



## Topical Reviews

# Improving patient compliance with asthma therapy

K. R. CHAPMAN\*, L. WALKER<sup>†</sup>, S. CLULEY<sup>‡</sup> AND L. FABBRI<sup>§</sup>

\*Asthma Centre of the Toronto Hospital, Suite 4-011 ECW, 399 Bathurst Street, Toronto, Canada M5T 2S8

<sup>†</sup>Benreay Surgery, Buckie, Scotland and <sup>‡</sup>Department of Respiratory Medicine, Guy's Hospital, London, U.K.

<sup>§</sup>Universita degli Studi di Ferrara, Laboratorio di Ricerca su Asma Bronchiale, Ferrara, Italy

Patients fail to comply with asthma medication for a variety of reasons. These range from physical inability to use an inhaler, through simple forgetfulness, to a conscious decision not to use medication as prescribed due to internal or cultural health beliefs or socioeconomic factors. In some patients, poor self-care because of deep-rooted psychological factors (i.e. factors of which patients have only limited awareness) can affect compliance. Poor doctor–patient communication can be the cause in many other individuals. Thus, there is no single solution that will improve compliance in all patients. Simplifying the regimen or providing memory aids will be sufficient for some patients, while education or psychological counselling will be more appropriate for others. Doctors can also use a range of communication skills to improve the way in which they present information, motivate patients and reinforce progress. These approaches, plus respect for patients' health beliefs and involving them in treatment decisions, can help foster an atmosphere of mutual responsibility and concordance over medicine taking.

**Key words:** asthma; doctor–patient relationship; education; patient compliance; psychology; respiratory therapy.

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## Introduction

Patients may fail to comply with prescribed medication regimens for a variety of reasons. They may intend to comply but may misunderstand or forget complicated drug regimens. They may be physically unable to cope with inhaler devices. Patients may also have fears about their medication; a fear of becoming dependent on medication is common. Many patients express concerns about possible side effects of inhaled corticosteroids used for the treatment of asthma (1,2). In addition, asthma patients may think that treatment is unnecessary during symptom-free periods (3,4). Alternatively, patients may consider the medicine to be ineffective or unnatural, or wish to balance its risks and

benefits according to internal, cultural and social criteria (4). Socioeconomic factors also play an important role (5).

A major contributor to non-compliance is poor communication between the doctor and patient. Management of a chronic disease differs from that of an acute disease in that it requires an ongoing partnership between doctor and patient, which enables the treatment regimen to be constantly fine-tuned (6). This partnership depends on education of both healthcare providers (7,8) and patients (9), and on doctor–patient communication. This is to ensure that the best available information is supplied to patients and that they are willing and able to follow the treatment regimen at home. The partnership is hindered if patients feel that they are wasting the doctor's time or that they have not been listened to, and by an inability to understand the information given (4). In turn, patients may omit details that they deem unimportant or embarrassing but may be important in deciding the optimal treatment.

Clinical investigators have described compliance in widely varying terms such as the percentage of prescribed doses taken or the percentage of days with 'adequate' compliance. By whatever definition used, estimations of compliance with inhaled respiratory medication are invariably poor, and are in the range of 40–50% (10,11). Values as low as 15% have been reported (12). Long-term compliance is a particular problem in chronic respiratory disease. Using an electronic monitoring device to record inhaler usage, Simmons *et al.* (13) showed that compliance

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Correspondence should be addressed to: Dr. K. R. Chapman, Asthma Centre of the Toronto Hospital, Suite 4-011 ECW, 399 Bathurst Street, Toronto, Canada, M5T 2S8. Fax: +1 416 603 3456.

gradually declined during the 4 months between clinic visits, and improved immediately after each clinic visit. This improvement post-visit decreased with each clinic visit in a long-term clinical trial. Similar results were obtained in a 2-yr follow-up study, with self-reported compliance confirmed by inhaler weights indicating a fall in compliance from approximately 70% at baseline to 48% at 1 and 2 yr (14). Even patients with severe disease do not necessarily comply with their medication. Only about half of patients requiring home nebulizer or oxygen therapy adhere to the prescribed regimen (15–17), while 26% of patients requiring oral steroids were non-compliant (18). A mixture of socio-economic, demographic and personal factors appeared to affect compliance more than symptom severity in these patients (15,16). This prevalence of poor compliance to medication may also affect adherence to guidelines for stepped treatment, making the most appropriate level of treatment difficult to judge and leading to inappropriate stepping up of medication as a result of an apparent lack of efficacy.

A working party on medicine consumption for the Royal Pharmaceutical Society of Great Britain has recommended that 'concordance' should replace the term 'compliance' (19). This change in terminology is thought to reflect more appropriately the necessary doctor–patient relationship. The modern doctor–patient relationship is one that is based less on unquestioning trust and more on openness and respect. Thus, it is hoped that by improving patient understanding there will be an increase in co-operation and 'compliance'. This article explores ways in which this can be achieved.

## Improved understanding of psychological, social and cultural issues

Thoughts, beliefs and emotions all influence behaviour to varying degrees. Psychological, social and cultural factors all have an impact on these aspects of the personality and can affect compliance (1). Compliance can be affected by socioeconomic factors. Poverty, poor family support, living alone and belonging to a minority ethnic race have all been associated with poor compliance (5). Better understanding of how these issues affect compliance is required so that helpful strategies, such as psychotherapy, motivation and support can be investigated to help encourage compliance in some patients.

## PSYCHOTHERAPY

Psychological counselling may produce an emotional improvement that can increase the desire and ability of some patients to improve self-care, particularly those who are depressed. However, studies examining the use of psychological interventions to improve compliance have reported only a few statistically significant improvements, most of which were short-lived (1,19).

An ongoing randomized, controlled study at Guy's Hospital, London, U.K., is assessing the effectiveness of

cognitive analytical therapy in severely asthmatic patients who are less than 70% compliant. This technique increases patient awareness of unhelpful thought and behaviour patterns developed in childhood and their effect on present self-care. By coming to understand their treatment rights and responsibilities, patients can, it is thought, break the cycle. Improvements in feelings of self-worth and independence may then produce positive behavioural outcomes, such as improved compliance (Fig. 1). To date, assessment using the Hospital Anxiety and Depression Scale (HADS) has shown higher scores in non-compliant compared with compliant patients. Depression was diagnosed more than twice as often in the non-compliant group compared with the compliant group. Significantly higher HADS depression scores (4.7 vs. 3.2,  $P < 0.05$ ) were also observed in the non-compliant compared with compliant group during a prospective study of 102 asthma patients (20). Thus, addressing depression appears to be a logical approach for some non-compliant patients.

## MOTIVATION

Motivation has been described as 'the probability that a person will enter into, continue and adhere to a specific change strategy' (21). This reflects the fact that behavioural changes are not usually instant but involve several steps, taken over a period of time. These steps are described in the Stages of Change model (22). In deciding to change a current behaviour, patients must balance the pros and cons of the change (decisional balance) according to their lifestyles and health beliefs. As patients move from unawareness of any problem through contemplating a change to actually carrying out the action, the pros increase and the cons decrease (23,24). Once the change has been accomplished, self-efficacy (the confidence to overcome difficulties and maintain the new behaviour pattern) is important (25). Reinforcement of any progress and encouragement to continue are essential during the entire process of change, but help from healthcare providers differs at each stage (Table 1). In the early stages of change, emotional and cognitive factors are important to raise consciousness and increase motivation to take the first step.

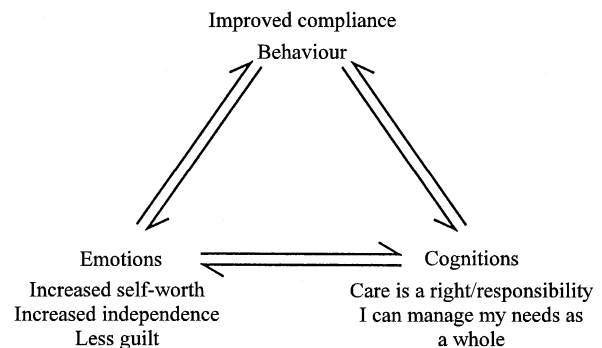


FIG. 1. The interaction of improvements in emotional and cognitive factors with behavioural outcome.

TABLE 1. Use of the stages of change model to improve compliance

Stage of change	Processes in operation	Patient Characteristics	Action to take
Precontemplation	Consciousness raising Social liberation	Rebellion Resignation Rationalization Reluctance	Provide choices Build hope Encourage reflection Give information Reinforce progress
Contemplation	Consciousness raising Social liberation Emotional arousal Self-re-evaluation	Open to information Ambivalence	Provide information Help weigh pros and cons Increase self-efficacy Reinforce progress
Preparation	Social liberation Emotional arousal Self-re-evaluation Commitment	Determination	Help set goals Provide strategies for change Reinforce progress
Action	Social liberation Commitment Reward Countering Environmental control Helping relationships	Actively changing Self-evaluation	Teach skills and self-management techniques Guide attribution process Reinforce progress
Maintenance	Commitment Reward Countering Environmental control Helping relationships	At risk of lapse/relapse Self-evaluation	Teach relapse prevention strategies Encourage continuation Help re-define goals Reinforce progress

In the later stages, there is more emphasis on commitment, action and avoiding relapse; defining goals and teaching drug administration skills and relapse prevention strategies become more important. Motivation and supplying relevant information therefore need to be geared specifically to the patient's stage of readiness to change. However, care must be taken not to pressure the patient as this may lead to resistance.

Counselling guidelines based on this model have been published by Miller *et al.* (26), and have proved successful in fields such as smoking cessation (27) and exercise motivation (28). The model has been recognized as a potentially valuable framework for increasing compliance (22), and a recent study in psychiatric patients has confirmed the effectiveness of compliance therapy (29).

## CULTURAL AND SOCIAL FACTORS

Many ethnic groups have their own health beliefs and traditional remedies (30). For example, inhaled substances are considered 'bad' in some eastern cultures, while oral ones are thought of as 'good'. Inhalers may therefore be

poorly accepted in these communities. Chinese and Ayurvedic medicine is based on a balance between life forces. Although western medicine is perceived as powerful in the short-term, it is considered to cause imbalance in the long-term. Thus, immigrant ethnic groups often mix traditional and western medicines (31), and may discontinue the western medication in favour of the traditional remedy when acute symptoms disappear. It is unrealistic to expect traditional medicines to be abandoned completely in favour of western ones; compliance can only be encouraged through education. In these groups there are also potential language barriers, hence it is important that information is understood.

Social factors are of particular concern when treating children, since the entire family needs to be fully informed and agree with the diagnosis and treatment to comply with their physician's advice. Poor family support has been linked with non-compliance (5). Well-designed booklets and videos, together with good support from healthcare workers, can assist with family education (32).

Patients may view having asthma as a stigma, e.g. when using inhalers in public, seeking employment or needing time off work. The potentially negative social image of

chronic respiratory illness is a particular problem for children and adolescents (4). However, highly technical, state-of-the-art inhaler devices are usually popular in adolescents, so it may be possible to increase compliance. Explaining how treatment can result in being able to participate in enjoyable activities may be more motivating than discussing clinical information in this case.

## Improvement of the doctor–patient relationship

A poor doctor–patient relationship can severely hinder compliance. Improved listening and communication skills can assist in identifying patients' problems and concerns, and in delivering education, reassurance, advice and encouragement in the most accessible and acceptable way for each individual patient (9).

The way in which information is presented is also important. Non-verbal behaviour, such as sitting next to the patient or leaning forward, reduces any perceived social distance and indicates attention. Verbal praise and encouragement are extremely important to patients and reward positive disease management. Participating in interactive conversation, using open-ended questions and providing reassuring messages helps patients feel part of a partnership that is working to control their condition. Tailoring messages specifically to patients is also very important.

## NEUROLINGUISTIC PROGRAMMING

Neurolinguistic programming is a method by which the doctor attempts to tailor messages to each individual patient. In neurolinguistic programming, the doctor takes cues from the patient to establish rapport, determine what the patient hopes to gain from the consultation and how he/she assimilates and processes any information given. Communication can then be structured effectively to suggest ways to achieve the desired health outcome. For example, while some patients welcome increased participation and control in treatment plans, others do not (33) and require more support. Diagrams, demonstrations and written material can be used as appropriate. The conversation should start with the problem and dispel any worries, so that preoccupation with these does not impede taking in new information. It can then move on to suggest ways to improve control. Such tailored self-management strategies have resulted in improved compliance, better inhaler technique and reductions in symptoms and hospital visits (34–37).

## DO IMPROVED COMMUNICATION SKILLS AFFECT PATIENT OUTCOMES?

Clark *et al.* (38) compared clinical outcomes of asthmatic children treated by 42 paediatricians who had undergone

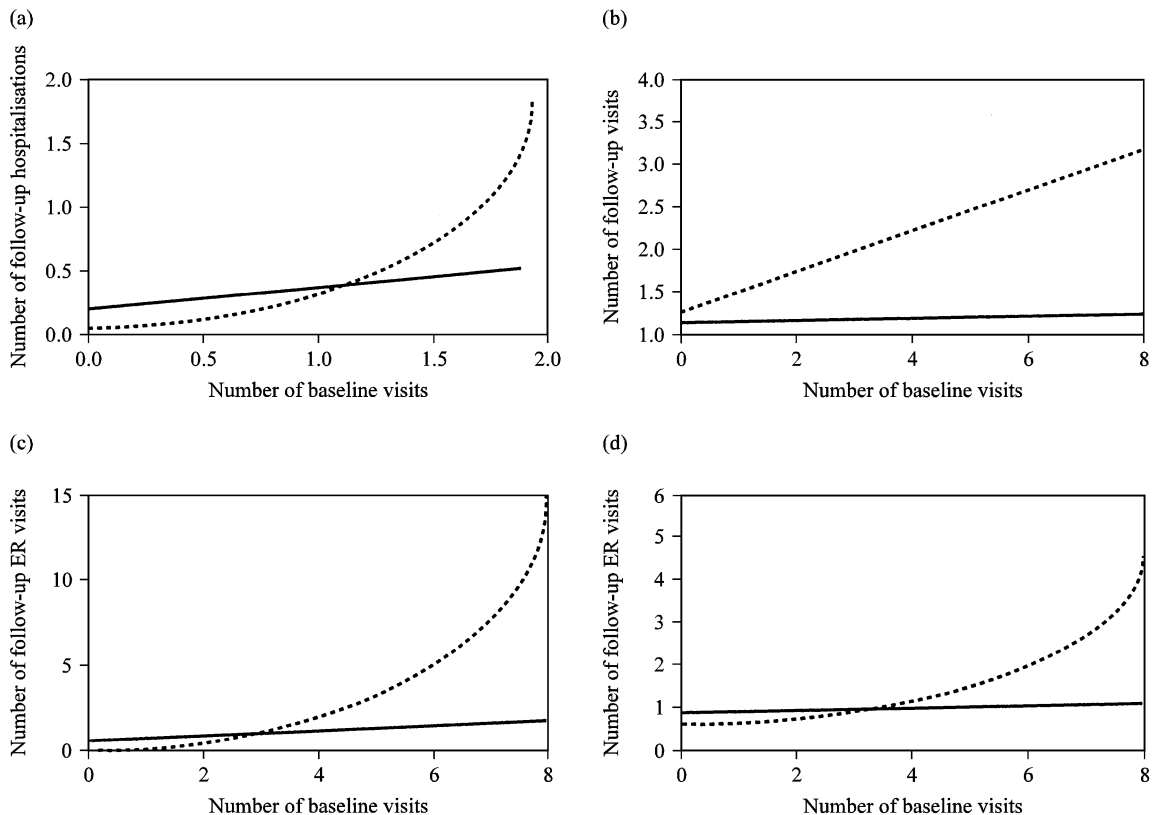


FIG. 2. Use of medical services by asthma patients before and after training of their doctors in asthma treatment guidelines and communication skills. a: Hospitalizations; b: Non-emergency consultations; c: Emergency room (ER) visits; d: Visits to follow-up an episode of symptoms. (All baseline vs. follow-up). —: Treatment; . . .: control.

training in the latest recommendations for asthma treatment and communication skills with those treated by 41 control paediatricians (no training). The training significantly increased the likelihood of prescribing inhaled anti-inflammatory therapy, checking inhaler technique and providing tailored guidelines, reassurance and encouragement. Consequently, patients made significantly fewer consultations (1.24 vs. 2.25,  $P < 0.005$ ) and visits after an episode of symptoms (0.94 vs. 1.61,  $P < 0.005$ ).

Among the 72 children who started inhaled anti-inflammatory medication during the above study, those treated by doctors who had undergone training showed significantly fewer asthma symptoms, and had a minimal number of non-emergency and follow-up consultations, hospitalizations and emergency room visits regardless of their visit frequency at baseline. This suggested that both the anti-inflammatory agent and education to enable correct use of the device were needed to improve symptom control. In contrast, control patients who often used these services continued to do so (Fig. 2). Thus, by improving self-management, doctor training reduced the need for medical services by high-level users.

## Practical measures to increase compliance

Current stepped guidelines for asthma treatment involve complex medication schedules, which alter as symptoms increase or decrease (39–41). Persistent asthma requires regular inhaled corticosteroid therapy to maintain control, even if symptoms are relatively mild. As severity increases, so does the number of regular medications. Self-monitoring of peak flow is also recommended so that instability can be recognized early and treatment adjusted accordingly. Stepped treatment therefore requires compliance in many areas but also introduces many possibilities for non-compliance, ranging from difficulty in using inhalers through to confusion over complex monitoring and treatment regimens. Education, training and support are all important in assisting compliance, but a number of practical measures can also be used.

### SIMPLIFICATION OF THERAPY

#### *Reducing dosing frequency*

Medicines requiring frequent dosing are less convenient than those with a once or twice daily schedule and may result in reduced compliance. Coutts *et al.* (42) found compliance with inhaled corticosteroids taken two-, three- or four-times daily was 71%, 34% and 18%, respectively, indicating that increasing the dosing frequency decreases compliance. Mann *et al.* (43) observed similar results with inhaled flunisolide; patients taking four inhalations twice daily underdosed on 20% of study days while those taking two inhalations four times daily underdosed 57% during the study ( $P < 0.001$ ).

## Combined inhalers

Patients with moderate or severe persistent asthma are often advised to use both inhaled corticosteroids and a long-acting bronchodilator. Although using two regular medications improves respiratory function (44), it increases the complexity of the treatment regimen and creates inconvenience. Combining the two agents in one inhaler could improve compliance in this setting, but conflicting results have been obtained in studies to date. Combination inhalers containing a short-acting  $\beta_2$ -agonist plus a corticosteroid (45) or nedocromil sodium (46) were not complied with more faithfully than separate inhalers under clinical trial conditions. However, Barnes and O'Connor (47) found that compliance with a fixed combination of terbutaline and budesonide was the same as that obtained with terbutaline alone and superior to that seen with budesonide alone (Fig. 3). It is possible that this improvement in compliance is the result of increased convenience with the combination inhaler. One of the limitations of this study is that it combined a short-acting  $\beta_2$ -agonist plus a corticosteroid; the effect of combining a long-acting  $\beta_2$ -agonist and a corticosteroid on compliance remains to be determined.

However, one study has examined the effect of adding a long-acting  $\beta_2$ -agonist to existing corticosteroid therapy on repeat prescription usage (which can be considered as an indirect measure of compliance) of inhaled corticosteroids in general practice (48). The addition of a long-acting  $\beta_2$ -agonist to on-going corticosteroid therapy increased the proportion of inhaled corticosteroids dispensed to the patient. This suggests that the prescription of long-acting  $\beta_2$ -agonists with corticosteroid therapy actually improves compliance with inhaled corticosteroids. This may be because patients have a greater belief in the efficacy of their treatment when a long-acting  $\beta_2$ -agonist dramatically reduces symptoms and hence the need for short-acting bronchodilator needs.

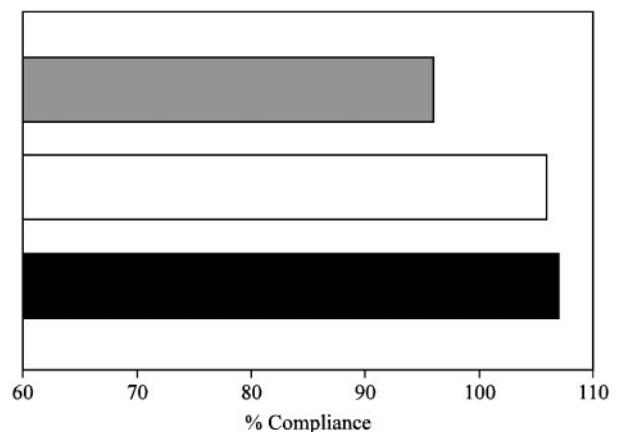


FIG. 3. Compliance with separate and combined inhaled corticosteroids and  $\beta_2$ -agonists. ■: Budesonide; □: terbutaline; ■: combined.

### Switching to oral medication

It is sometimes assumed that switching to oral administration may improve compliance compared with the inhaled route. However, there is little evidence to support this assumption. Kelloway *et al.* (49) found significantly better compliance with oral theophylline ( $79 \pm 34\%$ ) than with inhaled sodium cromoglycate ( $44 \pm 34\%$ ,  $P = 0.0080$ ) or low-dose beclomethasone dipropionate ( $54 \pm 43\%$ ,  $P = 0.0001$ ). A separate study found that 70% of patients complied with oral treatment compared with 52% for inhaled medication ( $P < 0.0001$ ) (50); however, the same dosing frequency was not used for oral and inhaled medications. In contrast, Allesandro *et al.* (51) observed better compliance with inhaled beclomethasone dipropionate than with oral theophylline, implying that patients do not always prefer oral medication.

Inhaled short-acting bronchodilators used as-required have a rapid onset of effect for acute relief of symptoms. For example, oral terbutaline or salbutamol produce peak bronchodilatation about 2.5–3 h after administration; but the same effect is achieved in only 10–15 min after inhalation of either medication (52). Such rapid relief of symptoms provides strong reinforcement to the patient and encourages further use. Short-term side effects such as tremor and haemodynamic effects (53) also occur quickly, and may be viewed by some patients as a signal that the medication is working. In addition, when a metered-dose inhaler (MDI) is used to deliver a drug, the taste of the formulation and the propellant and its physical impact on the oropharynx is more obvious than when using delivery devices such as the Turbuhaler<sup>®</sup> (AB Draco, Lund, Sweden) or a MDI plus spacer. The oropharyngeal sensation reassures patients that the device is working and that they have received their medication. As a consequence, there may be reduced compliance with a MDI plus spacer even though this results in improved drug delivery to the lungs (54). In a study comparing two different dry powder inhalers, Diskus<sup>®</sup> (GlaxoWellcome, London, U.K.) inhaler (which incorporates a small amount of lactose with each dose) and the Turbuhaler<sup>®</sup>, one of the main reasons that patients preferred the Diskus<sup>®</sup> was because they were able to perceive the dose being delivered (55).

In current treatment guidelines, the inhaled route is preferred to oral administration, as the former is considered a safe and rapidly effective topical therapy. The oral leukotriene modifiers are mainly recommended as add-on therapy to inhaled corticosteroids. Asthma patients almost always need to carry an inhaler containing rescue bronchodilator medication, and if disease is of moderate or greater severity, complete symptom control is likely to require concurrent inhaled preventative medication. Hence, it is possible that oral medication used in conjunction with inhaled corticosteroids may lead to reduced compliance because of increases in regimen complexity.

### Type of inhaler

Poor inhaler technique is a major reason for unintentional underdosing and can easily be interpreted as non-compli-

ance (3). Many patients have problems using MDIs and may benefit from repeated training or easier to use inhalers.

MDIs require co-ordination of device actuation and inhalation, but dry powder inhalers are breath-actuated devices and may be easier for children and the elderly to use. Comparisons of two newer dry powder inhalers, the Diskus<sup>®</sup> and Turbuhaler<sup>®</sup> inhalers, have shown that patients (particularly the elderly) preferred the Diskus<sup>®</sup> inhaler, finding it significantly easier to hold and use (55,56). However, whether this increased preference results in improved compliance has yet to be determined.

### Memory aids

Memory aids such as reminder notes or diaries can be helpful in reinforcing compliance. Electronic diaries are available, and provide a more accurate record than written records (57). Electronic dosage recorders such as the Chronolog<sup>®</sup> (Forefront Technologies Inc., Lakewood, Co, U.S.A.) (42,58), Turbuhaler<sup>®</sup> Inhalation Computer (59,60) and Doser<sup>®</sup> (Meditrack Products, Hudson, Ma, U.S.A.) (61) are also now available in several countries. These devices display the number of doses remaining in the inhaler and record usage at specific times over a set time period. Newer devices such as the Diskus<sup>®</sup> inhaler have built-in dosage counters. Besides acting as a memory aid, these counters can provide doctors and patients with feedback on medication administration, which can be used at consultations to improve compliance (13,62).

## Conclusions

Patients can fail to comply with asthma medication for a variety of physical, personal, cultural and socioeconomic reasons. In some patients, a general lack of self-care due to psychological outlooks developed during childhood can affect compliance. Many others will fail to comply because of poor doctor–patient communication. Thus, there is no single solution that will improve compliance in all patients. Simplifying the treatment regimen or providing memory aids will be sufficient for some patients, while education or psychological counselling will be more appropriate for others. Doctors can also use a range of communication skills to improve the way in which they present information, motivate patients and reinforce progress. This may involve the use of diagrams, leaflets, reports and written home-management plans as well as discussion. These approaches, plus respect for patients' health beliefs and involving them in treatment decisions, will foster an atmosphere of mutual responsibility, leading to concordance over medicine taking. When focusing on compliance it is important not to lose sight of clinical outcome. For example, it is better to achieve complete asthma control with an effective medication taken less than that prescribed than it is to achieve perfect compliance with an ineffective medication that fails to control the disease.

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