

Adolescent treatment compliance in asthma

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The term compliance is defined in the dictionary as 'to consent' or 'to do as asked'. With adolescent behaviour these two definitions are not the same thing: many adolescents will consent to treatment in the clinic but do not do as asked when they return to normal day-to-day life. The term adherence in relation to treatment is also widely used and is defined as 'wilful intention'. Non-adherence would therefore be the wilful intention not to do something. Ordinarily, the word compliance refers to taking the correct dose of prescribed medication at the correct intervals. In real life doses are often omitted and the intervals between doses are commonly longer than they should be; a rarer form of non-compliance is over-consumption of medication. Yet compliance affects many other aspects of the management of chronic conditions, such as avoidance of aggravating factors, monitoring, appointment-keeping, prevention or applying an emergency plan of action when needed.

The term concordance has also been introduced to reflect an alliance of equals, professional and patient, rather than one-sided obedience¹. The direct involvement of patients in decision-making is now central to policy in the National Health Service. However, the concordance concept is not discussed further in the current review because of the scarcity of evidence-based data on its application to asthma treatment. Here we review the complex issues of compliance with asthma treatment in adolescence and how they can be assessed, understood and addressed.

REASONS FOR NON-COMPLIANCE

Non-compliance can be either unintentional or intentional. The reason for unintentional non-compliance may be inadequate instructions or a regimen that is too complex or time-consuming. Inadequate training in inhalation technique often causes non-compliance despite the best intentions. Lack of understanding about the need for long-term preventive treatment is another important cause of non-compliance, especially when preventive medication does not produce immediate symptom relief. The

commonest reason for inconsistent use of inhaled corticosteroids in one large North American study, including 394 adults, was the belief that these agents were not needed during symptom-free periods². Parental or patient anxiety regarding side-effects, dependence and overdosage also contributes substantially to non-compliance^{3,4}, especially in relation to inhaled corticosteroids. Another difficulty for teenagers is the awkwardness of taking medication via a large volume spacer when at school or out with friends; treatment must take account of the changing circumstances of children and adolescents. Denial of being asthmatic, or of the severity of the illness, is a common reason for non-compliance in this age group. Additional factors such as inconvenience of treatment, forgetfulness, laziness, or carelessness⁵ are not unique to adolescent behaviour, and any criticism should be expressed in a way that does not worsen the relationship between professional and patient. Children do become less compliant as they approach adolescence. In a study of 163 children aged 7–16 years Jonasson *et al.* found that those aged less than 9 had significantly better drug adherence than those aged 10–16⁶. Other risk factors for non-compliance are large family size and history of recreational drug intake⁷.

True intentional non-compliance is more complex in its origins and more difficult to recognize and change in the individual. Although many adolescents and young adults with chronic disease, including asthma, neglect their health, very few are harming themselves deliberately. The long-term management of intentional non-compliers presents special ethical dilemmas. Adolescent factors that militate against compliance with treatment include struggles with authority, cultural pressures to be normal and a chaotic home environment⁸.

CONSEQUENCES

Troublesome consequences of non-compliance include uncontrolled symptoms day and night, limitation of lifestyle and the need for emergency attendances at the general practitioner's surgery or hospital. The other side of non-compliance, overuse (estimated to occur in 2–7% of patients^{6,9}), means an excess of side-effects. The economic implications of non-compliance have increased with the advent of expensive new treatment regimens. In England in 1999 £587 million was spent in the community on drugs

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listed under the Respiratory System section of the *British National Formulary*¹⁰. If compliance is about 50% the direct waste of resources is substantial. Moreover, the economic impact of non-compliance will include less easily measured costs such as those of missed appointments, emergency visits to hospitals and days off school or work.

ASSESSMENT

The exact scale of non-compliance is hard to assess and for asthma medication the estimates range from 10% to 55%. What is the best way to assess compliance? As one might expect, diary cards tend to exaggerate^{6,13}. History taking and examination provide the first clues. An open 'be honest' type of questioning should be adopted with child and parents: how much of the medication is really being taken day to day? The answer can help with compliance since, if it is much lower than expected and the disease is well controlled, the prescription can be cut. Put *et al.*¹⁴ found a higher incidence of self-reported non-compliance with asthma treatment in patients who were currently in hospital or recently discharged from hospital than in patients of similar severity who contrived to avoid hospital admission. One way to identify the non-complier is to ask the primary care physician how often the patient attends for a repeat prescription. Sherman *et al.*¹⁵ also found that the patient's pharmacy provided accurate information in 92% of cases.

At the clinic visit, weighing a metered dose inhaler, checking the date of issue or counting remaining tablets could enable the physician to gain insight into treatment adherence. However, in studies where tablets were counted or medication was weighed the results were only 50% accurate in reflecting compliance¹⁶. A recent study of oral asthma medication in 57 patients obtained sufficient data from 47. Compliance was 92% as estimated from the tablet count but only 71% from recordings of electronic TracCaps, which recorded the dates and times patients removed and replaced their medication bottle caps¹⁷.

Treatment can also be monitored directly by measurement of drugs in the blood, but in practical terms this applies only to theophylline and cyclosporin, which are seldom used in current practice. Moreover, low blood levels must be interpreted with caution¹⁸. Sputum eosinophil count has been investigated in a small number of patients as a marker for non-compliance but more work is needed to show whether it provides a reliable and practical method¹⁹.

Electronic devices have been used for both metered dose inhalers and oral medication. Devices that record the time and frequency of use are available for research purposes, and the ethics of 'bugged inhalers' have been discussed by Levine²⁰. In his view, this kind of covert monitoring is

ethically justifiable if the risk to the patient is negligible and the research would be invalid if the patient was informed he or she was being monitored in this way. In non-compliers, further therapeutic support could be offered on completion of the study.

Investigations of non-compliance in chronic disease have been reported by Sackett *et al.*²¹ and Cochrane²². These indicate that about one-third of patients are compliant with treatment, one-third partly compliant and one-third non-compliant.

Coutts *et al.*⁹ studied 14 asthmatic children aged 9–14 years with a Chronolog electronic timer⁹. These children were aware they were being monitored; nevertheless, underuse of medication was found in 55% of study days, mainly due to omission of a dosage time rather than not taking enough puffs of medication. With a twice-daily regimen compliance was 71% whereas with a four-times-daily regimen it was only 18%. One patient activated the inhaler 77 times in the 30 minutes before arriving in clinic.

A covert electronic monitoring study was conducted by Redline *et al.*²³ in Chicago. 65 children aged 5–9 years were included, of whom 40% were below the poverty level for that city. The patients were asked to undertake electronic peak flow measurements twice daily for three weeks and enter the results on a diary card. At three weeks diary cards indicated missing reports in 15% but the true figure was 52%.

Chowienczyk *et al.*²⁴ likewise found that patients who were asked to keep a record of their peak expiratory flow frequently invented the results. Electronic devices that alert patients to the exact time of recording may improve data-keeping.

WHAT DO PATIENTS WANT?

Improvement of compliance demands an understanding of the patient's likes and dislikes. Patients understandably do not favour a medication regimen that requires regular blood testing²⁵. Regarding the route of administration, some²⁶ but not all²⁵ studies indicate a preference for oral over inhaled medication. The question of route assumes greater importance when one remembers that many patients take their inhaled drugs incorrectly. Infrequent administration is also preferred to frequent⁹. As regards choice of device for inhaled medications in adolescents, no broad conclusions can be drawn^{27–29}.

DEALING WITH NON-COMPLIANCE

A Cochrane Review of interventions to improve non-compliance and outcome concluded that most methods are complex and few are effective³⁰. The care of children with chronic illness demands a combined effort from paediatricians, general practitioners, nurse specialists,

psychologists and parents; the input of teachers, peers and support groups can also be invaluable. The most fundamental step in improving compliance is to identify the underlying reason for non-compliance in each case. Certain difficulties can be anticipated and avoided by careful management. Often, in asthma, the treatment regimen can be simplified—for example, by switching to once daily³¹ dosage of inhaled corticosteroids; this regimen is effective in mild to moderate asthma^{32,33}. A fixed combination of inhaled medications can be at least as effective as use of separate inhalers^{34–36}; patients prefer fixed combinations³⁵ though no clear benefit in terms of compliance has yet been demonstrated^{34,35,37}. The time of a once-daily dose may be relevant. Jonasson *et al.*³⁸ measured compliance over twenty-seven months in 122 children aged 7–16. In the 89 who completed the study, compliance with a twice daily regimen was slightly higher for evening doses (47%) than for morning doses (41%).

Other strategies include discussions to reduce the fear of side-effects and a written and talked-through personal instruction plan for day-to-day therapy. We know that only 50% of a consultation tends to be remembered, so written instructions are helpful. The clinician should talk directly to the adolescent in the presence of the parents. Leaflets and videos, especially on inhalation techniques, are available. An asthma nurse specialist can be of great help in this setting. The patient needs to gain an understanding of the inflammatory processes in asthma and the different functions of ‘preventer’ and ‘reliever’ inhalers². A consistent relationship, one to one, with a healthcare professional is desirable and a practice nurse will often be that person. Adolescents require privacy, respect and confidentiality in clinical consultations. In addition, well-designed peer-led education programmes can improve asthma control in adolescents³⁹. Attendance at follow-up appointments is important, and in several large studies only about 50% of adolescents kept their appointments^{40–42}. Those who understand the potential hazards of non-adherence seem to have better attendance records than those who do not⁴¹. Reminders and other incentives can make a difference. Direct telephone call reminders before clinical appointments increased clinic attendance by 26% in a randomized controlled trial⁴². In an Australian study, a group of 15 and 16-year-olds were provided with

educational material, including videos, games and songs. Preceded by individual teaching, this intervention resulted in clinically relevant improvement in asthma control⁴³.

The role of special adolescent clinics is under much discussion. So far there is no convincing evidence that they offer specific advantages over the current approach, provided it is targeted at the patient with relevant support to the parents. Recommendations for improving compliance are summarized in Box 1.

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Box 1 Factors improving compliance

- Once or twice daily regimen
- Open and honest reporting of compliance
- Discussion of agreed treatment plan
- Written treatment plan
- One-to-one professional relationship with doctor or nurse
- Patient education, leaflets, videos

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