symptom- and PEF-based plans, the choice should be determined by the patient and doctor together.

For both plans, it is important that the patient recognises the significance of an upper respiratory tract infection (URTI) as the main trigger for asthma exacerbations. Patients should be advised to activate their plan (i.e. increase their treatment) at the onset of an URTI, rather than wait for signs of deteriorating asthma – it is often too late by this stage. By convention, the initial step in most action plans is to increase reliever medication and inhaled corticosteroid, but at present there is conflicting evidence to support the importance of changing corticosteroid dose for acute asthma (or exacerbations).

Written action plans combined with regular medical review and optimal self-management education reduce time lost from school or work and out-of-hours visits to GPs and emergency departments, and improve lung function.[10] Recent evidence indicates that action plan ownership is associated with a reduced risk of death from asthma and that verbal information alone does not confer similar benefit.[11] The 3+visit plan, which has been introduced under the Federal Government's Practice Incentives Program for patients with moderate to severe asthma, is underpinned by this evidence.

Its purpose is to encourage planned regular asthma review and self-management education, rather than simply dealing with acute attacks as they crop up. Its uptake should ensure substantially better outcomes for asthma patients.

Step 6. Educate and review regularly

Effective asthma treatment reduces the morbidity and mortality associated with asthma, improves quality of life and helps to maintain lung function by controlling the underlying inflammatory process in the airways. To be effective, it must be tailored to the patient's lifestyle and reviewed regularly so that the minimum effective dose of medication is taken and side effects are minimised. Patients are reassured by this undertaking – that the doctor is committed to reducing the dose when the best control is achieved.

It is important to explore health beliefs concerning medication, illness, the diagnosis and autonomy. Many patients believe that they have to live with asthma, but they don't realise that with appropriate treatment they may be free of daily symptoms and the need for daily reliever medication.

Practical skills need to be taught carefully and reviewed. Too many patients have never had any demonstration of optimal inhaler use from their doctors. A one-off demonstration is never enough – regular review of technique is crucial (see Figure 1).

Asthma education is a long term process – it is not simply a matter of giving information at a single visit, but more one of enhancing patients' ability to manage their asthma to their best advantage, optimising medication use and control of trigger factors. This involves an acceptance of the diagnosis and its implications, recognition of symptoms and signs that necessitate a change in treatment and an appropriate response to this. Regular medical review that is part of an ongoing commitment from the patient and doctor to optimal outcomes is essential.

Summary

Effective asthma treatment is essential to reduce the morbidity and mortality associated with this condition and to improve patients' quality of life. Patients with asthma should have a written action plan, ownership of which has been shown to be associated with a reduced risk of death from asthma. Educating and regularly reviewing patients with asthma have been shown also to result in better outcomes for these patients. MT

A list of references is available on request to the editorial office.

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References

1. Thien FCK. Leukotriene receptor antagonist drugs for asthma. Med J Aust 1999; 171: 378-381.
2. Calhoun WJ, Nelson HS, Nathan RA, et al. Comparison of fluticasone propionate-salmeterol combination therapy and montelukast in patients who are symptomatic on short acting β_2-agonist agonists alone. Am J Respir Crit Care Med 2001; 164: 759-763.
3. Suissa S, Ernst P, Benayoun S, et al. Low dose inhaled corticosteroids and the risk of death from asthma. New Engl J Med 2000; 343: 332-336.
4. 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: 253-256.
5. Pedersen S. Do inhaled corticosteroids inhibit growth in children? Am J Respir Crit Care Med 2001; 164: 521-535.
6. Greening AP, Ind PW, Northfield M, et al. Added salmeterol versus higher-dose corticosteriod in asthma patients with symptoms on existing inhaled corticosteroid. Lancet 1994; 344: 219-224.
7. Pauwels RA, Lofdahl C-G, Postma DS, et al. Effect of inhaled formoterol and budesonide on exacerbations of asthma. N Engl J Med 1997; 337: 1405-1411.
8. Shrewsbury S, Pyke S, Britton M. Meta-analysis of increased dose of inhaled steroid or addition of salmeterol in symptomatic asthma (MIASMA). BMJ 2000; 320: 1368-1373.
9. National Asthma Council. Asthma management handbook 2002. Melbourne: National Asthma Council Australia, 2002.
10. Gibson PG, Coughlan J, Wilson AJ, et al. Self-management education and regular practitioner review for adults with asthma. The Cochrane Library of Systematic Reviews, 2000.
11. Abramson MJ, Bailey MJ, Couper FJ, et al. Are asthma medications and management related to deaths from asthma? Am J Respir Crit Care Med 2000; 163: 12-18.