

## REVIEW ARTICLE

# Non-adherence in children with asthma reviewed: The need for improvement of asthma care and medical education

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## Keywords

health communication; illness perceptions; inhaled corticosteroids; medication beliefs; patient-centred care; physician–patient relation; quality of care; self-management

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## Abstract

Adherence to daily inhaled corticosteroid therapy is a key determinant of asthma control. Therefore, improving adherence to inhaled corticosteroids is the most effective method through which healthcare providers can help children with uncontrolled asthma. However, identifying non-adherent patients is difficult, and electronic monitoring is the only reliable method to assess adherence. (Non-)adherence is a complex behavioural process influenced by many interacting factors. Intentional barriers to adherence are common; driven by illness perceptions and medication beliefs, patients and parents deliberately choose not to follow the doctor's recommendations. Common non-intentional barriers are related to family routines, child-raising issues, and to social issues such as poverty. Effective interventions improving adherence are complex, because they take intentional and non-intentional barriers to adherence into account. There is evidence that comprehensive, guideline-based asthma self-management programmes can be successful, with excellent adherence and good asthma control. Patient-centred care focused on healthcare provider–patient/parent collaboration is the key factor determining the success of guided self-management programmes. Such care should focus on shared decision-making as this has been shown to improve adherence and healthcare outcomes. Current asthma care falls short because many physicians fail to adhere to asthma guidelines in their diagnostic approach and therapeutic prescriptions, and because of the lack of application of patient-centred health care. Increased awareness of the importance of patient-centred communication and increased training in patient-centred communication skills of undergraduates and experienced attending physicians are needed to improve adherence to daily controller therapy and asthma control in children with asthma.

Inhaled corticosteroids (ICS) are highly effective in reducing asthma symptoms and the risk of exacerbations, as shown by clinical trials and meta-analyses in children with asthma (1). However, many children with asthma remain symptomatic even when they have been prescribed ICS (2). There is good evidence that non-adherence to daily ICS use is the main reason for this limited effectiveness of ICS in daily practice (3–5). Improving adherence to ICS in children with asthma probably is the most effective method through which healthcare providers can help children with uncontrolled asthma (6). Intervention studies aimed at improving adherence in children

(and also in adults) with asthma are scarce, and recommendations on how to improve asthma care based on such studies are therefore limited by absence of solid evidence. This may lead practitioners to believe they can do nothing to address the problem of non-adherence. We will show, however, some best practice examples of comprehensive asthma care programmes in which high adherence rates and excellent asthma control have been achieved and documented. Building on the concept of 'guided self-management' and based on research on adherence in other chronic illnesses, the rationale of these best practices will be discussed, and practical recommendations will

be offered to help healthcare providers to improve their patients' adherence to ICS and their level of asthma control.

## Methods

We searched Medline, the Cochrane Database of Systematic Reviews, guidelines and consensus documents and personal records from 2000 to date. Our search strategy used a combination of MeSH, textwords and appropriate word variants of 'adherence' and 'chronic illness' or 'asthma'. We focused on systematic reviews, and added data from randomized controlled trials or high-quality observational studies in children with asthma published after publication of these systematic reviews.

## Results

### The scope and importance of the problem of poor adherence

Poor adherence to ICS is very common in children with asthma. In studies in which adherence is being measured by electronic logging devices, median adherence rates usually vary between 30% and 70% of the total number of doses prescribed, with large variations between individual patients (Table 1) (7). Studies in adults and children suggest that adherence to ICS needs to be in excess of 75% to allow these drugs to control asthma completely or satisfactorily (7, 8). Therefore, poor adherence to ICS severely compromises the effectiveness of this treatment and accounts for ongoing uncontrolled asthma and increased healthcare costs (9).

The important role of non-adherence to daily controller therapy has been most extensively studied in children with problematic severe asthma. Failure to take prescribed treatment is the commonest reason for continuing symptoms in these patients (5). For example, in a cohort of children with very problematic severe asthma referred to a national tertiary care referral centre in the UK, medication was either absent or out of date in 23% of homes visited by an

asthma nurse (10). The few studies on the relationship of non-adherence to asthma control in mild or moderate asthma support the hypothesis that non-adherence is the main determinant of ongoing mild symptoms such as exercise-induced wheeze, breathlessness and nocturnal cough (4, 8). When confronted with children with uncontrolled asthma, clinicians will therefore have to decide whether they want to step up therapy or address adherence issues first. In this decision process, identification of non-adherent patients is crucial, but this is problematic as we will discuss in the next section.

### Assessing adherence

There are several ways of assessing adherence (Table 2).

#### Parental or patient self-report

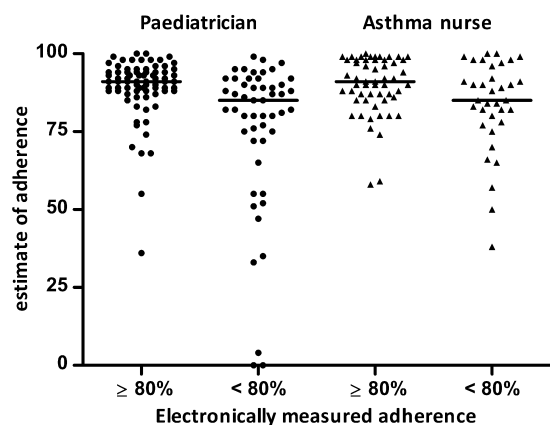
As clinicians, we like to think that we can identify non-adherent patients, but we cannot (Fig. 1) (7). Research consistently shows that patient or parental self-report, also when it is based on diary cards or anonymous questionnaires, is highly unreliable in assessing adherence (7, 11–13). Patients and their parents tend to overestimate their own (or their

**Table 2** Different ways of assessing adherence, in order of increasing accuracy

Method	Accuracy
Parental self-report	Very inaccurate
Anonymous questionnaire or diary card	Very inaccurate
Pharmacy refill rates	Inaccurate
Weighing used canisters or collecting used inhalers with dose counters	Fairly accurate
Electronic monitoring devices recording date and time of each inhaler actuation	Highly accurate

**Table 1** Overview of electronically measured long-term ( $\geq 3$  months) adherence rates to inhaled corticosteroids in children with asthma

First author, year, country	No. children	Age (years)	Study duration	Mean/median adherence rate (%)
Bender, 2000, USA (11)	27	7–12	6 months	50
Bender, 2008, USA (69)	104	8–18	4 months	40
Burgess, 2007, Australia (70)	21	1–7	3 months	65
Burgess, 2010, Australia (71)	26	6–14	4 months	58
Celano, 2010, USA (72)	1433	6–11	1 year	57
Duncan, 2013, USA (42)	48	9–15	5 months	49
Jentzsch, 2009, Brazil (14)	102	3–14	1 year	52
Jentzsch, 2012, Brazil (3)	102	5–14	1 year	47
McNally, 2009, USA (73)	63	5–17	1 year	34
Milgrom, 1996, USA (74)	24	8–12	13 weeks	58
Nikander, 2011, USA (16)	115	5–10	18 months	73
Klok, 2012, the Netherlands (22)	93	2–6	3 months	92
Schultz, 2012, Australia (12)	132	2–6	1 year	60
Vasbinder, 2012, the Netherlands (75)	87	2–11	3 months	49



**Figure 1** Comparison of assessment by paediatrician or asthma nurse of adherence to inhaled corticosteroids in 67 children with asthma, whose adherence was being recorded by electronic monitoring devices over a 3-month period, the results of which remained unknown to the paediatrician or the asthma nurse. Bars represent medians. Asthma nurses were significantly more likely to identify children with poor adherence (<80% of prescribed dosages) than paediatricians [unpublished data from study reported in (22)].

child's) adherence to daily maintenance medication, based on inaccurate recall and generalizing the behaviour over longer time periods rather than recalling specific events (13). In addition, the parents' and patient's desire to please their physician may play a role: if parents and patients feel that their physician really wants to help the child get better, they will probably be more likely to report that they have been using their medication as prescribed, even when they have failed to do so, for example as an expression of a 'social desirability bias' (7, 13).

#### Pharmacy refill rates

Pharmacy refill rates for prescriptions, although easily available, are similarly unreliable, because they only reflect whether the medication has been picked up from the pharmacy, not whether it has actually been taken (14).

#### Weighing used metered dose inhaler canisters or collecting used inhalers with dose counters

Weighing used metered dose inhaler (MDI) canisters or collecting used inhalers with dose counters is a fairly accurate method to calculate adherence, although 'dumping' (emptying the device before returning it to the doctor to mimic good adherence) cannot be detected this way (14).

#### Electronic monitoring devices

Electronic monitoring devices (EMDs) recording the exact time and date that an inhaler is used are the only really accurate method of adherence monitoring (15).

EMDs are more expensive than other methods of monitoring, which may limit their use in clinical practice, but they are increasingly being used in adherence research because of their unrivalled objective validity. Apart from occasional mechanical and electronic failure, these EMDs have been well validated. There is now consensus in the literature that such electronic devices are the recommended method to measure adherence reliably, both in clinical practice and in research (15). 'True adherence' to inhaled medication involves both taking the right quantity of medication (*adherence per se*) and inhaling it in the right way (correct inhalation technique) (16). With all methods of adherence monitoring, there is no guarantee that when the medication is taken, it is inhaled effectively. Studies have shown that repeated inhalation instructions and demonstration of the patient's inhalation technique to a healthcare professional such as an asthma nurse are key factors in determining correct inhalation technique in children with asthma (17).

Without the use of EMDs, reliable assessment of adherence to prescribed treatment is a challenge.

Interviewing parents and patients about risk factors of non-adherence may help to improve the accuracy of such an assessment. In the next section, risk factors of non-adherence will be discussed in detail.

#### The multifaceted character of non-adherence

A useful model for daily practice divides non-adherence into three categories (Table 3) (18).

#### Unwitting non-adherence

The most basic form of non-adherence is caused by misunderstanding of medical advice by parents or patients (erroneous or unwitting non-adherence). This form of non-adherence usually occurs in patients who have received little or no education on the disease asthma and its treatment. Interviewing patients and parents about the prescribed treatment and the recommended use may reveal misunderstandings (19). There is, however, consistent evidence from the literature showing that knowledge about asthma and its treatment is not significantly related to adherence levels (20, 21). This indicates that unwitting non-adherence is relatively uncommon and that other factors are more important in driving non-adherence.

**Table 3** Different patterns of non-adherence (18)

Unwitting non-adherence	Caused by poor instructions by healthcare providers or insufficient understanding of the treatment rationale on the part of the patient
Intentional non-adherence	Refers to patients who deliberately choose not to follow the doctor's recommendations
Unplanned non-adherence	Related to barriers to adherence such as child-raising issues, limited family (medicine taking) routines and lack of motivation

*Intentional non-adherence*

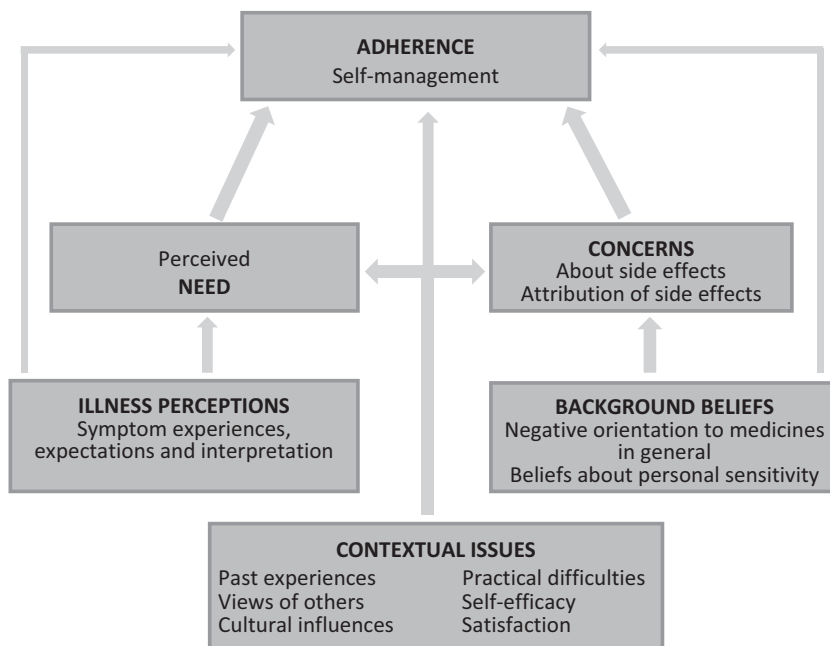
Illness perceptions and medication beliefs have consistently been shown to be strong determinants of adherence. These cognitions are the main drivers of intentional non-adherence (Fig. 2) (22–25). Children with a chronic disease and their parents face competing concerns (26). On the one hand, the condition itself is reason for concern, both with regard to short-term and long-term threats. Based on earlier symptom experiences and information from families, friends and popular media including the internet, people develop cognitions about the disease (illness perceptions), which shape their view on the necessity and perceived need of medication (23, 27). For example, a person who views asthma as an episodic disease will not perceive the need to take daily preventer therapy (23). By contrast, a person who perceives asthma to be a chronic condition characterized by inflamed airways is more likely to perceive the need for daily controller treatment. On the other hand, people also have strong cognitions about drugs (medication beliefs). Qualitative studies have shown that many parents express strong resistance against giving medication on a daily basis to their child because it ‘does not feel right to pour chemicals into such a little body’ (28). This uniform resistance to giving daily medication in general may be augmented by fear of side effects, for example those of (inhaled) corticosteroids (Fig. 2) (26, 29). Because such illness perceptions and medication beliefs frequently do not correspond to the medical model of asthma, decisions about taking maintenance medication made by patients and their parents can differ considerably from the advice being offered by the medical team. Eliciting parents’ and patients’ perspectives in the consulting room is therefore crucial to detect non-adherence.

*Unplanned non-adherence*

Even when parents or children decide to follow the physician’s advice to take daily ICS, many barriers can withhold them from doing so, causing unplanned non-adherence. Qualitative studies show the diversity and complexity of such barriers. A recent qualitative study in teenagers showed lack of routines, problems with remembering aggravated by rushing and hurrying caused by waking up late, and competing interests such as spending time with friends and playing video games as deterrents to medication adherence (30). In a population of school-aged children, we found that the following issues hampered adherence: complex family and social or child-raising issues, and excessive responsibility given by parents to children at a relatively young age to self-manage the daily use of their own medication without parental supervision (31). Other common barriers include financial problems such as poverty or, in some countries, lack of healthcare insurance covering daily controller therapy (20). Home visits may be an efficient method to collect information on such barriers, as shown in patients with severe asthma (10). Adding results of electronically measured adherence to a low-profile discussion with parents and patients in their domestic environment may provide useful insight into individual barriers to regular use of ICS (31).

*Adherence from a behavioural perspective*

Although the distinction between these three forms of non-adherence is useful as a frame of reference for daily practice, (non-)adherence is a complex behavioural process influenced by more interacting factors. Human behaviour is determined by a complex interplay of conscious and unconscious factors, among which emotions are crucial. For example, self-efficacy is



**Figure 2** Factors related to medication adherence (27).

related to adherence, and a lack of motivation is thought to contribute to unplanned non-adherence (20, 31). The interpersonal dynamics of the physician–patient relationship also play an important role in determining adherence. Trusting relationships between physicians and patients can greatly affect patient outcomes (32).

For reasons of conceptual clarity, we have approached adherence in this paper up to now as a concept on its own. This helps in outlining issues regarding definition, assessment, rates and types of adherence. It is clear, however, that managing medication is part of a broader conceptualization of patients' behaviour. Self-management is one such broader concept, requiring a range of skills to be effective (Table 4) (33).

Managing medication is only one of the seven skills associated with managing a chronic medical condition, such as asthma. Note also the word 'skills': skills can be taught. Therefore, adherence is not a fixed characteristic of a person. People adjust their lifestyle to changing circumstances, such as increasing shortness of breath. Importantly, this also makes clear that physicians are in a position to address the medication managing by patients.

Based on the literature, a few suggestions can be offered on how to encourage and facilitate self-management and therefore adherence, in patients with asthma and their caregivers, or with any chronic medical condition, for that matter. This will be outlined in detail in the next sections.

#### Interventions to improve adherence: no simple solution

Confronted with parents who (seem to) fail to adhere to the recommendation to give ICS on a daily basis to their child, the first response of many healthcare providers is to repeat asthma education and to re-emphasize the importance of daily controller medication use. Because misunderstanding (unwitting non-adherence) is a minor cause of non-adherence, this is likely to be ineffective. Indeed, two independent meta-analyses showed that educational interventions alone do not modify adherence behaviour (34, 35). Providing information, while necessary to allow patients to understand why and how to adhere, is only one of the essential components of this approach. This suggests that we should avoid using the word 'education' when thinking about how to help patient self-manage their illness.

Incorporating behavioural components into educational efforts to improve adherence (Table 5) increases their potential efficacy, illustrating that targeting both intentional and

non-intentional (unplanned) barriers is needed (34, 36). Therefore, most if not all effective interventions improving adherence to long-term therapies are complex and multidimensional (37, 38). A recent example of such a complex successful intervention including a behavioural component is providing directly observed medication therapy by a school nurse combined with motivational interviewing in urban asthmatic youths (30). However, even such behavioural and multicomponent interventions have mostly shown modest effect in improving adherence (34). It appears logical that interventions specifically tailored to each patient's needs could be most successful and cost-effective, but this has been the subject of very few studies. In one such study, a web-based tailored intervention in teens improved adherence rates temporarily, but the effect did not persist after 12 months of follow-up (39). In another, patients' medication beliefs could be modified by providing information tailored to the patient's need after exploring their medication beliefs, but the effects of these modified medication beliefs on adherence were not assessed (40).

#### Light at the end of the tunnel: good adherence and satisfactory asthma control are achievable in most patients

The reality of high rates of non-adherence, the problems with recognizing non-adherent patients, and the multifaceted character of non-adherence may be daunting to clinicians, in particular because simple interventions such as repeating education do not increase adherence to maintenance medication. A number of studies, however, have shown a different reality, with high rates of patients with good asthma control and good adherence to maintenance medication.

Two American studies examined interventions to improve adherence in ethnic minority patients from underprivileged families, who usually show poor adherence and poor asthma control (Table 1). In a large sample of such patients, high adherence and excellent asthma control could be achieved by enrolling them into a programme of regular follow-up and repeated tailored self-management skills training (41). In a small group of adolescents from similar background, high electronically measured adherence was achieved by an intervention focusing on collaboration between parents and adolescents on the goals of asthma treatment and the use of medication (42). We recently showed high adherence rates in

**Table 5** Examples of basic behavioural principles, which can be used to improve adherence (13)

Help parents to develop a behavioural chart or reward system
Help patients with linking medication taking with established daily activities (e.g., meal time, brushing teeth)
Help patients with setting alarms on cell phones or watches
Determine reasonable, specific goals defined by the patient
Reinforce patients in a positive fashion
Teach parents to offer labelled praise for adherence behaviours and ignore minor misbehaviour
Help patients with introducing visible reminders at home

**Table 4** The seven essential skills of effective self-management (33)

Gathering information
Managing medication
Managing symptoms
Managing psychological consequences
Adjusting lifestyle
Using social support
Communicating effectively

young children with asthma from Caucasian middle-class families over 3 months of follow-up (22). The striking feature of our own observational study is that we achieved unparalleled high adherence in children receiving regular comprehensive guideline-based asthma care, without any specific intervention to improve adherence. This underscores that providing comprehensive guideline-based asthma care can be effective in achieving good adherence and good asthma control, irrespective of the background of the population (22, 41). Apparently, many barriers to regular intake of medication can be overcome by comprehensive health care. In the next section, we will discuss which elements of comprehensive asthma care are likely to be responsible for achieving and maintaining good adherence to daily controller therapy.

### Understanding the relationship of asthma care and adherence

In a recent systematic review of qualitative studies of caregivers' views, credible input from healthcare professionals was found to be important in influencing caregivers' beliefs about the illness and the treatment (26). Healthcare professionals were seen as a reliable source of advice on how to overcome difficulties with the treatment regimen, or to help communicate with their child about treatment goals. In situations in which treatments were not observed by caregivers to be immediately beneficial, a strong relationship between caregivers and healthcare professionals appeared to have an important role in promoting adherence to such treatments (26).

This reinforces the recommendation in asthma guidelines that the development of a strong and supportive partnership between healthcare providers and patients and their parents is a prerequisite for the implementation of successful guided self-management (43). In such a supportive and collaborative relationship between healthcare providers and parents/patients, parents are more likely to accept suggestions to help them overcome the barriers of each of the three types on non-adherence (Table 2) (26). Most parents of children with a chronic disease prefer to collaborate with the medical team, also in making decisions about the treatment of the child's condition (44, 45).

Guided self-management has indeed been shown to be effective in increasing adherence (43). Essential components of guided self-management are regular follow-up, developing a doctor–parent/patient partnership, the provision of information-based and skills-based self-management education, discussion of patients' and parents' perspectives about asthma, their fears and concerns including their medication beliefs, a joint setting of goals and shared decision-making (43). These prerequisites can be summarized as providing patient-centred care (Fig. 3) (46) and suggest that patient-centred communication skills of health professionals are crucial. This is, in fact, supported by a considerable body of evidence showing that adherence and healthcare outcomes can be improved by applying specific patient-centred communication consultation skills (47–49).

A proof-of-concept study in asthmatic adults showed that only a change in communication by providing shared decision-

making improves adherence (50). An increasing body of evidence consistently shows that such shared decision-making is associated with better treatment adherence and better healthcare outcomes in chronic diseases, both in adults and in children (47, 51). This is supported by evidence from studies in children showing that interventions to promote patient-centred communication improve adherence (49) and that training physicians to provide patient-centred education and support help children and their families to improve asthma management and outcomes (48).

Because patient-centred asthma care focused on guiding parents and children in self-management is associated with good adherence and satisfactory asthma control in most children, the low adherence rates found in most studies suggest shortcomings in the provision of such patient-centred asthma care. In the final section of this review, we will explore the reasons for these shortcomings, as well as potential interventions to improve this.

### Shortcomings of current asthma care and implications for clinical practice

The evidence suggests that there are two areas in which current asthma care falls short of the 'best practice' examples which have been associated with excellent adherence and good asthma control. First, physicians' diagnostic and prescribing behaviour deviates from their own professional organization's and international asthma guidelines. Second, physicians experience difficulties in applying patient-centred communication skills.

#### *Physicians' non-adherence to asthma guidelines*

Non-adherence to the diagnostic and prescribing recommendations of asthma guideline by physicians providing asthma care to children is common. Several international studies reported high ICS prescription rates in children without a diagnosis of persistent asthma, and ongoing ICS prescriptions to children who had not reported a single episode of wheezing in the past 2 years (52–54). A recent study showed that combination therapy (ICS and long-acting  $\beta_2$ -agonist) was initiated in the majority of young subjects with asthma without prior inhaled steroid therapy (55). Studies from other countries showed similar non-adherence to guidelines (56, 57). When reviewing the care provided to children with asthma in general practice, we found that general practitioners commonly prescribed ICS to children with non-specific respiratory symptoms in 5–10 min consultations, without formally making a diagnosis of asthma. In addition, ICS were prescribed as short courses to be used during symptomatic episodes only. Asthma education was being provided in a haphazard and limited fashion; children were not followed up regularly (52). Similarly inappropriate asthma management in primary care has been documented in various other countries and studies, and this is associated with lack of basic knowledge about the rationale of daily use of ICS and poor self-management skills such as inhalation technique (unwitting non-adherence) in patients referred to asthma clinics (17, 58, 59). It is also associated with

<b>Doctor-Centred model</b>	→	<b>Patient-Centred model</b>
Patient's role is passive (Patient is quiet)	→	Patient's role is active (Patient asks questions)
Patient is the recipient of treatment	→	Patient is a partner in the treatment plan (Patient asks about options)
Physician dominates the conversation (does not offer options)	→	Physician collaborates with the patient (Offer options; discusses pros and cons)
Care is disease-centred (Disease is the focus of daily activities)	→	Care is quality-of-life centred (The patient focuses on family and other activities)
Physician does most of the talking	→	Physician listens more and talks less
Patient may or may not adhere to treatment plan	→	Patient is more likely to adhere to treatment plan (Treatment accommodates patient's cultures and values)

**Figure 3** Comparison of doctor-centred (medical model) and patient-centred care (shared decision-making).

parental illness perceptions and medication beliefs that are discordant to the medical model of asthma (intentional non-adherence) (28). In contrast, studies have shown superior asthma control and higher adherence to treatment and self-management plans when asthma care was provided by specialist physicians supported by allied health professionals, providing more comprehensive self-management education and structured follow-up (59–62). Similarly, a recent systematic review showed that more intensive follow-up, with multiple educational sessions using combinations of instructional modalities, was associated with higher adherence and improved outcomes for children with asthma (38).

Apparently, asthma care provided in a few short consultations does not meet the needs of parents and children to develop adequate self-management skills (Table 4). Development of successful asthma self-management by children and their parents requires repeated contact between the healthcare team and the patient and parents (59), development of a constructive and supportive collaborative partnership (43), and low-threshold access to credible sources of information such as asthma nurses. The experience of the national asthma programme in Finland illustrates how such improvements in the basics of asthma care are associated with improvements in asthma control and reductions in asthma hospitalizations (63).

#### *Physicians' limitations in patient-centred communication*

Most consultations, both in primary and secondary asthma care, are primarily doctor-driven: most questions asked are biomedical in nature (aimed at elucidating symptoms of disease, their course over time and response to treatment), and the communication during the consultation is therefore largely 'instrumental' (i.e., serving medical purposes, Fig. 3) (64). This is accompanied by a lack of exploration of the parents' and patient's perspective in many medical consultations (65, 66). In a recent study, for example, healthcare providers asked for caregiver input into the asthma management plan in only 9% of consultations (65). In such a doctor-centred consultation, decisions about the use of maintenance

medication are also largely doctor-driven and are not taken following the principles of shared decision-making (65).

This lack of patient-centred communication in healthcare consultations is likely to be the result of a lack of specific training during undergraduate and graduate medical education, and the strong impact of role models continuing to apply the doctor-centred approach in postgraduate medical education.

Although paediatricians spend a large proportion of their daily work conducting follow-up visits, they rarely receive specific training in, or feedback on, conducting such chronic care consultations effectively (51, 67). Hardly any experienced physicians have been trained in patient-centred communication skills (68).

Most medical students are now being satisfactorily trained in basic communication skills, including eliciting the patient's perspective and preferences (67). However, when these students enter clinical practice, they experience that many of their role models show different professional communication behaviour altogether (68). Instead of eliciting the patient's perspective and agenda, most senior consultants perform their consultations in a doctor-centred fashion, and they do so with great confidence and time-efficiency. This lack of training in and role modelling of patient-centred care may help to explain the ongoing doctor-centred character of most consultations. A paradigm shift therefore appears to be needed in medical education and training, in which the 'soft' communication skills involved in achieving shared decision-making are recognized as being equally important as advances in biomedical knowledge, exploration of molecular biology pathways and pathophysiological reasoning.

#### **Conclusions**

Non-adherence to daily controller therapy in childhood asthma is common and is a major cause of uncontrolled asthma. Non-adherence is a complex and multidimensional issue, in which parental illness perceptions and medication beliefs play an

important role. Exploring and acknowledging parental views and preferences on the disease asthma and its treatment help to establish a constructive physician–patient/parent partnership, in which the healthcare provider is viewed as a source of credible information and advice. Applying patient-centred

communication skills and aiming for shared decision-making increase adherence to daily controller therapy and improve asthma control in children. This requires an effort in training these patient-centred communication skills, both for undergraduates and for experienced attending physicians.

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