

Asthma management in practice

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ASSESSMENT OF CURRENT MANAGERMENTS

5.1 How well is asthma being managed?



Compared with the management of asthma 20 years ago, the answer is very well, but compared with the standards laid down by national and international guidelines, there is still room for a great deal of improvement.

The Asthma Insights and Reality in Europe (AIRE) study¹ surveyed nearly 300 asthmatics throughout Europe and found that the Global Initiatives for Asthma (GINA) standards were not being met:

- More than half or all adult respondents and a third of all children reported daytime symptoms at least once a week.
- More than half of all adults and children reported asthma episodes in the previous month.
- Most adults and children had needed to use their relievers in the previous month.
- More than half of the children and nearly half of the adults claimed that they had never had any lung function tests.

Studies from the USA² and the International Study of Asthma and Allergies in Childhood (ISAAC) study³ confirm that asthma morbidity is still high, even in countries with sophisticated healthcare systems. Overall, more than a quarter of children with current asthma reported more than four attacks within the previous year. The European Community Respiratory Health Survey⁴ found that one in three adults with current asthma had had nocturnal breathlessness in the previous year.

5.2 How well is asthma managed in the UK?

In the UK there have been many large surveys on the effects of asthma:

- In the 1990–1991 National Asthma Survey⁵ involving 61 000 respondents, Action Asthma found that nearly half of the respondents experienced symptoms on most days. Most asthmatics were woken at least once a week by their symptoms. One in five respondents thought that asthma had a major effect on their lives, but many were so used to their restrictive lifestyle that they no longer regarded these restrictions as abnormal.
- In 1993 Action Asthma conducted a similar survey amongst asthmatic children. The Young Asthmatics Survey⁶ received over 20 000 responses from children aged 4–17 years in the UK. As with the adult survey, the results showed that many asthmatic children were

inadequately controlled, resulting in a compromised lifestyle. One in three children were woken at least once a week by the asthma, and nearly a quarter had symptoms on most days.

- In the National Asthma Campaign's Impact of Asthma Survey,⁷ asthmatic respondents were recruited by leaflets that were left in doctors' surgeries, supermarkets, community centres and pharmacies. The survey was carried out in the autumn of 1995, and 44 000 responses were analysed. Some 25% of respondents felt that asthma controlled their life or had a major effect on it, and 40% experienced asthma symptoms on most days. A similar number were woken at night at least once a week with asthma symptoms.
- The more recent Asthma Control and Expectations Survey⁸ showed that many asthmatics alter their lifestyle to avoid asthma symptoms. More than half of respondents accepted a restricted lifestyle as the price to be paid for feeling well.

5.3 Can we make international comparisons on how well asthma is being managed?

This is always difficult because the data may not be collected in the same way in different countries, and definitions of, for example, acute asthma may vary. The mortality rates for asthma have actually increased in the USA. This may be due to the lower use of inhaled steroids in the United States, and the subsequent failure of disease modification and suppression of airway inflammation, although other factors such as access to health care

TABLE 5.1 Comparison of asthma statistics in various countries

Country	Asthma mortality rate per 100 000 (1993)	Prevalence of severe asthma (1993–1995)	Ratio
Australia	0.86	8.3	0.10
Canada	0.25	8.1	0.03
England	0.52	8.5	0.06
Finland	0.21	3.1	0.07
France	0.40	2.8	0.14
Germany	0.44	5.7	0.08
Italy	0.23	2.0	0.12
Japan	0.73	2.1	0.35
New Zealand	0.50	8.0	0.06
Sweden	0.12	2.0	0.06
USA	0.47	10.0	0.05

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and medication are also important. Death rates are higher in disadvantaged, poorly educated and urban populations.

A useful measure when comparing outcomes of asthma care between countries is the ratio of the asthma mortality rate to the prevalence rate of severe asthma in each country. Bear in mind that there are difficulties in standardizing descriptions of severe asthma, and of obtaining age-matched data. The lower the ratio, the 'better' the asthma outcomes, as shown in *Table 5.1*.⁹

DEATH AND ADMISSIONS

5.4 What about hospital admission rates and deaths?

These rates have increased dramatically in the UK over the past 20 years, but are beginning to decline again from a peak in the early 1990s; the decline is for all age groups, but is especially marked for children and young adults, as shown in *Table 5.2*.¹⁰ *Table 5.3* shows the trends in hospital admission rates for different age groups between 1979 and 1999 in England and Wales.¹⁰

TABLE 5.2 Percentage change from 1979 to 1999 in admission and mortality rates for asthma in England and Wales

Age band (years)	HOSPITAL ADMISSIONS		MORTALITY	
	1999 rate (per 10 000)	Change from 1979 to 1999 (%)	1999 rate (per 10 ⁶)	Change from 1979 to 1999 (%)
0-4	58.3	+118	1.8	-40
5-14	18.2	+29	2.4	-37
15-44	9.0	+73	6.2	-43
45-64	8.9	+27	23.6	-38
65+	9.8	+49	110.2	+3

TABLE 5.3 Trends in hospital admission rates for asthma in adults and children, England and Wales 1979-1999

Age band (years)	Admission rate per 10 000 population							
	1979	1982	1985	1988	1991	1994	1997	1999
<i>Children</i>								
0-4	23	44	81	101	98	83	74	64
5-15	18	21	24	26	25	24	19	19
<i>Adults</i>								
15-44	5	6	8	10	10	10	9	9
45-64	7	9	12	11	10	10	9	9
65+	7	9	10	10	10	11	9	9

Also, the mortality rate in the UK has declined against a background of rising prevalence of asthma, so that the rate per 1000 diagnosed asthmatics has reduced substantially, especially in adults. *See also Q. 3.10.*

5.5 Why have asthma deaths declined in the UK?

The reduction in asthma deaths is widely considered to be due to improved asthma management, especially the more widespread use of inhaled steroids.

OUTCOME MEASURES

5.6 What outcome measures are important in asthma?

Clinicians and patients should aim for perfection in managing asthma. The overall aim should be to maintain perfect control of the disease and prevent any future problems. More specifically:

- no or minimal symptoms during the day and at night
- normal or best-possible lung function – peak expiratory fraction (PEF) or forced expiratory volume in 1 second (FEV₁)
- unimpeded, appropriate lifestyle with ability to exercise and work as easily as one's peers
- no or minimal need for medical input, especially urgently – this implies no acute episodes of asthma
- minimal use and need for relieving medication
- management, including medication, that is safe and minimally disruptive.

The mission statement of the Swindon Asthma Group states these aims succinctly:

'Every asthmatic should lead a normal life untroubled by their disease or its management.'

5.7 How can I assess my asthma management of individual patients?

The list of outcome measures is too long and vague to be a series of questions to patients. The Royal College of General Physicians¹¹ has formulated three questions as a means of rapidly assessing an asthmatic patient's control:

- Have you had any difficulty in sleeping because of your asthma or cough in the last week?
- Have you had any of your usual asthma symptoms (cough, wheeze, chest tightness or shortness of breath) in the last week?

- Has your asthma interfered with your your usual activities (work, school, exercise, chores) in the last month?

Although useful, these questions have not been fully validated and provide no information on the effect of these symptoms on the patient's overall well-being. It is the way in which a patient reacts and adapts to symptoms, rather than the symptoms themselves, that determine how having a chronic disease affects an individual.

5.8 Should I use quality-of-life questionnaires in my practice?

Various quality-of-life questionnaires are used in research projects, but their use for individual patients is time consuming. The information that these questionnaires give is not specific enough to allow evaluation of changes in management, but provides an overall assessment of well-being, so they are not often used in clinical practice.

5.9 What is the best way to assess my patients?

There is no formula or short cut that will be applicable to every patient. We are left with taking a personal history for each patient. We should try to include symptoms, loss of function, and reaction to the symptoms and management, concentrating on the factors that are most important to the patient.

5.10 What are the criteria of good asthma care?



The patient:

- is aware of their diagnosis
- is aware of what asthma is, and the principles of its management
- has continuing involvement in their asthma management, especially with regard to choice of inhaler device
- has minimal symptoms
- can sleep through the night
- can do whatever exercise and work is appropriate
- needs their relieving inhaler rarely or not at all
- can lead a normal lifestyle minimally troubled by either the asthma or its management
- has managed to eliminate or reduce any triggers with minimal or no disruption to their preferred lifestyle
- knows exactly how and when to recognize when their asthma is deteriorating, how and when to alter their own treatment, and how and when to call for help
- has their lung function monitored regularly (if appropriate and possible) and the FEV₁ shows no excess decline with age.

TALKING TO PATIENTS

5.11 How do I start with a newly diagnosed asthmatic?

At the initial appointment:

- register the patient
- measure height and weight
- explain the purpose of the clinic (it is not just for ill asthmatics)
- complete the summary or database card including past history, family history, current and past medications for asthma, allergies
- teach and check inhaler technique
- teach and check peak flow reading if appropriate
- assess the severity of asthma from the recent history, drug use and lifestyle
- identify triggers
- arrange a subsequent appointment for 1–2 weeks' time.

5.12 What should I cover at the next few appointments?

- Explore the patient's assessment of their disease.
- Explain about the disease and its management.
- Ask about symptom control. Be as specific as possible. Ask especially about days off work or school, night symptoms, exercise tolerance, and any limitations of daily living. Ask about the patient's partner's sleep disturbance by the patient's symptoms.
- Ask whether the patient can do all the things they would like to do.
- Ask them how often they need to use their reliever inhaler.
- Review the trigger factors and, if possible, their avoidance.
- Check peak flow readings if appropriate.
- Explain the concept of peak flow readings and prescribe a peak flow meter if appropriate.
- Make sure the patient knows how to recognize deterioration, how to respond, and how to call for help.
- Check the inhaler technique and adjust if necessary.
- Check compliance.
- Listen to the patient.
- Explain and educate if necessary.
- Arrange a follow-up appointment.

5.13 What should I cover at subsequent appointments?

Subsequent appointments should cover:

- symptom control
- inhaler technique

- compliance with drugs
- patient's confidence about when to increase treatment, how to do it, and when to call for help
- answer any questions
- enquire about how asthma and its management may be affecting the lifestyle of the asthmatic.

5.14 Which primary care clinician should manage asthma?

General practice in the UK is able to provide comprehensive personal, family and community care that includes chronic disease management, as the primary healthcare team provides a wide range of care.

THE PRACTICE NURSE

Properly supported and trained practice nurses can manage the majority of patients with asthma in primary care; in the UK the bulk of this care is provided by the nurses. To be effective, nurses do need ongoing training and updating, and the support of their general practitioner and managerial colleagues.

THE COMMUNITY OR DISTRICT NURSE

Community nurses can be aware of potential asthmatics in the community who may not have been diagnosed. They can also be aware of 'neglected' asthmatics who have not been reviewed or seen for their asthma for some time. They are in a unique position for assessing many housebound patients who are known to be asthmatic or who might have asthma. Alternatively, some community nurses may be able to assess the patients themselves, especially if the nurse has been properly trained and supported; such nurses can fulfill the same role as the practice nurse in the asthma clinic, but working in the patient's own home.

THE HEALTH VISITOR

Health visitors regularly see new babies and their mothers, as well as providing ongoing care and assessment of, especially, the under-fives in either their own home or health visitor clinics. They are therefore in the good position to advise mothers of young children on the management of any child's asthma, and on primary and secondary prevention.

THE COMMUNITY MIDWIFE

Like the health visitor, the community midwife is in an excellent position to provide ongoing care, advice and education to known asthmatic mothers or mothers-to-be.

THE SCHOOL NURSE

The school nurse can provide ongoing support and education to any known asthmatics at the school. She can also advise and educate teachers on asthma and its treatment, so that children who are having symptoms at school can be properly and adequately treated with minimal disruption to either the child or the rest of the class.

THE PAEDIATRIC LIAISON NURSE

This type of nurse is employed by some Trusts or health authorities to liaise between the hospital paediatric department and primary care. Her role is one of facilitating seamless care between primary and secondary providers. She can provide ongoing support and education for patients and their families. She can also check on inhaler technique and compliance.

PHYSIOTHERAPISTS

Physiotherapists in the community can help with the education, compliance and inhaler technique of known asthmatics.

PHARMACISTS

Pharmacists can have a role in the care of asthma, both by supplying medicines and by advising and motivating patients. Pharmacists also have a role in advising asthmatic patients on the unsuitability of treating their symptoms with proprietary cough and cold mixtures. They can encourage patients to seek professional medical help if their symptoms are deteriorating.

PRACTICAL MANAGEMENT

5.15 It all sounds quite easy in theory, but in practice I've got lots of asthmatics whose asthma is difficult to control. Can you advise me on managing different types of difficult asthma?



Asthma management is logical and usually straightforward, but we all have patients who have asthma that is difficult to control. It is probably easier to consider the components of managing asthma, and then to apply these components to various categories and types of patient.

There are five major steps in managing asthma in primary care.

1 The diagnosis

- The diagnosis must be suspected and proven.
- The diagnosis must be agreed and accepted by the members of the primary healthcare team, the patient and the patient's carers (if appropriate).

- Other possible diagnoses should also be considered in each case, and steps taken to differentiate the diagnosis as accurately as possible.

2 Triggers

- For each asthmatic, the triggers for their asthma must be identified if possible.
- Avoidance of any likely triggers should be discussed and, if feasible and agreed to be worthwhile by both the patient and the doctor or nurse, appropriate avoidance measures should be agreed and undertaken.

3 Drug treatment

- Particular attention must be placed on each patient using the most appropriate *device* that they are happy and able to use. Ideally each patient should be able to take all his or her medication by using one form of device, although sometimes a different device may be needed for use away from home.
- No drug is effective unless taken correctly and so the correct *technique* of using the device should be checked regularly.
- Some patients may need to change their devices, depending on their changing circumstances. For example, a device that was suitable for a small infant may be less suitable once the child starts school.

4 Self-management plans

- Each patient should be capable of monitoring the severity of their own asthma, either by recognizing changes in their symptoms or by additionally using peak flow measurements. The patient must then be capable of knowing how and when to increase treatment, and how and when to call for help.
- These self-management plans can be successful only if there is good education of the patients by members of the primary healthcare team regarding asthma and its management. Other essential platforms of successful asthma management are good compliance with the treatment regimens and good inhaler technique.

5 Sharing

- Management of asthma is dependent on agreement between a patient and their carers within the primary healthcare team. Often, further sharing of management will be needed with secondary care. The patient will also need to share their management with their immediate family, and often with their school or workplace.

These five bases provide the framework for the successful management of asthma. More specific details of particular problems that may be encountered in primary care when managing asthma will now be discussed, using the five bases as a common framework.

Most problems in managing asthma are due to poor education, poor sharing of knowledge, skills and attitudes, and subsequent undertreatment. Asthma continues frequently to be undertreated, suggesting continual opportunities to reduce its morbidity by the more consistent application of existing guidelines.

ASTHMA MANAGEMENT: INFANTS (0–2 YEARS)

5.16 How can I diagnose asthma in this age group?

The diagnosis is usually based on recurrent coughing, especially at night, either in the absence of upper respiratory tract infection, or that is disproportionate to the severity of the infection, or cough that persists for more than a few days beyond the coryzal episode. The younger the child, the more difficult it is to make the diagnosis. A positive response to bronchodilator treatment will strongly support the diagnosis, especially if the success is repeated. Be more suspicious if the child has a strong family history of atopy. Be wary of infants who may have asthma-like symptoms but who were born prematurely, or were intubated, especially if they were also ventilated and spent time in a special care baby unit after birth. It is probable that such children are more at risk of developing asthma in later infancy, but they may also have upper airway stenosis or bronchopulmonary dysplasia. Be mindful also that the child may have croup, bronchiolitis or whooping cough, the latter being more likely in unvaccinated children. Some infants may have acid reflux that presents purely as a cough, which may be worse at night. A rarer but important differential diagnosis is cystic fibrosis. The sudden onset of symptoms should make one suspect an inhaled foreign body. *See also Q. 2.3 & Q. 2.29.*

5.17 What triggers are relevant when managing asthma in infants?

The most common trigger is upper respiratory tract infection. The role of the house dust mite is probably also very important. Contact with family pets should be avoided if at all possible, and on no account should the family pet be allowed into the child's bedroom at any time. No child at any age should be exposed to cigarette smoking, and the parents should be strongly encouraged to stop smoking and to realize that it is not acceptable just to agree to smoking 'not in front of the baby'.

5.18 What medication should I use in infants with asthma?

BRONCHODILATORS

Inhaled short-acting β_2 -agonists as needed are the first-line therapy. Response to bronchodilators may be very variable. There is little evidence that anticholinergic drugs are superior bronchodilators in infants.

INHALED STEROIDS

Long-term anti-inflammatory treatment with inhaled corticosteroids may not always be needed, and it is still not certain that inhaled corticosteroids alter the natural history of asthma in this age group. While there is increasing evidence that inhaled steroids should be started and maintained in the long term – as soon after diagnosis as possible in established asthma – there is still some concern about the effects of long-term inhaled steroids on the development of the lungs in very small infants, especially in the first 6 months of life. Referral for a second opinion from a paediatrician with an interest in asthma may be advisable before committing small infants to long-term inhaled steroids. The younger the child, the greater the need for a second opinion.

DEVICES

To deliver inhaled therapy, small infants require a large-volume spacer plus face mask, held vertically so as to allow the valve to open and remain open. If the parents and infant cannot manage the spacers, a nebulizer can be tried. Be aware that paroxysmal bronchoconstriction can occasionally occur with nebulized bronchodilators.

5.19 Should infants have a management plan?

The type and duration of treatment needed in infants will depend entirely on each infant's response to the treatments. There are no objective assessments of airway obstruction in small infants that can easily be used by parents or general practitioners. In general, most infants can be managed by using short courses of inhaled short-acting bronchodilators on an as-required basis using a large-volume spacer, but parents and carers will need to know how to recognize deterioration (usually increased cough, especially at night, reluctance to feed, rapid respiration and fretfulness) and to seek help if they suspect any deterioration.

5.20 What should I tell parents when I suspect a diagnosis of asthma in their infant?

All parents naturally want their children to be perfectly healthy and may resist a diagnosis of a chronic, incurable disorder. However, many parents may already have considered the diagnosis themselves, and many will be relieved that there is an explanation for their child's symptoms and that they have a treatable condition. When considering the diagnosis of asthma in this age group, share the uncertainty with the parents and explain the difficulties of making a firm diagnosis. Explain to them that response to treatment is one of the pillars of diagnosis and that is why it is best to treat before a firm diagnosis is made (indeed it is often inevitable). Explanation

and education about asthma is always important, particularly for parents of very young children. Frequent reviews of the baby and parents will be necessary, especially initially.

5.21 When should I refer an infant with asthma?

- Be especially ready to refer babies to a paediatrician if there is any doubt about the diagnosis or management.
- Refer all babies under the age of 6 months for assessment, and also any child who has spent time in a special care baby unit, especially if the baby was ventilated or premature.
- Refer before starting an infant on long-term inhaled steroids. Unless you are quite experienced and confident, giving a course of oral steroids to young babies as a diagnostic test is probably best left to specialists.
- Be prepared to discuss the baby's asthma and its management, with parental permission, with crèche workers, nannies or childminders, if appropriate.

ASTHMA MANAGEMENT: TODDLERS AND PRESCHOOL-AGED CHILDREN

5.22 How can I diagnose asthma in this age group?

The main symptoms in children of this age are coughing, especially at night, or symptoms with or following a cold that persist for more than a few days after the cold has finished. Children are generally well otherwise and do not have failure to thrive or gastrointestinal symptoms. Peak flow readings are not sufficiently reliable in this age group.

The main differential diagnoses in this age group are simple cough with upper respiratory tract infection, croup, bronchiolitis, whooping cough (especially in the unvaccinated) and persistent postnasal drip. Other possible diagnoses include recurrent gastro-oesophageal reflux with aspiration and chronic upper respiratory tract infections. A rarer but important differential diagnosis is cystic fibrosis. The sudden onset of symptoms should make one suspect an inhaled foreign body. *See Q. 2.29.*

5.23 What triggers are relevant when managing asthma in preschool-aged children?

Identification of likely triggers is usually obtained by taking a careful history. Colds, upper respiratory tract infections and exercise are the commonest triggers. Many asthmatic children have atopy; many are allergic to the house dust mite and a smaller number to animal dander. It is reasonable to give all children and their parents some basic advice on

reducing exposure to house dust mite and animal dander by, for instance, not allowing pets into the bedroom at any time, and giving general advice about buying new mattresses, damp-dusting bedrooms and avoiding dust in general. More intensive anti-house dust mite avoidance is more expensive and time consuming, and needs individual assessment with regard to the benefits and costs. General advice about avoiding pollens if the asthma is seasonal is usually fairly straightforward. Skin prick tests can be used in children but are seldom available in the UK, and the tests are not as important as a close and careful history. The results of skin prick tests may sometimes be misleading and may not help with clinical management at all. No child should ever be exposed to cigarette smoke.

5.24 What medication should I use in preschool-aged children with asthma?

All pre-school children with asthma require a short-acting bronchodilator. Most need regular inhaled steroids for control and the prevention of future problems. A small number require third-line agents:

- inhaled long-acting β_2 -agonists (licensed only for children aged 4 years or more)
- leukotriene receptor antagonists (LTRAs), especially if exercise seems to be a major trigger
- oral theophyllines, usually slow-release and low-to-medium dose (beware side-effects, which are common)
- high-dose inhaled steroids
- oral long-acting bronchodilators

The best inhaler devices for preschool-aged children are the large-volume spacers. Smaller children need the mask attachment, and the spacer should be held vertically to keep the valve open. As children grow older, they can discard the mask. Devices for children are shown in *Table 5.4*.

TABLE 5.4 Device selection for children

Age (years)	Inhalation delivery system
< 2	Large-volume spacer plus mask with metered-dose inhaler Nebulizer
2–4	Large-volume spacer with metered-dose inhaler Nebulizer for emergencies
4–8	Dry powder devices Large-volume spacer with inhaler for emergencies
> 8	Dry powder devices Metered-dose inhaler Breath-actuated inhaler

5.25 Should preschool-aged children have a management plan?

Some children of preschool age who have asthma can be well maintained by using short-acting bronchodilators intermittently, with more regular use in response to upper respiratory tract infections. Most children will need long-term preventive treatment as well. Parents should know when to increase the treatment, usually in response to an increase in symptoms or to a cold or other upper respiratory tract infection.

5.26 What should I tell parents when I suspect a diagnosis of asthma in their preschool-aged child?

Often the diagnosis is received with some relief by parents, who may have felt for some time that something was amiss with their child. Share the diagnosis and emphasize that there are safe and effective treatments for asthma (rather than the multiple courses of antibiotics that the child may have been given in the past).

5.27 When should I refer a preschool-aged child with asthma?

Referral to a paediatrician is again advisable if:

- there is diagnostic uncertainty
- the asthma is proving difficult to control
- before contemplating long-term high-dose inhaled steroids
- there is significant co-morbidity (such as heart disease, cystic fibrosis, metabolic disorder).

**ASTHMA MANAGEMENT: SCHOOL-AGED CHILDREN
(5–14 YEARS)**

5.28 How can I diagnose asthma in this age group?

As children get older, the diagnosis becomes more straightforward. Many children present with episodic wheeze, cough, breathlessness and chest tightness (children often complain that their chest hurts or aches), especially on exertion and at night.

The differential diagnosis includes recurrent gastro-oesophageal reflux with aspiration and chronic upper respiratory tract infections. Acute bronchitis may occasionally occur. Even children at primary school can inhale foreign bodies.

5.29 What triggers are relevant when managing asthma in school-aged children?

- By the time children go to school, the identification of likely triggers from taking a careful history is usually more straightforward.

- As with all children, avoidance of tobacco smoke is imperative.
- Pets should not be allowed into the bedrooms.
- General methods to reduce house dust mites are probably reasonable to suggest, especially if the child is atopic.
- Skin prick testing can be used with the same proviso as discussed above (*see Q. 2.20 & Q. 5.23*).

5.30 What medication should I use in school-aged children with asthma?

BRONCHODILATORS

All children should have ready access to inhaled short-acting β_2 -agonists. Most children will require regular, long-term inhaled steroids (<400 $\mu\text{g}/\text{day}$). A smaller number will also require one or more of the following (in order):

- 1 Inhaled long-acting β_2 -agonists
- 2 Oral LTRAs, especially if exercise is a major trigger. If compliance with inhaled therapy is irredeemable, LTRAs can be used as sole therapy. This strategy is commonly used in the USA but European clinicians are less keen, and are wary of denying children the long-term benefits of inhaled steroids.
- 3 Oral theophyllines (beware side-effects; use low to medium doses)
- 4 High-dose inhaled steroids (400–800 $\mu\text{g}/\text{day}$)
- 5 Oral long-acting β_2 -agonists

DEVICES

Although metered-dose inhalers (MDIs) with large-volume spacers are the cheapest and most effective option, children naturally find them too bulky to carry to school. They could use them for their twice-daily medication at home, with a second device for their as-needed bronchodilator, but most children will prefer to use all their medications using the same type of inhaler device. Choose the device with the child, and be aware of which devices currently and locally carry the most prestige. Most dry-powder devices are suitable and many children can use breath-actuated MDIs. Even children as young as 5 years can safely be left in charge of their own inhalers, as long as they are suitably instructed. Devices for children are shown in *Table 5.4*.

5.31 How can I help my asthmatic children manage their asthma at school?

Many children's asthma will be well controlled by regular inhaled steroids taken at home, and they will not have any symptoms in school. However, a significant number will have problems, especially with exercise, and may relieving treatments. Children should, unless there are compelling reasons

against, always have access to their own relieving inhalers and be allowed to use them when they feel the need. Children and parents will need guidance on this from their doctor or nurse.

5.32 How can I help teachers to help my asthmatic patients at school?

- Liaison with the teachers and school nurse may be desirable or necessary, and an agreed policy on allowing asthmatics access to their own medication may be needed.
- Teachers at school should have access to a large-volume spacer with a metered-dose short-acting bronchodilator that can be used for any child who is having acute symptoms. A protocol may need to be agreed by the school or education authority and the local health authority or community health services, involving local primary healthcare teams and school nurses as well as teachers.
- Teachers will need teaching so they find asthma less confusing and frightening, and they are able to offer their asthmatic pupils the most appropriate help and support.
- Asthmatic children should be encouraged to join in all activities and sports, and must not be stigmatized or discriminated against.

5.33 Should school-aged children have a management plan?

By the time a child attends primary school, he or she should be involved with the education about their disease and should be an active participant in discussing its management. As children grow older, they should take increasing responsibility for managing their asthma and for their own compliance.

Simple plans should be agreed verbally, more complex ones written down. Examples of plans are shown in *Figs 4.2 & 4.3*.

5.34 When should I refer school-aged children with asthma?

Referral to a paediatrician is again advisable:

- if there is diagnostic uncertainty
- if the asthma is proving difficult to control
- before contemplating long-term high-dose inhaled steroids
- if there is significant co-morbidity (such as heart disease, cystic fibrosis, metabolic disorder).

ASTHMA MANAGEMENT: TEENAGERS WITH ASTHMA

5.35 How can I diagnose asthma in this age group?

Asthma is the most common chronic disease of adolescence. Most teenagers with asthma have the condition diagnosed as primary school or preschool

children. However, asthma can begin at any age and the teenage years are no exception. Often, asthma first presents with exercise-induced symptoms, and it is during the teenage years that many children begin to exercise more competitively or vigorously. Older teenagers will present with coughing, wheeze, shortness of breath and chest tightness, just like adult asthmatics.

Many teenagers are reluctant to accept a new diagnosis of asthma or that their continuing respiratory symptoms are due to continuing childhood asthma, especially if they have been erroneously promised that they will 'grow out of it'.

The main differential diagnoses are postnasal drip or persistent upper respiratory tract infection, including chronic sinusitis.

5.36 What triggers are relevant when managing asthma in teenagers?

- Trigger identification and avoidance are similar to measures advised for younger children.
- Actively discouraged smoking.
- Avoidance of passive smoking in the home is also advisable, but it can be more difficult for adolescents to avoid passive smoking in pubs, clubs or discos.
- Anecdotal advice that illicit drugs such as marijuana can benefit asthma should never be condoned as part of the conventional treatment of asthma. Most marijuana is taken mixed with tobacco, so is bound to be damaging to the lungs.
- Many teenagers will begin working either as part of their work experience or after leaving school, and will be exposed to new triggers and allergens in the workplace. Again, a careful history is required in each case to help identify any work-related asthma. Management of occupational asthma is discussed more fully in [Q. 5.65](#).

5.37 What medication should I use for adolescents with asthma?

BRONCHODILATORS

All patients should have ready access to inhaled short-acting β_2 -agonists. Most will require regular long-term use of inhaled steroids (<400 $\mu\text{g}/\text{day}$ rising to 800 $\mu\text{g}/\text{day}$ in older adolescents). A smaller number will also require one or more of the following (in order):

- 1 Inhaled long-acting β_2 -agonists
- 2 Oral LTRAs, especially if exercise is a major trigger. If compliance with inhaled therapy is irredeemable, LTRAs can be used as sole therapy. This strategy is commonly used in the USA, but European clinicians are less keen, and are wary of denying children the long-term benefits of inhaled steroids.

- 3 Oral theophyllines (beware side-effects; use low to medium doses)
- 4 High-dose inhaled steroids (800–2000 µg/day in older adolescents)
- 5 Oral long-acting β_2 -agonists.

DEVICES

Any of the inhaler devices is suitable, as long as the patient can use it correctly. Choose with the patient, taking into account which devices are currently trendy, but also the shape and size of the device and how easy it is to use unobtrusively.

5.38 Should adolescent asthmatics have a management plan?

Yes:

- Good control avoids the embarrassment of symptoms or having to use treatments in public. Adolescence is a difficult enough time for most of us, without any additional burden from a chronic disease or its management.
- It is especially important to involve all adolescents in managing their own disorder.
- Do not assume that all adolescents are hostile to their diagnosis or its management, or that they will deny they have asthma, but be aware that these are always possibilities.
- Be aware that poorly controlled asthma in this age group may *not* be simply the result of adolescent rebellion and poor compliance.
- Simple plans should be agreed verbally, more complex ones written down. Examples of plans are shown in *Figs 4.2 & 4.3*.
- The responsibility for asthma management needs to be transferred during adolescence from the family to the individual. We can help facilitate this transfer by treating the adolescent appropriately: partly as an adult when needed and partly as a child when needed.

5.39 When should I refer an adolescent with asthma?

Referral to a paediatrician or adult physician is advisable if:

- there is diagnostic uncertainty
- the asthma is proving difficult to control
- before contemplating long-term high-dose inhaled steroids
- there is significant co-morbidity (such as heart disease, cystic fibrosis, metabolic disorder).

Some hospitals have special clinics for adolescent asthmatics; others may have 'change-over' clinics where older children requiring long-term follow-up can be transferred to an adult physician by the paediatrician.

ASTHMA MANAGEMENT: ADULT ASTHMA

5.40 How can I diagnose asthma in adults?

Many children with asthma lose their asthmatic tendency as they get older, and many will be completely asymptomatic by the time they reach early adult life. However, it is likely that most of these adults will still have a tendency towards asthma and they should be aware that any recurrence of respiratory symptoms in later life may well be due to asthma.

Any adult who develops cough, wheezing, shortness of breath or chest tightness that is episodic and that may follow a cold or other trigger exposure may well have asthma – and probably does if they had asthma as a child.

Asthma can occur *de novo* at any age. The childhood asthmatic who has ‘grown out of it’ is especially vulnerable as they may deny that the recurrence of their symptoms could possibly be due to asthma. They may therefore ignore the symptoms and seek help or intervention at a late stage.

The differential diagnosis is of upper or lower respiratory tract infections, postnasal drip, pneumothorax, heart failure, sarcoidosis or tuberculosis. See Q. 2.4 & Q. 2.36.

5.41 What triggers are relevant when managing asthma in adults?

Triggers that were important in childhood asthma may not necessarily be the same ones that are implicated in the later re-emergence of symptoms. Cigarette smoke should be avoided by everybody, but especially those adults who had childhood asthma.

Triggers are, as always, usually identified by taking a careful history. Skin prick tests can occasionally be useful. Most adult-onset asthma is intrinsic rather than atopic. Anti-house dust mite measures are much less likely to be helpful in adult-onset asthma.

5.42 What medication should I use for adults with asthma?

All adult asthmatics require an inhaled short-acting bronchodilator and they nearly all require regularly inhaled steroids (< 800 µg/day). A majority will also require regular inhaled long-acting β_2 -agonists. A minority also require one or more of the following:

- oral LTRAs
- high-dose inhaled steroids (800–2000 µg/day)
- oral theophyllines
- oral long-acting β_2 -agonists.

The choice of inhaler device depends greatly on the individual patient, but most adults are capable of using most devices. MDIs are the cheapest and are the universal device, but not all asthmatics can use them perfectly.

5.43 Should adult asthmatics have a management plan?

All should have a basic action plan so that they know how to recognize deterioration, how and when to alter their own management, and how and when to call for help. Some will need a more complex, written agreed plan (see *Figs 4.2 & 4.3*).

All will require a good understanding of their disorder and its management in order to achieve perfect control and good compliance. Good education is again the key.

All asthmatics should be reviewed at least annually when their self-management plan should be revised and agreed, and their inhaler technique checked.

5.44 When should I refer an adult with asthma?

If:

- there is diagnostic uncertainty
- the asthma is proving difficult to control
- long-term high-dose inhaled steroids are being contemplated
- there is significant co-morbidity (such as heart disease, other respiratory diseases, metabolic disorder).

ASTHMA MANAGEMENT IN PREGNANCY

5.45 What happens to asthma in pregnancy?

Asthma is a common condition affecting people of all ages, including women of reproductive age. Pregnancy is also common, especially in women aged between 15 and 45 years. It follows that many asthmatics will get pregnant. If a pregnant woman who is a known asthmatic develops respiratory symptoms in pregnancy, the chances are that the symptoms are due to asthma. However, care must be taken that the woman has not got left ventricular failure or pneumonia, either of which need prompt and proper treatment, and can cause problems for the mother and fetus if adequate treatment is delayed. Valvular heart disease may only become apparent for the first time during pregnancy as a result of the extra cardiovascular strains that the condition imposes.

Some asthmatic women will find that pregnancy worsens their asthma, some that it improves it, and some that it makes no difference.

5.46 What triggers are relevant when managing asthma in pregnancy?

The triggers for asthmatic pregnant women are no different than for other asthmatics. It may well be that trigger avoidance during pregnancy by

mothers whose babies are at a high risk of developing asthma may be particularly beneficial, especially if the trigger avoidance continues for the baby after birth.

5.47 What medication should I use for pregnant women with asthma?

All the drugs used to treat asthma, which are given by inhalation in usual doses, are completely safe right through pregnancy, from preconception until the puerperium. The dangers to the fetus of poorly controlled asthma, and especially of hypoxia, far outweigh any problems with any of the drugs.

Even the use of systemic corticosteroids has not been shown to cause great problems, unless taken in high dosage throughout the pregnancy or as frequent courses, when they may be associated with decreased birthweight of the baby. However, this risk is probably less dangerous than the possible hypoxia that may result from poorly controlled asthma.

High-dose β_2 -agonists can inhibit uterine contractions, but this is not clinically relevant if they are given by inhalation. There are too few data to establish the safety of leukotriene receptor antagonists in pregnancy or with breast-feeding.

If possible, avoid oral medication, especially oral long-acting β_2 -agonists and theophyllines.

5.48 Should pregnant asthmatics have a management plan?

Self-management plans should be agreed and followed in pregnant women in exactly the same way as if the woman was not pregnant. If anything, the threshold for increasing therapy should be lowered, as it is better to overtreat than to undertreat asthma during pregnancy. Obviously, inhaler technique and the self-management plan should be reviewed throughout the pregnancy and puerperium.

Patients with inadequate inhaled anti-inflammatory treatment during pregnancy run a higher risk of suffering an acute attack of asthma than those receiving treatment with an adequate dose of anti-inflammatory agent. If an acute attack of asthma should occur, prompt and early treatment does not have serious effects on the pregnancy, delivery or health of the newborn infant.

Breast-feeding should make no difference to the type or quantity of medication.

5.49 When should I refer a pregnant woman with asthma?

The management of pregnant asthmatics should be along the same lines as that for non-pregnant women. Advice may be needed from a respiratory physician and obstetrician from time to time. The midwife must also be

involved, and she has a key role in reinforcing the importance of compliance with preventive treatment, and in promptly recognizing and treating any deterioration. It is important to continue treatment in the puerperium.

MANAGING BRITTLE ASTHMA

5.50 What is brittle asthma and how can I diagnose it?

Brittle asthma refers to asthma in patients who suffer repeated life-threatening asthma attacks. There are two types of brittle asthma:

- *Type 1* – Such patients have recurrent asthma attacks on a background of widely variable peak flow readings (more than 40% diurnal variation on most days) despite maximal medical therapy. Type 1 brittle asthma is three times more common in women than in men. Many patients have complex psychosocial problems and have often experienced sexual or physical abuse. Some patients may hyperventilate in response to worsening asthma.
- *Type 2* – Such patients suffer an attack of asthma that becomes severe within minutes or hours, despite having little instability in their asthma in the preceding days or weeks. Indeed, such patients may have absolutely no symptoms attributable to asthma in the interim, and may have steady and good peak flow readings. This type is equally common in men and women, and there is not usually any underlying psychiatric or psychological morbidity.

Type 1 brittle asthma is more common than type 2, but both types are rare. The diagnosis is based solely on the history and peak flow readings.

5.51 What triggers are relevant when managing brittle asthma?

Patients with type 1 brittle asthma are usually strongly atopic but choose not to avoid any allergens. They usually smoke and keep dogs and other pets.

Triggers in patients with type 2 brittle asthma can be difficult to identify, but if identified they should be avoided vigorously.

Skin prick testing may be particularly useful in these patients. They need to avoid any likely triggers and, if such triggers can be shown to be more likely by skin prick testing, this will help with more specific avoidance. Of course, such avoidance may not always be practical, or possible.

5.52 What medication should I use in patients with brittle asthma?

TYPE 1

Patients will often be on many drugs, many at high or heroic doses, including high-dose, long-term oral steroids. The patients often change the

doses of all or some of their drugs, not necessarily logically or in proportion to their symptoms or peak flow readings (which are often not taken). Drugs and doses should be reviewed regularly and the dosage of oral steroids kept to the minimum necessary. Continuous subcutaneous terbutaline may rarely be of help, preferably after an inpatient double-blind trial with clearly defined objective criteria of efficacy. Respiratory physiotherapy may help with control of breathing, as may relaxation exercises.

TYPE 2

Patients should always have an easily accessible supply of a suitable bronchodilator inhaler, which they are happy and able to use. Ideally they should also have a large-volume spacer available. In addition they should have a supply of oral steroids, preferably not enteric-coated, for emergency use. They may need duplicate supplies of the bronchodilator inhalers and the oral steroids so that they have access at home, at work and, for instance, in the car. A Medic-Alert bracelet or equivalent is a good idea.

5.53 Should patients with brittle asthma have a management plan?

TYPE 1

These patients often react erratically and inconsistently to events and are poor at anticipating or predicting deterioration. Written self-management plans should regularly be reviewed and agreed. Some form of bargaining and subsequent contract-making between patient and clinician should be attempted. Criteria for self-admission need to be agreed with the patient and hospital.

TYPE 2

The patient's chronic asthma must be optimally managed at all times. At the first inkling of the beginning of an attack, the patient should call for help. He or she should then immediately take high-dose inhaled short-acting β_2 -agonists, ideally 20 to 50 puffs via a large-volume spacer, or 5 mg via a nebulizer. The patient should also take 30–60 mg prednisolone immediately and go straight to the nearest hospital.

If previous attacks have been very severe, the patient should self-inject adrenaline subcutaneously or intramuscularly, having been previously instructed in how to do this by the practice nurse or general practitioner, and attend the nearest accident and emergency department, even if there is apparently full recovery. The patient will need to be monitored fairly regularly, and their ability to recognize the early signs and to respond promptly should be regularly revised.

5.54 When should I refer a patient with brittle asthma?

All patients with brittle asthma should be managed jointly by the primary healthcare team and a respiratory physician. The patient's family, carers and colleagues at work should all be aware that the patient may have sudden catastrophic asthma and they should know how best to help. In some cases this may mean just calling the ambulance and allowing the patient to administer their own medication; in other cases help may be needed in injecting adrenaline or using a nebulizer.

Type 1 brittle asthma sufferers have complex problems. Medical management is often complicated by poor compliance. Management must be holistic, with attention paid to the roles of diet (often low in vitamins A, C and E, and in trace elements) and exercise. Psychological help is often needed, but not always wanted.

Brittle asthma, understandably, is the cause of great anxiety to patients and their relatives and carers.

MANAGING MIXED OBSTRUCTIVE AIRWAY DISEASE

5.55 What is mixed obstructive airway disease?

This phrase describes patients who have a mixture of chronic obstructive pulmonary disease (COPD) (either emphysema, chronic bronchitis or both) and asthma. 'Pure' COPD implies airway obstruction that is irreversible, as opposed to the reversible or partially reversible airway obstruction that occurs in asthma. In practice, many patients will have a mixture of COPD and asthma. Such patients are often said to have partially reversible COPD. There is considerable overlap between COPD and asthma.

5.56 How can I diagnose mixed obstructive airway disease?

COPD has been defined as a chronic, slowly progressive, disease characterized by reduced maximum expiratory flow and slow forced emptying of the lungs – features that do not change markedly over several months. Airflow obstruction is relatively fixed but bronchodilator therapy may result in some improvement. COPD normally comes on in late middle age and affects men more than women. In the UK nowadays it is a common complication of smoking, and is rarely seen in lifelong non-smokers. The breathlessness and coughing is usually insidious in onset and is far less episodic than 'pure' asthma. With COPD, there will be not only reduced peak flow readings but also reduced FEV₁ readings. Even after treatment with inhaled bronchodilators or oral steroids, FEV₁ or peak flow readings will not return to their theoretical normal value, and the improvement will be less than 15%. With COPD extensive pulmonary damage has usually occurred before a patient is aware of any symptoms. The structural changes

that occur in the lungs in COPD are irreversible, although their progress can be slowed or halted. This is in contrast to 'pure' asthma, where the anatomical changes in the lungs are far less marked and are less likely to be permanent unless the asthma has been poorly treated or is very severe over a long period of time.

The symptoms of COPD may mimic those of asthma. Both can cause wheezing, shortness of breath, chest tightness and cough. In asthma, however, the symptoms are usually paroxysmal or episodic and are often worse at night, whereas in COPD they tend to be much more chronic, usually begin with exertional breathlessness and morning cough, and do not usually affect sleep. The differential diagnosis between these two disorders can be difficult, and there is often some degree of overlap. The main differentiating feature between COPD and asthma is the lack of reversibility in peak flow or FEV₁ in response to treatment. *See Q. 2.39.*

5.57 What triggers are relevant when managing mixed obstructive airway disease?

COPD is caused almost exclusively by cigarette smoking. Cigarette smoking can certainly exacerbate asthma and make the asthma more difficult to control. Patients with COPD who give up smoking will prevent further decline in lung function and further anatomical deterioration in the lungs.

Common triggers in mixed obstructive airway disease are the same as those for asthma. Exercise is normally a very potent trigger, as is cold air. Dust and smoky atmospheres may exacerbate the airway obstruction, but exposure to house dust mite and other allergens is rarely of clinical importance.

5.58 What medication should I use in mixed obstructive airway disease?

- Patients with mixed obstructive airway disease nearly always benefit from regular bronchodilators taken by inhalation.
- Anticholinergics are more useful for patients with mixed obstructive airway disease in many cases, because the cholinergic tone is the main reversible component in COPD. There is often an additive effect between anticholinergics and short-acting β_2 -agonists.
- Long-acting β_2 -agonists can be of help for persistent night-time or exercise-induced symptoms where some reversibility has been demonstrated.
- Theophyllines may help some patients.
- Some patients with mixed obstructive airway disease benefit from the regular use of inhaled steroids. A steroid trial should be given and the FEV₁ and peak flow should be measured before the trial begins. A 3-week course of high-dose steroid should be given and respiratory

function monitored during and after the course. If there has been an improvement in the peak flow or FEV₁ of more than 15%, the management should be as for asthma. If there is no reversibility and the patient does not feel any symptomatic improvement, there is little point in continuing with the inhaled steroids. If there is objective improvement of FEV₁ or peak flow of 0–15%, and the patient feels symptomatically better, long-term inhaled steroid therapy may be justified. However, no effect from long-term inhaled steroids on lung function and responsiveness will be usual.

- The best device for people with mixed obstructive airway disease is one that they are able and happy to use.
- Large-volume spacers are often the most efficient way of delivering treatment for patients with COPD.
- Trials of nebulization should be given only when all other inhaler devices have not produced maximal symptomatic or peak flow improvements, and only when monitored by regular peak flow (preferably) FEV₁ measurements. Failure of improvement in the FEV₁ despite regular nebulizations probably means that their continuation is an unjustified expense.
- *See Q. 2.40.*

5.59 Should patients with mixed obstructive airway disease have a management plan?

Patients with mixed obstructive airway disease should receive the same education, support and follow-up as patients with 'pure' asthma. Compliance with therapy, and especially with giving up smoking, is very important. These patients may need antibiotics for acute infective exacerbations.

5.60 When should I refer patients with mixed obstructive airways disease, or should I manage them in my asthma clinic?

Patients with an asthmatic component to their COPD should receive the care similar to those with 'pure' asthma. There are now good guidelines for the management of COPD,¹² and patients with 'pure' COPD should *not* be seen in the asthma clinic. The poor response of these patients to therapy can be dispiriting to those setting up asthma clinics and to the patients themselves and their families. However, they should receive appropriate care and follow-up from within both primary and secondary care.

Although it may be inappropriate to manage patients with COPD in the asthma clinic, do not dismiss them completely. A diagnosis of emphysema or chronic bronchitis is usually not well received and such patients' self-esteem and self-confidence can be further demoralized if they are told that their illness is all their own fault for smoking. It is important to remove

such patients from the asthma clinic tactfully and to offer alternative care, support and management, preferably from within the primary healthcare setting.

Good management of patients with mixed obstructive airway disease is challenging. Many patients will be also under the care of a respiratory physician, especially those who may require or who have required hospital admissions for acute exacerbations.

MANAGING OCCUPATIONAL ASTHMA

5.61 What is meant by occupational asthma?

Occupational asthma is asthma due to causes and conditions attributable to the particular occupational environment and not commonly found outside the workplace. Thus occupational asthma excludes bronchoconstriction induced by irritants such as exercise and cold air, even though these may also be encountered at work. *See also Q. 1.14.*

5.62 How common is it?

Occupational asthma is the most common occupational respiratory ailment, and accounts for about 25% of all such cases. There are two main forms. The first is when asthma occurs after a latent period of exposure, and the second when there is no such latency but usually in response to a high concentration of irritant. Between 2% and 6% of workers will be affected, which corresponds to about 50 cases per million working people per year.

The epidemiology of occupational lung disease in Britain has been greatly enhanced by the Surveillance of Work-related and Occupational Respiratory Disease (SWORD) Project, which was established in 1989 and is sponsored by the Health and Safety Executive. Occupational and respiratory physicians are invited to report new cases of occupational lung disease with the suspected agents. The data are analysed and the results published annually.¹³

5.63 What are the most common causes of occupational asthma?

In the UK there are more than 200 known respiratory sensitizers, and more are identified each year. Some sensitizers may not be immediately obvious. The major causes of occupational asthma and the groups at risk are shown in *Table 1.1*. The causative agents are listed in descending order of frequency.

5.64 How can I diagnose occupational asthma?



The diagnosis is based on the history. A detailed and comprehensive occupational history is essential in the initial assessment of anyone thought to have occupational asthma. The first symptom is often coughing at the end of a shift. Symptoms generally improve at weekends and holidays, but at a later stage the symptoms may persist all the time. Further examination is rarely helpful. Serial peak flow measurements may help with the diagnosis.

Skin prick tests can occasionally be helpful. Liaison with a company's occupational health physician, if there is one, may also be helpful to the patient.

A fall in peak respiratory flow rates or substantial diurnal variability on working days but not on days away from work supports a diagnosis of occupational asthma. Patients often experience symptoms that are worse on Mondays, often recovering by the end of the week as they adapt; other patients find that their symptoms build up during the week and are at their worst on Thursday, often being unable to return to work on Fridays. If there is any doubt about the diagnosis, the patient should be referred to a respiratory physician. If the diagnosis is clearcut, the patient should be referred to an occupational or respiratory physician for confirmation. The ultimate test is a bronchial challenge.

5.65 How should I manage occupational asthma?



The asthma should be managed as usual. However, it is important to be aware that, once somebody has been sensitized to a specific substance, subsequent exposure even to tiny amounts of that substance may precipitate severe acute asthma.

Anybody who develops occupational asthma should avoid any further exposure to the causative agent. This may mean relocation or loss of current employment, so it is important to identify the specific cause accurately.

Occupational asthma is a prescribed occupational disease. A worker who develops the condition is entitled to 'no fault' compensation if the degree of disability is 14% or more. Further details are available in the Department of Social Services leaflet *Occupational Asthma* (Ref NI237). Benefit is not taxable, not income-related and non-contributory. Claims should be made using form B1100-OA. It is advisable to refer patients to a chest physician first (to confirm the diagnosis of occupational asthma).

Another approach is to eliminate totally the exposure of the individual to the suspect agent whilst remaining in the same employment. This is not always feasible.

In view of the implications on unemployment, some patients are reluctant to accept that they may have asthma, much less that their asthma may be occupationally related.

All patients with suspected occupational asthma should be referred for assessment by a respiratory specialist.

5.66 What about a career in the armed forces for asthmatic patients?

Until recently, asthma was a bar to joining HM forces in the UK. Nowadays, a past history of asthma is not necessarily a bar. Entry will not be denied if the asthma was mild and there have been no acute episodes in the previous 2 years and no need for treatment in that time.

Should asthma occur in a person already in the forces, they may well be redeployed in UK-based units or advised against certain occupations or active service. However, such a diagnosis no longer means that the patient is automatically considered unfit to remain as a serving member of the forces.

MANAGING ASTHMA IN THE ELDERLY

5.67 How can I diagnose asthma in this age group?

Asthma can start at any age: the elderly are not exempt. Asthma is probably underdiagnosed in the elderly as it is mistaken for either COPD or heart failure. Another reason for the diagnosis being overlooked and the disease subsequently being undertreated is older people's tolerance of respiratory symptoms.

There is also some evidence to suggest that elderly people with asthma have a lower perception of a given degree of airway narrowing than younger people experiencing the same degree of narrowing. However, the airways of elderly asthmatics are as sensitive as those of younger patients, and elderly asthmatics should not be undertreated.

Generally, elderly people welcome a diagnosis that not only explains their symptoms but for which there are good, effective and safe treatments.

Conditions to consider in the differential diagnosis are COPD, bronchiectasis and congestive cardiac failure, all of which may be indistinguishable from asthma by the history alone. New respiratory symptoms in middle-aged or elderly smokers, or ex-smokers, may be due to lung cancer; so have a very low threshold for requesting a chest radiograph in such patients, and refer to a chest physician if there is any doubt regarding the true diagnosis of asthma. *See Q. 2.5 & Q. 2.37.*

5.68 What triggers are relevant when managing asthma in the elderly?

Most asthma in the elderly is intrinsic and triggered by upper respiratory tract infection, exercise or cold air. Allergen identification and avoidance is not usually very fruitful. Smoking should, as for all asthmatics, be avoided.

5.69 What medication should I use in elderly patients with asthma?

The principles of management are the same as for younger adults (*see Q. 5.42*).

- Many elderly patients will benefit from long-acting inhaled bronchodilators to help their night symptoms or exercise-induced symptoms.
- Oral bronchodilators and/or theophyllines should be avoided as first-line therapies because they are more likely to induce side-effects or have unwanted interactions with other medications the elderly patient may be taking.
- Many elderly people have difficulty with coordination, and many suffer from poor sight or arthritis affecting the hands. For these reasons, elderly patients should be given the opportunity to try out various different types of inhaler and to use the ones they feel happiest with. Metered-dose inhalers are frequently unsuitable. However, large-volume spacers with metered-dose inhalers are probably the treatment of choice, especially if high-dose inhaled steroids have been given.

5.70 Should elderly asthmatics have a management plan?

The elderly require education and understanding in a similar fashion to patients in all other age groups. Compliance and inhaler technique needs to be checked, especially if other faculties are failing.

5.71 When should I refer elderly patients with asthma?

The successful management of asthma in the elderly can usually be provided from within primary care. In the infirm elderly, the help of family, nursing home staff or day-carers may also be needed. It is important that everybody tries to aim for perfection in managing the elderly, just as they would for people at all other ages, and referral should follow the same criteria as for younger adults (*see Q. 5.44*).

MANAGING DIFFICULT ASTHMA

5.72 **A few of my patients seem to have troublesome symptoms and sudden changes in asthma control despite small falls in their peak flow readings. Why is this and how should I manage them?**

A number of asthmatic patients seem to be very high perceivers of minimal change to their airway calibre and they also tend to respond by inappropriate hyperventilation. This leads to worsening dyspnoea, increased anxiety, and the use of high doses of medication. Increasing anxiety levels lead to an increased ability to detect small changes in airway obstruction. These patients tend to be high attenders both at their GP's surgery and at hospital emergency and outpatient departments, and are frequently admitted to hospital. They take and need a lot of time. Simple reassurance is not helpful. They need a careful explanation of their disease and that they are in a subgroup whose responses are oversensitive, through no fault of their own. They will need to be given the confidence to manage their own asthma in a logical way without panicking. This is not a simple neurosis, although many patients will be generally anxious. Patients will need detailed, agreed, self-management plans (peak-flow led rather than symptom led). Although relaxation and biofeedback therapies are generally ineffective in asthma management, this small group of patients may benefit from such approaches.

5.73 **I also have a few patients who don't seem to appreciate that their asthma has become very severe until quite late. How can I help them?**

In a similar vein to the answer above, a number of asthmatics seem to be low perceivers of quite marked changes in their airway. Some patients will be subconsciously in denial of their disease and the need to control it, but others will be well motivated. These patients seek help late and are at an increased risk of dying from severe asthma. They are a difficult group to manage. Regular peak flow readings, even when feeling well, are strongly advised, with peak flow-led self-management plans combined with education and regular follow-up. These patients need to be motivated to monitor their asthma and to increase their self-management, even when feeling well.

COMPLIANCE

5.74 **One of the biggest problems I have is getting my patients to comply with the suggested management. Why is this and how can I improve compliance?**

It is a source of great disappointment and occasional amazement that, despite the best efforts of doctors and nurses, patients fail to comply with the excellent and logical treatment regimens presented to them. Non-compliance is especially a problem with regular preventive treatment in asthma, and has been estimated to be as high as 50%.¹⁴ Many factors contribute to non-compliance, including misunderstandings about the disease and its treatment, underestimating expectations about the efficacy of treatment, and lack of knowledge about the different roles of preventer and reliever treatments. Non-compliance is a particular problem with inhaled therapies, and does not appear to be a problem only for inhaled steroids. Correlations with good compliance include the perception by the patient that the drug is useful, and the perception of the drug regimen as regular. Better compliance also correlates with low frequency of dosage, and whether the patient has seen a specialist. Compliance is increased with symptoms that would otherwise occur daily.

Modern synonyms include adherence or concordance.

5.75 **Is poor compliance just due to patients' ignorance?**

Factors affecting non-compliance include patient concerns about their disease, about acute attacks and about the side-effects of drugs. This is especially true when considering fear or misunderstanding of inhaled steroids. Patients may also have concerns about the stigma of being labelled asthmatic; refusal to accept the diagnosis will result in poor compliance with therapy. In general, patients who find treatment logical and easy to use, and without side-effects (either real or perceived), are more likely to comply with therapy than those who are taking the drugs because their therapists tells them to. Indeed, education alone has little effect on compliance, whereas combining education with training and behavioural therapy will show improvement in compliance and in the quality of patients' lives.

5.76 **Are there different types of non-compliance?**

Non-compliance is either accidental or deliberate:

- *Deliberate* non-compliance results from the patient's beliefs regarding the cause of their asthma, how serious it is, the likely benefits and costs of therapy, their past experiences and their relationship with the

doctor or nurse. Many patients feel that they will lose control of their lives and their asthma by complying with therapy suggested by other people, including the nurse or doctor. Patients react emotionally and intellectually to changes, and often the emotion will dominate the intellectual response. Many type 1 brittle asthmatics fit this model.

- *Accidental* non-compliance is less common but more straightforward. Patients may fail to understand what has been discussed with them because of poor concentration (often due to anxiety or depression), poor memory, poor comprehension (especially if their English is poor), poor intellect, or perhaps they are just scatterbrained!

The Impact of Asthma Survey⁷ found that 45% of respondents admitted that they did not exactly follow the instructions given to them for taking their medication. The commonest reasons given were that they took only the medication that they felt they needed, or that they simply forgot, or they felt better, or they thought the medication was not really necessary anyway. The same survey cited nearly half of respondents as wanting more information about treatment, so the lesson of better and more appropriate education seems clear.

5.77 How can I improve my patients' compliance?

Recommendations for improving compliance should include the following:

- simple drug regimens
- hand-written instructions
- good patient–doctor or patient–nurse rapport
- minimization of possible side-effects
- patient education.

The most important factors contributing to non-compliance with asthma medication are lack of knowledge about the disease and the need for long-term maintenance therapy even in the absence of symptoms.

5.78 How can I get my patients to take their inhaled steroids?

In general practice, poor compliance with inhaled steroid therapy is potentially common. Generally, the media are ignorant about inhaled steroids and readily broadcast misinformed or sensational negative reports. These can cause untold damage to many patients' confidence and may undermine the hard work done by many doctors and nurses over many years.

To improve compliance, it may be useful to educate patients as follows:

- Acknowledge that asthma inhibits growth: the more severe and more poorly controlled the asthma, the greater the effect on growth retardation. This effect is also seen in children with eczema, so it may

reflect some fundamental property of atopy rather than of asthma itself.

- Asthma can delay maturation, and this is true especially if the asthma is poorly controlled and inhaled steroids have never been used. This may also be an atopy-related phenomenon. The delay is not usual and, if it occurs, is not critical.
- Systemic steroids inhibit growth and development. It is for these reasons that inhaled steroids were developed.
- Inhaled steroids have dose-related systemic effects, but the systemic absorption of inhaled steroids is negligible if given in normal doses. Even when given in higher doses, there is occasionally biochemical evidence of dose-related adrenal suppression, which is rarely clinically important.
- Emphasize that the adult height for asthmatic children is normal, regardless of whether or not they had inhaled steroids at whatever dose during childhood.

SMOKING AND ASTHMA

5.79 Is smoking a problem in asthma?

Smoking is undoubtedly a harmful habit for everybody who indulges. It is especially harmful for those who already have lung diseases such as asthma. Although not a cause of asthma, smoking is a frequent cause of exacerbations of asthma at all ages. Babies with an asthmatic tendency (those with a strong family history of atopy and asthma) are more likely to develop asthma in later life if their mother smoked during pregnancy or if exposed to second-hand cigarette smoke during the first year of life.

All doctors and nurses working in primary care have a duty to try to help all their asthmatic smokers to stop smoking, and to protect all asthmatics from the effects of second-hand cigarette smoke. In a few cases simple education and pointing out the facts will be sufficient. However, smoking is an addictive habit that many people find difficult to give up. Coupled with the addiction may be feelings of guilt. Patients may be economical with the truth when admitting to their habits or to the extent of their habits – and certainly to their behaviour in front of their children.

5.80 How can I help my patients stop smoking?



Better approaches are required than simply pointing out the evils of smoking. It is better to get patients to agree that they want not to smoke and actively want to stop. This may take time and patience. To achieve these goals it is best not to alienate the smoker but to help him or her agree that they have a problem that they would like to overcome and that can be overcome – although admittedly not always easily. Most primary care trusts in England and Wales have a smoking cessation clinic to which patients can be referred.

Helping asthmatic patients who smoke to give up smoking is a challenge for all doctors and nurses along with asthma care. It is not an optional role.

MANAGING ASTHMA IN PATIENTS WITH OTHER DISEASES

5.81 Many of my asthma patients have other disorders. Will their asthma management be different?

UPPER AIRWAY DISEASE

Asthma is often associated with rhinitis, sinusitis and nasal polyps. Proper attention to these conditions and correct treatment will facilitate effective asthma management, and may be an essential prerequisite for the management of some people's asthma.

PSYCHOSOCIAL FACTORS

Asthma may cause anxiety and depression in sufferers and their carers. Asthma and psychological or psychiatric illness can obviously coexist without one being a cause of the other. The mortality rate from asthma is increased by depression, alcohol abuse, unemployment, schizophrenia, bereavement and family disruption. There is some evidence to suggest that non-compliance with treatment may be common in those with depression and that psychosocial problems may have been commoner in those who have died from asthma. Patients who use major tranquillizers and who also have asthma are more likely to suffer increased illness and death. *See Q. 1.18, 5.72 & 5.73.*

GASTRO-OESOPHAGEAL REFLUX DISEASE (GORD)

Asthma and GORD often occur together, each exacerbating the other. Good control of either condition helps to control the other, or may be a prerequisite.

EXERCISE-INDUCED ASTHMA

5.82 What is exercise-induced asthma?

Exercise is a common trigger of asthma; in some asthmatics it is the only one. The inability to exercise normally is often underestimated by patient and doctor alike. Exercise-induced asthma symptoms occur in about 70–80% of all asthmatics.

The exact mechanism by which exercise induces bronchoconstriction is not clear. It is probably caused by the increased ventilation that always occurs on exercise, resulting in inadequately warmed and inadequately humidified air reaching the lungs. Thus, exercise results in the inhalation of relatively dry and cold air, and this is thought to be more important than the metabolic changes caused by exercise itself. Exercise-induced asthma is typically present 5–15 minutes after exercise, and may last for up to an hour. There may be an additional late response up to 10 hours later.

Exercise-induced asthma may be a mark of poorly controlled asthma; better overall control of the asthma may result in better control of the exercise-induced symptoms. Some people may have normal lung function and good control of their asthma most of the time, and have symptoms only when exercising or active.

Symptoms may be induced by different degrees of activity in different people. At worst, everyday activities may bring on asthma symptoms, such as children playing normally with their friends or adults doing tasks of daily living such as vacuuming or cleaning the car. Other people may get symptoms only when participating in sport. Finally, there may be competitive athletes for whom even minor changes of asthma control may affect their performance. Bear in mind that many asthmatics may have low expectations of their ability to exercise and therefore have self-imposed restrictions.

Not everybody who has exercise-induced coughing, wheezing and breathlessness has necessarily got exercise-induced asthma. They may just be generally unfit, or have cardiac disease or other respiratory disease. Identification of those with true exercise-induced asthma can be made by regular peak flow monitoring before and after exercise. A fall in peak flow of more than 15% up to 20 minutes after cessation of exercise is diagnostic of exercise-induced asthma. *See also Q. 1.11.*

5.83 How can I diagnose exercise-induced asthma?

It is important to ask the right questions to the right patients:

- In *children*, the doctor or nurse needs to ask whether the child joins in with their peer group at play, and whether their teachers notice any

problems with sport or exercise. Are they able to join in formal sport at school or do they, for example, always play the goalkeeper or wicket-keeper? Do they prefer playing indoors or outdoors?

- In *adolescents*, the doctor or nurse needs to ask whether they take regular exercise and, if so, whether they enjoy it. Do they shy away from activities where they might be embarrassed by their inability to perform or participate?
- In *adults*, what exercise do they undertake and are these exercises limited because of their asthma? If they do not take exercise is it because they are frightened that the asthma may be provoked?
- In *sportsmen and women*, what sports are most likely to trigger the asthma, and does this affect their ability to compete or train? Is their level of proficiency impaired?

5.84 How should I manage exercise-induced asthma?

The management of exercise-induced asthma involves the following non-pharmaceutical measures:

- The doctor or nurse should encourage full physical fitness.
- The patient should avoid triggers such as smoking and, if possible, cold air, and any known allergens.
- Sports less likely to provoke asthma include swimming and steady indoor exercise in a warm moist environment.
- Committed athletes should be advised to use steady warm-up exercises in advance of their event and if possible to avoid cold dry environments.
- Before turning to pharmacological measures for exercise-induced asthma, it is important to establish that the asthma is well controlled apart from during exercise or activity. Consider, as always, compliance with medication and inhaler technique.
- Premedication is the mainstay of treatment for symptoms induced by exercise. Unpredictable activity may occur especially in children, and this will influence the choice of therapy.

5.85 What medications are useful in exercise-induced asthma?

The following therapies may be considered:

- *Inhaled short-acting β_2 -agonists* given 15–30 minutes before exercise. The effects should last between 4 and 6 hours, and provide acute relief or prevention of exercise-induced symptoms. They are useful for people who experience only occasional symptoms because they provide rapid relief.
- *Inhaled long-acting β_2 -agonists*. These last for up to 12 hours and can be given on the morning of a day that will involve multiple bouts of

exercise. They are also useful for children when exercise may be unpredictable, when they can be given once or twice every day. A short-acting bronchodilator may also be necessary for acute relief. Regular use of long-acting β_2 -agonists should not be given in the absence of other anti-inflammatory treatment.

- *Oral LTRAs* given regularly, or intermittently. The effect lasts for 24 hours and comes on within a few hours of taking the dose, so a tablet can be taken the night before a football game or athletics competition, for example, or LTRAs can be used in the same way as inhaled long-acting β_2 -agonists.
- *Sodium cromoglycate or nedocromil*. These drugs are best given 30 minutes before exercise; they have few side-effects. A short-acting inhaled bronchodilator may also be necessary.
- *Ipratropium bromide* is best given 30–60 minutes before exercise. It is useful if short-acting bronchodilators do not appear to control symptoms. Ipratropium may not provide such rapid relief as short-acting inhaled bronchodilators, so the latter may also be needed for acute relief.

5.86 What about longer-term management and prevention of exercise-induced asthma?

Particular attention should be paid to the good control of asthma. The regular use of inhaled steroids for 2 months or more reduces the incidence of exercise-induced asthma and the severity of exercise-induced symptoms. However, even if the asthma is generally well controlled, exercise-induced symptoms may still occur. Exercise is an important part of most people's lives, especially children. One of the goals of asthma management is to allow people to be involved in normal activity, including full participation in exercise or sport. This goal is attainable in most patients.

5.87 What about professional or representative sports – are there any problems with taking asthma medications?

Most prescribed treatments for asthma are allowed in competitive sports, but those competing at national or international levels should check with their individual sports or with the British Olympic Association.

Table 5.5 lists the substances and drugs permitted or prohibited by the International Olympic Committee, but it is always wise to check with each sport's governing body, or with the UK Sport Drug Information Line +44 (0) 20 7841 9530.

TABLE 5.5 Medication allowed or banned by the British Olympic Association

Condition	Drugs allowed	Drugs banned
Asthma*	Cromogens	All products containing sympathomimetics, e.g. ephedrine, isoprenaline, fenoterol, rimiterol, orciprenaline
	Salbutamol	
	Terbutaline	
	Salmeterol	
	Formoterol (eformoterol)	
	Beclomethasone	
	Budesonide	
	Fluticasone Theophyllines	
Cough	All antibiotics	Products containing sympathomimetics: Ephedrine Pseudoephedrine Phenylpropanolamine
	Menthol inhalations	
	Terfenadine	
	Astemizole	
	Pholcodine	
	Dextromethorphan	
	Guaiphenesin	
	Paracetamol	
Hay fever	Terfenadine	As for cough
	Astemizole	
	Cromoglycate eye-drops	
	Nasal sprays containing steroids or xylometazoline	

*These drugs are allowed if given by inhalation (except theophyllines) and written notification of administration has been given to the relevant medical authority

5.88 Surely asthma must be a handicap at some levels of sport?

At higher levels, well-managed asthma is no bar to success: 41 Olympic medals, including 15 gold and 21 silver medals were won by American athletes suffering from exercise induced-asthma during the 1992 Summer Olympics. Asthma has not prevented such stars as Ian Botham, Steve Ovett, Paul Scholes and Ian Wright from reaching the top of their sporting trees.

MANAGING TROUBLESOME SYMPTOMS

5.89 What is cough variant asthma?

Patients who present only with coughing, usually worse on exertion and at

night, present a diagnostic dilemma. In children, asthma is the most likely explanation for chronic or persistent dry cough, especially if the cough is worse during the night. In adults with persistent or recurrent cough, chest radiography is advisable after a full history and examination. The main differential diagnosis and their tests include:

- *Cough-variant asthma*: spirometry, peak flow charts, trials of treatment
- *Chronic nasal catarrh and postnasal drip*: examination, computed tomography of the sinuses, referral to an ear, nose and throat department
- *Gastro-oesophageal reflux*: trial of a proton pump inhibitor for 2 months (at maximum dosage); endoscopy or barium studies
- *Bronchiectasis, tuberculosis, lung cancer*: chest radiography, computed tomography of thorax
- *No cause found*: in about a third of patients with a chronic dry cough, no cause can be found. Referral to a chest physician is indicated if the primary care physician is unable to find a cause.

5.90 What should I do if the asthma seems to be persistently worse at night?

Asthma that is worse at night may be due to poor underlying control. Serial peak flow measurements are required, as well as a symptom diary. Medication that is particularly useful at night, and that can be used in addition to regular inhaled steroids, includes inhaled long-acting β_2 -agonists, oral LTRAs and oral slow-release theophyllines. Theophyllines are most likely to cause side-effects and should be tried last.

New or re-emerging night symptoms are often the first warning of loss of asthma control, and may develop into acute severe asthma. Treat the re-emergence of night symptoms promptly and aggressively with high-dose bronchodilators and possibly a short course of oral steroids.

5.91 What is the role of respiratory infections? Many of my asthmatic patients seem to get chest infections.

One of the most common triggers for asthma is upper respiratory tract infection. These infections are often unavoidable, but at the first symptoms or signs of such an infection asthma therapy should be stepped up. Usually this entails doubling up doses of inhaled steroids; although the evidence for this course of action is poor, it has become standard practice. Such doses should be continued until the symptoms or signs of the upper respiratory tract infection have abated and for 2 days beyond. All patients with severe asthma should receive influenza vaccine each autumn, especially those who require long-term high-dose or oral steroids, or more than four courses on average of oral steroids per year. Many patients with upper respiratory tract infection-induced exacerbations of their asthma are wrongly diagnosed as

having a chest infection, either by themselves or by their physicians, on the basis of increased symptoms and a productive cough. Green or yellow sputum may indicate increased bronchial inflammation rather than bacterial infection. Antibiotics are usually indicated only if there is fever and purulent or increased sputum, crackles on chest auscultation, or comorbidity (e.g. bronchiectasis, diabetes). Long-term antibiotic prophylaxis should not be used in managing asthma.

5.92 Should all my asthmatic patients avoid aspirin?



Overall, only about 10% of adults with asthma are thought to be aspirin sensitive, and they are usually people who need chronic treatment with high-dose inhaled steroids. There is probably some cross-reactivity with non-steroidal anti-inflammatory drugs (NSAIDs), but the extent of this and its clinical relevance is not clear. As a general measure, aspirin should be avoided by asthmatics unless they have previously tolerated it without problems. The advice to avoid NSAIDs is also often made on less evidence. Those with a history of aspirin-induced asthma should definitely always avoid aspirin.

- Patients known to be sensitive should studiously avoid all aspirin and aspirin products, and aspirin-related products such as the NSAIDs (e.g. ibuprofen).
- Aspirin-sensitive asthma is rarely seen in children (in whom aspirin is contraindicated anyway).
- Asthmatics who are known not to be aspirin sensitive can safely use aspirin and aspirin-related products.
- Aspirin-induced asthma has a low correlation with atopy but a higher correlation with chronic rhinitis and nasal polyps.
- Challenging with aspirin should take place only in hospital when the asthma is in remission.
- LTRAs are particularly effective in aspirin-sensitive asthma.

See also Q. 1.17 & Q. 4.66.

5.93 Some of my female asthmatic patients say that the severity of their asthma alters with their menstrual cycle. How can I help them?

Some women find that their asthma may be slightly worse at different stages of the menstrual cycle. A good symptom diary together with peak flow readings and a menstrual diary can help to confirm this. A premenstrual increase in symptoms may occur in up to 40% of women with asthma. A few women may find that their asthma worsens during the time of ovulation, or during menstruation.

Premenstrual worsening of asthma may be due to an abnormal level of progesterone during the late luteal phase of menstruation, leading to changes in airway responsiveness in this group of patients. The patients most prone to premenstrual exacerbations are those with severe asthma.

Treatment options are empirical. It is worth doubling the dose of inhaled steroids during the second half of the cycle and/or adding a long-acting β_2 -agonist during that time. A logical option would be to add regular oral theophyllines, as there are cyclical changes in airway responsiveness to adenosine monophosphate (AMP), which tends to be highest premenstrually; theophyllines block the adenosine receptors and thus reduce the increase in airway irritability caused by increased AMP levels. A further option might be to consider intramuscular progesterone injections during the late luteal phase in women with severe premenstrual asthma.

If these measures are unsuccessful, refer to a chest physician, who should liaise with an endocrinologist or gynaecologist.

ASTHMA AND TRAVEL

5.94 What advice should I give to asthmatics about travelling?

- On no account should asthmatics fail to continue with their preventive medications.
- They should make sure that they have sufficient short-acting bronchodilator or other relievers to last the trip.
- Ideally they should monitor their asthma during their travels by measuring peak flows, and should have a low threshold for using their asthma self-management or action plan and stepping up to the next level of treatment, and for adding in regular short-acting bronchodilators to cover any acute exacerbation at an early stage.
- If past experience indicates that their asthma worsens when visiting particular areas or houses, then the above measures should be started 2–3 days before travelling and continued for that time after returning home.
- Patients should avoid high-altitude holidays, especially if their asthma is severe.
- Skiing is not necessarily contraindicated, but the combination of cold air, exercise and relatively high altitudes provides a potent mix of triggers for many asthmatics. Emphasize the need for good compliance with preventive therapy and action plans, and to increase the amount of exercise gradually in the first few days.

5.95 What advice should I give to asthmatics about flying?

Nearly all patients with asthma are fit to fly on commercial airlines. The following groups of patients need special consideration:

- Those with severe asthma (BTS/SIGN Step 4 or 5; *see Q. 4.95*), especially with dyspnoea at rest.
- Patients who have had an acute exacerbation requiring admission within the last 6–8 weeks.
- Patients with co-morbidity, especially COPD and heart failure.

Assessment should include a full history and examination, with particular attention to past experience of flying. If possible, assess oxygen saturation levels using a finger pulse oximeter: if the value is above 95%, there should be no problem; if less than 92%, there is considerable risk of severe hypoxia from the reduced cabin pressure (and therefore inspiratory oxygen levels) present in commercial aircraft. Levels of 92–95% should prompt referral of the patient to a chest physician for vitalograph measurements and, if available, a trial of air containing 16% oxygen and assessing subsequent arterial oxygen saturations.

Patients should be advised against high-altitude destinations such as Nepal, Bogota, La Paz, Quito and Tibet.

- Patients should be advised to carry their inhalers in their hand luggage (many are put off by the airlines' advice not to carry aerosols on the aircraft).
- Large-volume spacers should be used rather than nebulizers (*see Q. 4.140–4.143*). If nebulizers must be used, the patient should inform the airline well in advance.
- Many airlines will provide supplemental oxygen during flights, often at extra cost.
- If a patient has severe or unstable asthma, and wishes to travel on an aeroplane, they should be assessed by their general practitioner, referred if appropriate to a chest specialist, and – most importantly – contact the medical department of the airline with which they propose to travel for advice and guidance, well in advance of the proposed travel dates.

PRIMARY PREVENTION OF ASTHMA

5.96 Can asthma be prevented?

There is no proven preventive therapy. There are no strategies yet identified that might reduce the risk of atopic diseases in the population as a whole. Efforts have been focused on identifying and removing or eliminating the major environmental allergens, especially in individuals at high risk of atopy. No study has, to date, been very successful with this strategy.

Attempts have been made to identify new-born infants at risk of developing asthma by measuring cord immunoglobulin (Ig) E levels: the higher the level, the more likely is the child to develop asthma in later life.

Older children may have high total IgE levels and positive radioallergosorbent test (RAST) results to house dust mite, cat dander or grass pollen, all of which are associated with increased risk of later developing atopic asthma. The manifestation of one form of atopic disease is a risk factor for the manifestation of other forms. Atopic dermatitis often occurs in the first 3 months of life and is strongly associated with the later development of atopic asthma. There is some evidence that treatment for 18 months with an oral antihistamine may at least delay, if not prevent, the onset of asthma in children identified as being at high risk of developing asthma, as detailed above.

5.97 What advice can we give to a prospective mother worried that her children may develop asthma?

An infant who prefers not to develop asthma should choose:

- non-atopic parents
- to be a girl
- to have a mother who does not smoke in pregnancy but who does breast-feed
- a mother who avoids house dust mites, cats, pollens and other common allergens during her pregnancy
- a household where no-one smokes
- not to be born prematurely
- not to be born in the spring
- to be part of a large family, and preferably not be the eldest
- to be brought up in an environment that is not too clean and sterile.

5.98 Can environmental changes reduce the risks of developing asthma?

There is no firm evidence for this. However, a study from the USA¹⁵ looked at whether changes in air quality caused by relocation were associated with changes in lung function growth rates in children aged 10–15 years. The study showed that subjects who moved to areas with low levels of particulate pollution had increased rates of growth in lung function, and those who moved to areas of high pollution had lower rates. This finding may have implications for the development of COPD in later life, and may or may not be relevant for assessing the risks of developing asthma.

REFRACTIVE ASTHMA**5.99 What do I do with the asthmatic who is not getting better despite all my efforts?**

Consider the following questions.

Is the diagnosis right?

It is always a good idea to revise the criteria on which the patient's asthma was diagnosed. Take a careful history and examine the patient for signs of other illnesses, especially heart disease. If there is diagnostic doubt, get a second opinion from a specialist. The diagnosis is hardest to make in babies and the elderly.

One of the pitfalls is the failure to establish reversibility of the patient's airway obstruction. Patients with no or little reversibility have COPD rather than asthma and should be treated as such, using the guidelines specific for the management of COPD rather than those of asthma.¹²

Is the patient taking the right drugs? Is the asthma not getting better merely because it is undertreated?

This is probably the commonest reason in practice. Take a careful history, being sure to elucidate all the patient's symptoms. As importantly, is the patient actually taking the drugs? Assessing compliance is difficult (*see Q. 5.74–5.78*). Asking patients to bring all their medication to appointments will at least allow a full assessment of how much has been taken, and this can be compared with the clinician's estimate of how much should have been taken. Enquiring as to which prescriptions have actually been dispensed can also be informative. Ask patients what they are actually taking, not what they should be taking. Ask, too, how often they forget to take each drug (this approach acknowledges that perfect compliance is not unusual and is often very difficult).

Is the patient inhaling the drugs correctly?

Always check inhaler technique in a patient who is deteriorating or not improving. No treatment works unless it is taken correctly.

Is the patient avoiding triggers correctly?

Occasionally patients will continue to be exposed to potent triggers of their asthma and be insufficiently treated to prevent the triggers from exacerbating the symptoms. This may be especially true for occupational asthma. A careful history of potential triggers should be taken and the appropriate, individualized advice given in each case. If there is persistent exposure to a trigger that cannot or will not be reduced, the preventive medication needs to be increased.

Does the patient have a reason not to get better?

Some patients may have much to gain by remaining unwell. The asthma may be their reason for avoiding occupations, relationships, duties or lifestyles that they consciously or subconsciously reject. There may be financial gain from asthma. Poorer families receiving a disabled living allowance, paid to parents who need to give care above that of usual parenting, may have a huge financial disincentive from improving their child's asthma. Compliance is likely to be particularly poor in such circumstances.

Has the patient seen the right person?

If the patient is not getting better despite a review of the diagnosis, the drugs, the regimen, the device technique, compliance and trigger avoidance, it is often worthwhile asking a colleague to review the patient and management. This can be another general practitioner or a nurse from within your primary healthcare team or, if available, a GPSI (GP with a Special Interest). Usually, hospital referral is recommended. Remember, many patients may have psychological problems that prevent them getting better. Other patients may have a subconscious motive for not getting better. However, don't be ready to accept the reasons for a patient's worsening asthma or failure to improve without careful assessment of all the other possible reasons listed above.

Is the patient anxious?

Asthma is common. Chronic anxiety is common. Some patients have both conditions. The theoretical management of the patient's asthma may be perfect, but unless the patient's underlying anxiety and its manifestations of hyperventilation (either chronic or episodic) are addressed control of the asthma will be poor. Anxious people are more accurate in their perception of airway obstruction than non-anxious people. Such people are not only more sensitive to small changes of airway obstruction, but often respond by hyperventilating, which in turn worsens the dyspnoea and distress. Usually such patients' symptoms are more severe than objective measurements of their airway obstruction. Patients are then often labelled as hysterical or overreacting, so worsening their overt dyspnoea and distress and long-term anxiety traits. This pattern is seen at its most extreme in patients with type 1 brittle asthma. The cycle can, however, be broken by careful assessment and the correct diagnosis of asthma *and* anxiety. A holistic approach involving psychotherapy assessment and teaching deep breathing and control-of-breathing exercises can be very rewarding for patients and carers.

In general, the most common reasons for a patient with asthma not getting better despite receiving the appropriate treatment are:

- poor inhaler technique
- poor compliance with treatment
- the wrong diagnosis.

5.100 What can I do about patients who frequently attend the local accident and emergency department or walk-in centre?

Asthmatic patients who make frequent attendances to A&E departments or walk-in centres are often undertreated, despite receiving regular surveillance from their general practitioner or practice nurse. It can sometimes be difficult to assess fully the reasons for the patient's frequent attendances at these places. The attendances may simply be more convenient for the patient, or the patient may not have an adequate self-management plan, or may not fully understand how to use it. Compliance with long-term medication may be poor. Simply treating the asthma in the A&E department or walk-in centre and returning the patient to their usual care results in returning them to poor control, frequent exacerbations and reuse of the department or centre. It is probably worthwhile referring such patients for a specialist assessment.

5.101 Why and when should I follow-up patients who have been seen in the hospital or walk-in centre?

Follow-up of every asthmatic after such attendance should be made by the general practitioner or practice nurse. Ideally the A&E department or walk-in centre should strongly encourage patients to visit their practice nurse or GP soon after discharge. Attendance at the A&E department or walk-in centre can be considered to some extent as a failure of that patient's previous management, and it provides the opportunity to educate and alter treatment in order to prevent further attacks. For this to be achieved there should be prompt and affective communication between hospital or walk-in centre and GP. This is actually cost-effective in that it will reduce the chances of readmission. This appointment will allow the reasons for the event to be reviewed, and to see what failings in the self-management plan occurred. The self-management plan can then be reviewed and revised. The patient may need to step up their maintenance treatment, if they haven't already. The management of the patient's acute asthma can also be reviewed, and any deficiencies in the provision of care can be highlighted and hopefully not repeated. Relevant changes in the practice's asthma protocols can be made.

GUIDELINES AND PROTOCOLS

5.102 When were asthma guidelines introduced in the UK?

Before the late 1980s, asthma management in primary care was very informal and *ad hoc*. The quality of management depended largely on the enthusiasm of the clinicians involved.

The British Thoracic Society (BTS) published the first national guidelines, which were used not only in the UK but also in many other countries, in 1990.¹⁶ The first American guidelines¹⁷ were produced in 1992, as were the first international management guidelines.¹⁸ The publication and distribution of the 1993 BTS revised guidelines¹⁹ greatly increased the consensus amongst all clinicians. Their introduction was one of several influences that led to the continuing improvement in asthma care in the UK and in many other countries.

All of these guidelines have helped put together the consensus on the management of asthma in adults and children. The publication and distribution of the 1993 guidelines was one of the most important influences on the evolution of modern asthma management in primary care in the UK. A survey undertaken in British general practice in 1996²⁰ showed that 95% of GPs were aware of the guidelines and the vast majority had changed how they managed asthma as a result of them. Moreover, their practice nurses were also aware of the guidelines and followed the advice given in them.

5.103 Why do we need the latest BTS/SIGN guidelines?

The BTS guidelines were updated in 1997²¹ and reflected changes in knowledge and – as importantly – implementation of care as practised in both primary and secondary care. The BTS/SIGN guidelines²² of 2002 again updated the guidelines and reflected best practice. The BTS/SIGN guidelines are meticulously evidence-based rather than purely consensus-based, which should encourage their use even further than the previous ones.

The new guidelines also conform more to the Global Initiatives for Asthma (GINA) guidelines²³ (used extensively in North America and much of Europe).

5.104 What is new in the 2002 BTS/SIGN asthma guidelines?



Comparing them to the 1995 BTS guidelines, the main changes are:²²

- The 2002 guidelines are evidence based.
- The emphasis is now on starting nearly all asthmatics on 'an appropriate dose' of inhaled steroids. This dose will remain fixed for most asthmatics. Fluctuations in control will be managed by the addition of other therapies, or by altering the dosage.
- Inhaled long-acting β_2 -agonists are the first-choice medication at Step 3.
- The option of high-dose inhaled steroids is now reserved for patients with more severe asthma (Step 4) whose disease is not controlled by low-to-moderate doses of inhaled steroids with inhaled long-acting β_2 -agonists.
- Most other therapeutic options are in Step 4 (LRTAs, theophyllines, anticholinergics, cromogens, oral long-acting β_2 -agonists).
- There will be more patients at Steps 3 and 4 and fewer at Step 2 than there would be following the advice of the 1995 BTS guidelines.

5.105 Why do some organizations have their own guidelines as well?

Many practices have also adapted the BTS guidelines for their own use, as have many health trusts and authorities, and primary care trusts. Such adoptions lead to the introduction of local guidelines that are adaptations of national guidelines, specific to the need of the local population or to the local organization of care. They may lead to even greater compliance with those guidelines by all those providing asthma care. Local guidelines should be drawn up by all interested parties, including local GPs, practice and community nurses, school nurses, pharmacists, hospital paediatricians, chest physicians, geriatricians, and A&E doctors and nurses. Local guidelines should ideally be a simplification or clarification of existing guidelines, and should aim to produce consistent standards of care in any particular locality.

5.106 What is the difference between a guideline and a protocol?

Guidelines are proposals based on consensus and evidence that are deliberately non-directive. They make no attempt to suggest how the advice given in them should be implemented. They are a means of advising those who provide asthma care on the essential points of that care.

Asthma protocols are agreements drawn up by organizations directly involved in providing asthma care, specifying how that care will be delivered and how the advice given in guidelines will be implemented. It is essentially a primary care trust or practice's way of agreeing what it will do and how it will do it.

5.107 What should a practice protocol for asthma contain?

The following should be agreed.

DIAGNOSIS

- Diagnostic criteria
- Use of peak flow diaries and trials of treatment
- Responsibility for making and recording the diagnosis and sharing it with the patient or carer.

MANAGEMENT

- Aims of management
- Who will give the relevant advice, education and follow-up
- Trigger avoidance, including smoking
- Treatment, including choice of drugs and delivery systems, peak flow meters, self-management or action plans, follow-up after any exacerbation
- Audit and quality control.

REFERRALS

- Criteria for referral to secondary care or from nurse to GP, and vice versa
- Criteria for referral to other healthcare professionals and agencies.

5.108 How often should we review well patients?

All asthmatic patients should be reviewed at least annually. The following groups of patients should be reviewed more frequently:

- *Children:* babies as often as monthly, preschool-aged children 3–6 monthly, school-aged children at least every 6 months
- *Elderly or patients with co-morbidity:* every 3–6 months
- *Pregnant women:* at every antenatal appointment
- *Those who needed emergency attention* in the previous 6 months (night visit, A& E or walk-in centre attendance): as soon as possible after the event, then 1–2 monthly until stable
- *Those who needed admission* with a severe exacerbation of asthma: as soon as possible after the event, then every month for at least 6 months.

5.109 Who should review the patients?

This will depend on the skills mix and experience of the doctors and nurses in the practice. In most UK practices there is at least one nurse who has received specialist asthma training and has experience in managing asthma.

It seems sensible for this nurse to review the majority of the asthmatics, especially those who are well controlled at Steps 1–3. Patients with poorly controlled asthma or more severe asthma should be managed by more experienced nurses, or by the GP. All patients should be offered the option of whom they see, if practicable.

5.110 What should we do at the review appointment?

At each review the clinician should:

- make a detailed enquiry of symptoms and lifestyle impairment
- check (and adjust if necessary) the inhaler technique
- check compliance with management
- check peak flow readings and charts, if relevant
- educate, listen and explain
- check the self-management plan. Does the patient know how and when to recognize deterioration; how and when to alter treatment; and how and when to call for help?

AUDIT

5.111 What is audit?

Audit is nothing more than looking at what one is doing and comparing it with what one would like to be doing, and trying to make the two identical.

5.112 Why audit asthma care?

Asthma is well suited to general practice audit because it is common and there are recognized, measurable outcomes and processes. Asthma audit should involve the team that is involved in asthma care, and not be the responsibility of only one member. It is only by looking at what we are doing that we can assess whether we are doing it correctly. Practices that have audited outcomes of their asthma care have found that the audits can help to bring about measurable improvements in the quality of care that is delivered to asthmatic patients.

5.113 What are the principles behind auditing my asthma care?

The cardinal rules of all audit are to keep it simple, to keep it specific, and to keep it relevant. As a practice's experience grows, audit can move from the very simple to the more complex. There are three parts to a successful asthma audit:

- 1 *Measures of fact:* e.g. practice prevalence of asthma, clinic attendance
- 2 *Measures of process:* e.g. How many asthmatics own a peak flow meter? How many have had a peak flow measurement recorded in the last year?

How many are on inhaled steroids or anti-inflammatories, or other measure of appropriate treatment?

- 3 *Measures of outcome:* e.g. how many home visits or emergency admissions there were per month, daily/nocturnal symptom scores, inhaler technique ability, compliance with medication, time off work or school.

The most valuable information lies in measuring outcomes. Processes are only ways of achieving the outcomes, not ends in themselves.

5.114 What do I need to audit?

To claim chronic disease management payments for asthma in the UK, each practice is required to provide the health authority with the following information:

- the number of patients with asthma
- the percentage of asthmatics receiving prophylactic therapy
- the percentage who have had a peak flow measurement recorded in the last 12 months
- the number of asthmatic patients who have received a statutory review of their asthma in last 12 months.

All of these requirements are process measures and do not really provide an objective assessment of the quality of asthma care. The practice should concentrate more on auditing outcome, especially hospital admissions.

5.115 What do I do with my audit results?

Audit is basically a cycle. The results of the initial audit should be used to test practice procedures so that the standards of asthma care that have been agreed will be met. If the initial standards are too low (i.e. easily met) or too high (not nearly met), the standards may need raising or lowering. The audit cycle is shown in *Fig. 5.1*.

5.116 What should I audit?

Each practice must decide which areas of asthma management to audit; the practice must also set criteria and agreed standards. Some examples include:

- *Measures of fact:* to establish the practice prevalence rate for adults and children, and to compare this with national rates; to see every asthmatic at least annually. It is important to try to maintain a dynamic asthma register. This is one that allows patients who have gone into remission and who remained in remission for a specified length of time to be removed from the register, as well as the ability to add new patients once they are diagnosed..

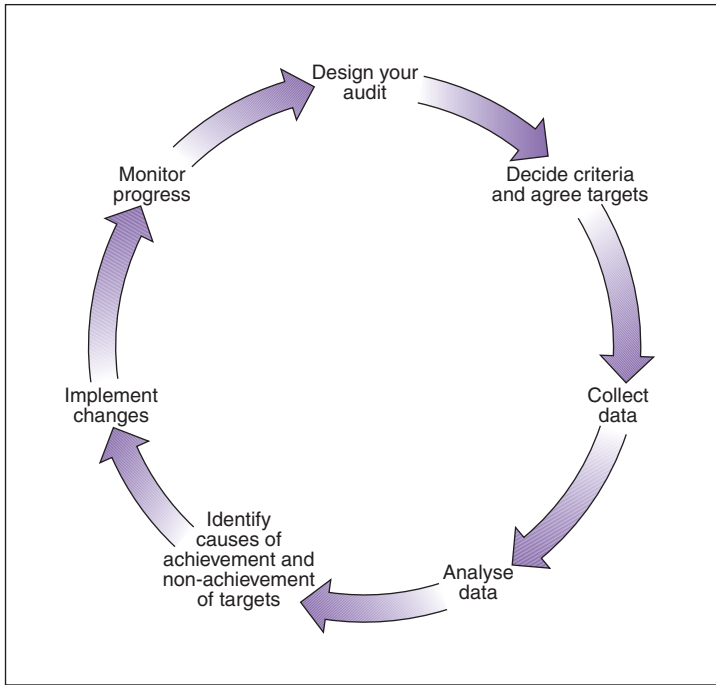


Fig. 5.1 The audit cycle.

- *Measures of process:* to achieve a rate 50% of asthmatics owning a peak flow meter; to have recorded a peak flow reading in the last year for all asthmatics aged 5 years or more; to have 100% of asthmatics who require more than four relieving inhalers a year to be using preventive inhalers regularly as well.
- *Measure of outcome:* to achieve no hospital admissions due to acute asthma, no emergency nebulizations and no home visits; 100% of asthmatics with *good* inhaler technique and no asthmatics suffering nocturnal symptoms.

5.117 How do I collect the data?

In the UK, most data are collected from computer records and are therefore reliant on the clinician accurately recording the data at the time of each consultation or review. Data retrieval depends on data input. It is often necessary to review the asthma protocol and to insert or delete the need to

record certain data. Adequate data recording is essential for all audit, but it is often not until audit is undertaken that deficiencies of data input become apparent.

5.118 What do I do with these data?

The data need to be analysed. The results achieved should be compared with the standards set. Discrepancies should be highlighted and attempts made to identify the causes of any non-achievement. For example, if the practice has an adult prevalence rate of 14% and a childhood prevalence of 6% compared with national estimates of 5% and 10% respectively, why is this? Are the diagnostic standards inappropriately wide for adults and too narrow for children? Similarly, low ownership of peak flow meters may be due to lack of awareness on the part of the professional carers about how useful they can be. The subject may have been omitted from the clinic protocols. Failure to meet the outcome standards may be due to faulty clinical protocols, inadequate monitoring, training or education, or inappropriate prescribing, poor use of self-management plans or inappropriate advice – or any combination.

5.119 How do I know what changes to make?

Having identified the causes of non-achievement of standards, changes should be implemented so that they can be achieved. Unrealistic standards may need to be modified. If the standard was appropriate but unmet, changes in the provision of care must be made. If attendance at the asthma clinic is low, is this because it is held at an inconvenient time or place? Is failure to review every asthmatic annually due to inadequate provision of clinic time or to poor organization, so that not all patients are called and recalled? If too few asthmatics are using preventive treatment, is this because the treatment protocols are wrong, or is the training of those running the clinic inadequate, or is the advice not being complied with by patients? If outcome measures fall short of the standards, is this due to poor care, to good care that is badly organized, or do the practice's asthmatics have dreadful asthma despite excellent care and management?

5.120 How do I make the necessary changes?

The final stage is to implement changes to protocols, procedures, standards and provision of care, and then to re-evaluate, monitor progress and re-audit. It is only by looking critically at the effects of change that we can evaluate that change. Not all change is necessarily good.

Having agreed with the practice the reasons for not achieving some of the standards that you have set, the practice needs to develop an action plan

to remedy these specific areas. For example, it may be useful to promote a protocol that any patient who has needed an emergency nebulization should also receive oral steroids, have their peak flow measured before and after the nebulization, be reviewed in an asthma clinic within a specified time after the event, and have a self-management plan initiated or reviewed. The practice can then look at how patients who received emergency nebulizations were managed in subsequent years and see whether there have been improvements.

5.121 Isn't audit a bit boring and depressing?

Audit can be uplifting, interesting or sometimes dispiriting. It is better to keep audit very simple and to confine oneself to asking simple questions that involve easy data collection and analysis, and that have fairly straightforward causes of non-achievement, and where it is easy to make small, beneficial changes. At first it is also best to audit simple aspects of asthma care where it is believed that the practice is doing well, to provide positive feedback for the whole team. As confidence increases, so can the complexity of audits: there can be more concentration on the aspects that are probably being done less well and are therefore in greater need of change. A more experienced, confident team can cope with negative feedback.

5.122 Does audit show that asthma clinics make any difference to the provision of asthma care?

The answer is probably that they do, but whether the improvement comes from having nurse-run asthma clinics or from the practice developing an interest in asthma, with protocols, self-management plans and peak flow meter use is difficult to know. It is more certain that patient education alone is insufficient to alter morbidity. A review of audits, facilitators and childhood asthma has been undertaken in Scotland.²³ The intervention group had a fall in the number of hospital inpatient days compared with quite a large rise in the control group. What is more, the total healthcare costs of the control group rose during the year studied by a much greater extent than the cost for the intervention group.

5.123 What about more sophisticated audits?

More sophisticated audits may be more difficult to carry out, partly because of difficulties in data collection and analysis. Most general practice computer systems are better at collecting data that involve either the absence or presence of something, than at determining the number of those things. Most of the systems currently in use are not useful for gathering information on, for instance, the number of prescriptions the patient may

have received of a particular drug over a particular timespan or, as another example, the number of days lost from work due to asthma.

More sophisticated measures of morbidity could include:

- *Nocturnal and early morning symptoms* – these are common manifestations of poor asthma control.
- *Daytime and activity-induced symptoms* – patients are often reluctant to acknowledge this limitation. Asking patients whether normal daily activities bring on symptoms is one way of addressing daytime symptoms.
- *Days lost to asthma* – this is a measure of morbidity as this reflects the impact of asthma on the patient's lifestyle. These data are very subjective, and patients are notoriously inaccurate in remembering the number of days that they may have lost from work or school, especially if you ask them to delve too far back into their memory.
- *Reliever use* – auditing the number of prescriptions for relieving medications over a 6-month period can help to identify patients with a high asthma morbidity. On the whole, a large number of reliever prescriptions indicates poor asthma control, unless the asthma is very severe.

The following measures of patient management can also be evaluated:

- *Inhaler technique* – poor inhaler technique is a major cause of failure of treatment. Inhaler technique should be checked at every opportunity.
- Does each patient have their own individual guidelines or self-management plan?