Issues in adolescent asthma: what are the needs?

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Although asthma is increasing in teenagers it is often not recognised. This may be partly due to a lack of perception of the disease and partly to a reluctance to seek medical advice. A greater awareness of asthma in schools and health checks for teenagers in general practice may help to improve diagnosis. In addition, strategies to discourage cigarette smoking should be targeted at young people with asthma. Asthma education is important, but in itself will not resolve the non-compliance with treatment that is common in adolescents. Treatment plans need to be negotiated, not dictated, and are more likely to succeed with parental and peer group support. One barrier to compliance is a general antagonism to regular daily medication. Teenagers are more likely to comply with once or twice daily regimens than with treatment three or four times daily. Inhaled bronchodilator therapy is preferred to oral therapy, although oral anti-inflammatory compounds may have advantages in compliance.

Asthma education is important, but in itself will not resolve the non-compliance with treatment that is common in adolescents.

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Recognition of asthma

There are several reasons why asthma often goes unrecognised and tends to be undertreated in teenagers. Disraeli (British statesman and writer, 1804–81) is alleged to have said that "youth is a blunder", a phrase that epitomises the traditional adult concept of adolescence as a disagreeable period of turmoil, awkwardness, rebelliousness, and unpredictability, to be tolerated then quickly forgotten. The other familiar aphorism detrimental to the care of adolescents is that "children grow out of their asthma". Asthma is almost as common in adolescence as it is in young children and more common than it is in adults. In New Zealand 32–38% of 12–15 year olds had experienced wheezing illness during the year preceding the study.[1] Diagnosed asthma occurred in 16·5% of Australian children of the same age.[2] In the Netherlands the figure was 19% for a group aged 10–23 years.[3] There are approximately 4·2 million teenagers in the UK (8·4% of the total population). If the prevalence of asthma in this group is the same as it is in The Netherlands, then more than 800 000 of them have asthma. In Scandinavia the prevalence of asthma in adolescents is low. However, in Finland it increased from 1% in 1977 to 2·8% in 1991 (table 1).[4]

Fortunately, asthma deaths are uncommon in adolescents, but in the UK between 1990 and 1992 three times as many children aged 10–14 years and six times as many aged 15–20 years have died of asthma as those aged between 5 and 10 years. Furthermore, asthma deaths were more frequent in boys than girls, but the gap narrowed in the late teens (table 2).[5]

The discrepancy between the data in table 1 – which indicates a prevalence of wheezing illness of over 30% in New Zealand obtained using video techniques and a standardised written questionnaire[1] – and that of 16·5% for diagnosed asthma in Australia[2] suggests that asthma may be underdiagnosed in young people. Further evidence comes from the study of the prevalence of asthma in young people in The Netherlands. Screening by questionnaire and spirometry identified 19% of the population studied as having asthma, but asthma had been recognised by the general practitioner in less than half of them. Male sex, a past history of "bronchitis", and a family history of atopy increased the likelihood of recognition of asthma.[3] Possible reasons for the failure to diagnose asthma are that young people may have poor perception of asthma symptoms or that they may be reluctant to consult their doctor about them.

It is well known that some patients with asthma are unaware of airways obstruction or underestimate the degree of its severity. Although no studies specific to teenagers have been carried out, Rubinfeld and Pain investigated the perception of wheezing by adults in whom asthma was induced by bronchial challenge. Some were found to be quite un-

Table 1 Prevalence of asthma in adolescents

Country	*Year of study*	*Age (years)*	*Prevalence (%)*
New Zealand[1]	1991	12–15	32–38
Australia[2]	1992	12–15	16·5
Netherlands[3]	1989	10–23	19
Finland[4]	1991	15–16	2·8

Table 2 Mortality due to asthma in the UK between 1990 and 1992[5]

	Age (years)			
	0–4	*5–9*	*10–14*	*15–19*
Population (millions)	3·54	3·26	3·13	3·11
Boys	22	9	31	50
Girls	12	5	12	37
Total	34	14	43	87

aware of any symptoms when their forced expiratory volume in one second (FEV_1) was less than 50% of predicted values. Others felt mildly wheezy with an FEV_1 of less than 30% of predicted.[6]

Four years ago Market and Opinion Research International (MORI) carried out a qualitative survey of adolescents with asthma on behalf of the UK National Asthma Campaign.[7] Forty six young people with asthma aged 13–16 years were recruited from schools throughout the UK. Groups of between six and nine individuals took part in topic guided discussions. It emerged that only two of the 46 attended an asthma clinic, only 25 had undergone peak flow measurement at some time, and most had poor knowledge of their asthma and limited understanding of its management. Furthermore, many relied heavily on pharmacists to explain their medication. The survey revealed a reluctance by these teenagers to visit their general practitioner or attend outpatient clinics.

One place where undertreated or undiagnosed asthma might be recognised is at school. About half of all school age children with asthma are unable to complete games periods because of asthma.[8] Unfortunately, many teachers in the UK have little knowledge of the relationship between asthma and exercise. In one survey over half of the teachers questioned considered that asthmatic children were less competent at sporting activities but few were aware that this was because the physical activity provoked wheezing or that it could be prevented by pretreatment with a β agonist bronchodilator.[9] Teachers need more structured information if their observations during play or games periods are to help identify undiagnosed asthma in teenagers. A survey of adolescent athletes suggested that screening followed by formal exercise testing might be one way of identifying asthma. Previously unrecognised exercise-induced asthma was found in 29% of adolescent athletes identified by medical history and spirometry to be at risk.[10] Formal exercise testing has the disadvantage that it is very time consuming if applied to large numbers of children. Also, it may not reveal asthma that has been asymptomatic for several months.[11]

An alternative approach is to invite adolescents to general practices for health checks. This offers the opportunity both for recognising asthma and for giving advice about other health issues such as diet, physical activity, contraception, alcohol consumption, and cigarette smoking.

The willingness of young people to attend health checks was tested recently in three UK general practices – one in an inner city area, another in a country town, and a third in a rural area. The aim of this particular study was to address the issue of cigarette smoking but the invitation made no special mention of smoking. Up to three invitations were sent out to each individual. Perhaps surprisingly, the response of 13, 15, and 17 year olds was very positive and 73% of those invited attended for check-ups.[12]

This and another study of screening of adolescents in general practice, which achieved a 50% attendance on a single invitation,[13] suggest that, if approached personally, teenagers are willing to listen to advice about their health. An unexpected bonus, expressed by the practice staff who conducted the first study, was the opportunity to begin a good adult-type relationship with the teenagers based on the concept of a healthy lifestyle.[12]

Self-image and risk taking

The adolescent environment is wider and often more hostile than that of the younger child. To be able to cope with the new environment adolescents must develop certain attributes such as personal autonomy and reduced dependency on parents and family, which is natural in early childhood, and increased intimacy with peers based on a combination of pre-adolescent experiences and newly acquired autonomy. At the same time adolescents are driven by and must respond to new and powerful sexual impulses. The fierce desire to achieve independence from pre-adolescent family ties is matched by an intense aversion to being different from the peer group. An almost inevitable consequence of this is risk taking behaviour which tests new boundaries in relationships with family and peers.

Asthma may make it more difficult for adolescents to arrive successfully at competent adulthood . . .

Asthma may make it more difficult for adolescents to arrive successfully at competent adulthood for several reasons including: (1) continued dependency on parents because adolescents and their parents attend outpatient or asthma clinics together and parents share the management of the adolescent's disease; (2) coughing or wheezing during physical activity such as sport and dancing; and (3) the need to use highly visible treatment which makes young people with asthma different from their friends and may lead to isolation. In addition, the desire not to be seen taking treatment may contribute to non-compliance with the treatment.

Investigation of self-image, self-esteem, and cognitive and emotional disturbance in asthmatic adolescents has produced differing results. One study using the Offer Self-Image Questionnaire failed to demonstrate any differences between asthmatic adolescents seen in a private outpatient allergy practice and non-asthmatic controls. In fact, the self-image of the asthmatic girls was better in some respects than that of their non-asthmatic counterparts.[14] On the other hand, a study of 12–18 year olds with chronic diseases including asthma, using a questionnaire compiled from the Beck Depression Inventory and the Rosenberg Scale of Self-Esteem, found they had higher depression

scores and lower self-esteem than healthy age matched controls.[15] All of the children in the second study had been admitted to hospital at least twice during the previous year and so may have represented a group with more severe disease than in the first study. This impression is borne out by the results of a third study which showed that teenagers with mild asthma did not have any greater cognitive or emotional disturbance than those without asthma. However, irrational beliefs, anxiety, depression, and hostility were strongly associated with severe asthma.[16]

Cigarette smoking is a common risk taking activity in teenagers. Most adult smokers take up smoking as teenagers and the earlier children start smoking the less likely they are to give it up.[17] A survey conducted in the UK in 1990 concluded that 27% of girls and 26% of boys in the fifth year of secondary school (aged 15–16 years) were smoking regularly (at least one cigarette per week).[18] Cigarette smoking is almost as common among adult asthmatics as it is in non-asthmatic subjects. Adolescents with asthma past or present may represent a group particularly likely to take up smoking. A questionnaire used to discover perceptions and beliefs about smoking in 13–16 year olds revealed that those with a past history of asthma had a more positive attitude towards cigarettes, a self-image more closely linked with their perception of smokers, and a stronger intention to become smokers themselves than non-asthmatics.[19]

The penalties for taking up smoking at a young age, such as increased risk of lung cancer,[20] reduced asthma control and, for girls who smoke during pregnancy, a major risk of abnormal lung function in their infants,[21] are irrefutable. A general awareness of these dangers does not seem to be sufficient to discourage teenagers from smoking. Other strategies are needed and it is encouraging that many teenagers seem to welcome an initiative from their general practitioners. Counselling in early adolescence by family doctors and practice nurses could potentially reduce the uptake of cigarette smoking by young asthmatic patients. The initial response of adolescents who attended health checks in the general practice study described earlier was that 60% of the smokers made an agreement with the practice doctor or nurse to give up smoking.[12]

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Education and compliance

An approach that assumes that the teenager will follow the clinician's directions if asthma is explained and treatment recommendations demonstrated is often unsuccessful.[22] Intelligence, education, and the ability to understand information about the nature of asthma bears little relationship to compliance. Even when clear written advice is given, as many as 75% of asthmatics do not take their medication correctly.[23]

The diagnosis of asthma, whether symptoms have just developed or the asthma is long-standing but previously unrecognised, is likely to provoke intense emotions and beliefs in adolescents. It may be very difficult to express these concerns either to parents or to doctors and reactions may take the form of anger, self-blame, fear, reduced sense of self-esteem, or denial. Most teenagers prefer to view asthma as episodic and find it hard to accept the need to take regular medication. A vital first step in management is to discover the teenager's anxieties about asthma and its treatment. Questions inviting a yes or no answer do not achieve this and open ended questions such as "What worries you about having asthma?" or permissive questions such as "Lots of teenagers tell me that they are unhappy about taking treatment every day. What sort of things worry you about taking treatment regularly?" are likely to be much more revealing.[24] This sort of discussion helps to establish a two-way flow of information that moves towards the negotiation of a contract of management between the physician and the teenager. Negotiation is important because it will give the teenager some authority and less of a feeling that asthma and its treatment will impede progress towards adulthood. Where possible the clinician should enlist the involvement and support of parents in such negotiations as effective parental involvement in the healthcare of teenagers will improve compliance with treatment regimens.

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Asthma management is also more likely to succeed if it is combined with that most powerful of influences – peer support. Support groups give the opportunity for teenagers with asthma to share the burden of their illness and to see how others cope with their parents and peers as well as with their asthma attacks. An example is the "Support for Asthma Youth" initiative sponsored by the Asthma and Allergy Foundation of America. Each group has a core of teenagers with asthma supported by a respiratory nurse or asthma educator and a physician who gives advice. This particular network produces written and telephone advice and organises group sessions to increase the understanding of asthma. The group sessions also offer the opportunity to share practical tips on asthma management. As adolescents employ some of the learning tools of childhood, including play, the most effective methods for education have proved to be role play and learning games. Information in the form of booklets and videos is a useful supplement to, but not a substitute for, personal contact. The same applies to treatment plans. A plan of asthma management once worked out with the

Table 3 Partnership in asthma management

Recognise expectations and concerns
Negotiate contracts, enlist family support
Keep the treatment plan simple
Write down what to do if the asthma gets worse, improves, or there is an attack
Review and reward efforts

teenager and his parents should be written down. Simple treatment plans are the most effective. They need to contain three essential elements: what to do if the asthma gets worse, how to reduce treatment if the asthma improves, and how to manage an acute attack. This gives teenagers some responsibility for and control over their disease, but they also need to know when to seek medical help (table 3).

Treatment

Administration of asthma medication directly to the airways by inhaler confers the great advantage that small doses can be given, thus reducing the risk of side effects. The large volume (750 ml) spacer device with a one-way valve is an efficient, easy to use delivery system. However, for teenagers, it is cumbersome and embarrassing. It cannot be carried unobtrusively and, in the teenager's bedroom, it is immediately obvious to friends. The unmodified metered dose inhaler (MDI) is much easier to conceal and tends to be more popular with teenagers. Unfortunately it is seldom used properly. More than two thirds of adults[25 26] and half of children[27] with asthma do not use the correct method even after instruction.

A study of MDI use by junior paediatric medical staff in a New York teaching hospital highlights the problem. When asked to demonstrate inhalation via an MDI 48% did not shake the inhaler and 40% failed to exhale before use; 29% actuated the inhaler more than once during a single breath and 54% did not hold their breath after inhalation.[28] This lack of knowledge and expertise among asthmatics and clinicians is striking, but it is probable that even those teenagers who know how to use the MDI correctly do not do so when they are with their peers. Although small and convenient to carry, the MDI becomes very obvious if the proper inhalation technique is used – first exhaling, then inhaling with the head tilted back, and finally holding the breath after inhalation. We have little specific information about the techniques used by teenagers to inhale medication via MDIs, but the least easily observed method is certainly not the most efficient.

Table 4 Preventive medication for asthma (France, Germany, Italy, USA, UK)

	Age (years)		
	0–9	*10–19*	*20+*
Population (%)	13	12	75
Prescriptions (%)			
Cromoglycate	46	22	78
Inhaled corticosteroids	10	12	78
Ketotifen	36	15	49
Theophylline	4	5	91

Source IMS AG (1994).

Two other factors likely to influence the willingness of teenagers to take medication are frequency of administration and concern about side effects. Four classes of compound are widely used for regular or preventive medication in children and adolescents with asthma: sodium cromoglycate, inhaled corticosteroids, ketotifen, and theophylline. There are wide variations in prescribing habits in different countries but when data from France, Germany, Italy, USA, and the UK were pooled, 22% of all prescriptions for cromoglycate, 12% for inhaled corticosteroids, 15% for ketotifen, and 5% for theophylline were for 10–19 year olds who comprise about 12% of the total population (table 4). It is recommended that sodium cromoglycate be taken four times a day. There must be considerable doubt about compliance with a regimen with such a high frequency of administration.[29] Compliance with a regimen of inhaled prophylactic medication in 9–16 year olds was found to be inversely related to the number of doses prescribed per day. The percentage of days when medication was taken as prescribed decreased from 71% for twice daily medication to 18% for four times daily medication.[30]

Inhaled corticosteroids are currently the most effective treatment for moderate and severe asthma in all ages and need be taken only twice daily. However, compliance with inhaled corticosteroid treatment may be influenced by anxiety about side effects. Such concerns about possible adverse effects, particularly effects on growth, are often expressed by the parents of young children with asthma; we do not know whether this is something that also worries teenagers. A physiological delay in the onset of puberty is often seen in asthmatic patients irrespective of the severity of disease or its treatment. It is conceivable that asthmatic teenagers who are smaller and less well developed than their peers might worry more about the possible adverse effects of treatment on their growth. However, what little evidence we have in adolescent asthma suggests that fears on growth suppression by inhaled corticosteroids during adolescence are unfounded. In a multicentre study in The Netherlands[31] the growth of 40 asthmatic teenagers treated with budesonide 0·6 mg/day for a median of 22 months was compared with the growth of asthmatic and non-asthmatic controls. Asthmatic boys grew more slowly than their age-matched non-asthmatic peers irrespective of whether or not they were taking inhaled corticosteroids. This is compatible with their having a later onset of pubertal growth. However, the growth rate of asthmatic boys and girls treated with inhaled corticosteroids was no different from that of those who received only a β agonist bronchodilator.[31] Young people may also associate "steroids" with the androgenic variety used by some athletes. Although these anxieties about the side effects of inhaled corticosteroids are without foundation, they may still be a barrier to compliance.

Oral compounds that are taken only twice daily have potential advantages for treatment compliance in teenagers. This may help to

Table 5 What are the needs?

Health checks, general practitioners, and schools
Non-smoking strategy
Peer support groups
Agreed, simple, written treatment plans
Joint clinics for severe disease

explain the frequent prescription of ketotifen to asthmatic adolescents. Although useful in atopic pre-schoolchildren, clinical trials have not shown this compound to be highly effective in older children and adults. Its popularity may in part be attributed to ease of administration. Slow-release theophyllines have the same advantage of ease of administration, but the need for frequent dose adjustment during rapid pubertal growth[32] makes their use impractical in many teenagers.

The leukotriene receptor antagonists, which are likely to become available on prescription for adults and adolescents in the near future, are also orally active. Our understanding of the role of the leukotrienes in childhood and adolescent asthma is still rudimentary. Levels of cysteinyl leukotrienes are raised during and one month after asthma attacks in young children, so one can speculate that upregulation of the arachidonic acid metabolic pathway may contribute to persistent inflammation of the airways in young asthmatics.[33] We must await the outcome of appropriate clinical trials before we know whether leukotriene receptor antagonists have a place in the treatment of young people with asthma. Certainly, an orally active prophylactic agent that can be taken twice a day is likely to appeal to teenagers, and may improve compliance.

Concluding remarks

In the UK most children with asthma do not attend hospital clinics and continuity of care is provided by their general practitioner. However, those with severe asthma, most of whom will not grow out of their symptoms, need hospital-based care as well. As they progress through adolescence teenagers become increasingly uncomfortable in paediatric wards and outpatient clinics. They need clinics where they can meet the chest physician who will take on their care before they transfer to a clinic for adults (table 5).

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Adolescent asthmatic patients are a distinct group of patients with different treatment requirements from either paediatric or adult patients. It is important that physicians recognise adolescent needs and the importance of regular health checks, smoking, peer pressure, and the negotiation of treatment plans in this group of patients.

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