Compliance with pulmonary medication in general practice

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Compliance with pulmonary medication in general practice. F.W. Dekker, F.E. Dieleman, A.A. Kaptein, J.D. Mulder. ©ERS Journals Ltd 1993.
ABSTRACT: We wanted to assess compliance with regular pulmonary medication, in 156 patients in a general practice setting.

Patients completed a questionnaire on their reported daily intake, the perceived prescription, and their self-assessed perceived compliance with pulmonary medication. Compliance was defined as a reported daily intake ≥50% of the prescribed amount.

Using this definition, 30% of patients were considered to be compliant. Compliant patients had daily symptoms more often, were more often prescribed two or more different medications, and a greater proportion of them had at some time consulted a chest physician. When patients correctly perceived the prescription to refer to medication which had to be taken on a regular basis, they were more likely to be compliant.

We conclude that, since less than one third of patients was compliant with medication, more efforts are needed to improve compliance in general practice. Noncompliance with medication may well provide an alternative explanation for the discrepancy between prescribed medication and medical outcome, which has been labelled in the literature as "undertreatment".
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Asthma and chronic obstructive pulmonary disease (COPD) are important health problems in the Western world today. The incidence, prevalence and severity of asthma are still increasing [1], and an increase in the number of patients with chronic bronchitis or emphysema (COPD) is expected in coming years, because of the increasing percentage of elderly in the population [2]. Numerous effective pharmacological treatments have become available in the past three decades, but many patients still suffer unnecessarily from their asthma or COPD [3]. It has been suggested that physicians fail to apply these treatments [3]. In addition to underprescribing by physicians, however, the discrepancy between therapeutic possibilities and medical outcome may be explained by patients not taking their medication as prescribed.

Compliance, or the extent to which a person's behaviour coincides with medical or health advice, is notoriously low in patients with a chronic disease [4]. In patients with asthma, compliance with prophylactic or maintenance therapy ranges from 6–67% [5]. It has been shown that a low compliance is related to a low peak flow and many symptoms [6], to a lower increase in forced expiratory volume in one second (FEV_1) after a trial with inhaled corticosteroids [7], to a more rapid decline in FEV_1 [8], and even to a higher mortality [9, 10].

Until now, most studies on medication compliance have been performed in patients with rather severe degrees of asthma, treated in asthma centres or emergency departments. However, in the Netherlands, as well as in several other countries, the majority of patients with asthma or COPD is cared for by general practitioners [11, 12]. Therefore, we designed a study to assess the medication compliance with regular pulmonary medication in general practice patients. Preliminary results of this study have been published previously for Dutch general practitioners [13].

Patients and Methods

Patients (12–64 yrs) were selected from nine adjacent general practices, on the basis of having had any antiasthmatic drugs prescribed in the 12 months preceding the study. Using the computer file of the local dispensary, containing all original prescriptions to the patients during the preceding 12 months, a list was generated of patients who had been prescribed bronchodilators, cromoglycate, or inhaled steroids. To allow calculation of compliance as the ratio of reported to prescribed daily intake, only patients with medication corresponding to the original prescription for regular use (in contrast to prescribed as needed) were considered for the present study. Patients who had consulted a specialist (chest physician) in the last two years were excluded, in order to focus on patients for whom the general practitioner was the main provider of medical care.

Of a total of 442 patients found, 20 (5%) had moved or had died before the study, 121 patients (27%) had seen a specialist in the 2 yrs preceding the study and were, therefore, excluded. A total of 301 patients fulfilled the selection criteria of the original study, of which 249 (83%) were willing and able to come to the practice. A total of 156 participants was prescribed regular medication and, therefore, included in the present study. Patient characteristics of this group are reported in table 1.

Table 1. – Patient characteristics n=156

Characteristic	
Age** yrs	35±16
Sex % male	47
Daily symptoms %	33
Weekly symptoms %	65
Now and then symptoms %	2
Ever consulted a specialist* %	24

*: patients who had consulted a specialist in the 2 yrs preceding the study were excluded from the study; **: mean±SD.

Using the original prescription from the dispensary's computer, the kind of medication and the prescribed amount were recorded. Patients were asked to come to the practice to fill in a questionnaire. For a different research project, the patients were also asked to supply a sample of blood [14].

The questionnaire referred to demographic characteristics (sex, age, education), frequency of symptoms (daily/weekly/now and then), reported use of medication, perceived prescription, perceived usefulness of medication, and perceived compliance by a self-assessed report mark. The perceived prescription refers to whether the patient thinks the medication is meant to be taken regularly, as a short course, or as needed. The perceived usefulness refers to whether the patients judge the medication to be useful or not. With respect to perceived compliance, the self-assessed report mark ranged from 1 (low perceived compliance) to 10 (high perceived compliance).

In addition, the Stigma and Optimism scales from the Respiratory Illness Opinion Survey (RIOS) were presented, measuring the extent to which patients feel ashamed about their respiratory problems, and feel optimistic about their lives in spite of having asthma or COPD [15, 16].

Two measures of compliance were used: (1) perceived compliance as assessed by the self-assessed report mark; and (2) calculated compliance, the reported daily use of medication as a percentage of the prescribed amount. Because some patients are prescribed more than one medicine, results were analysed on a per prescription basis as well as on a per patient basis. A percentage ≥50% was arbitrarily classified as "compliant". When patients used more than one medicine, their mean compliance was calculated on a per patient basis.

Chi-squared and Student's t-tests were used for comparison of patient subgroups. A multivariate comparison of compliant with noncompliant patients was made by means of a stepwise discriminant analysis. All analyses were performed with SPSS-PC.

Results

Compliance on prescription-level

The 156 patients were prescribed 201 medications, which had to be taken regularly. These 201 medications were aggregated into six medication groups. In table 2, these medication groups are shown, along with the number of subjects judging the medication as useful, the report mark given by the patients themselves (perceived compliance), and the calculated compliance.

About two thirds of all medications were perceived to be useful by the patients. Inhaled β_2-agonists scored higher compared to corticosteroids. The mean report mark ranged from 7.1 (anticholinergics) to 8.0 (inhaled β_2-agonists). One third (33%) of all 201 medications which were prescribed to be used daily, were indeed reported by the patients to be used daily, for at least 50% of the prescribed amount. This percentage was lower for

Table 2. – Perceived usefulness, perceived compliance (mean report mark), and number of people using at least 50% of prescribed amount every day (calculated compliance), by medication group (n=201 prescriptions)

	n	Perceived useful (n)	Perceived** compliance	Calculated compliance≥50% (n)
Cromoglycates	29	18	8	15
Inhaled β_2-agonists	97	76	8	30
Oral β_2-agonists	35	21	8	6
Anticholinergics and Theophyllines	17	8	7	6
Corticosteroids	19	9	8	7
Other*	4	3	9	2
All prescriptions	201	135 (67%)	8	66 (33%)

*: mucolytics, anti-histamines, or anti-cough medication; **: perceived compliance - mean report mark. n: number of people.

oral β_2-agonists (17%), and higher for cromoglycates (52%).

Based on all prescriptions, relations were analysed between perceived compliance (mean report mark), calculated compliance ($\geq$50% or not), and whether a medication is judged to be useful by the patient or not. The perceived compliance was higher for prescriptions which were judged to be useful (mean report mark 8.3 and 7.1, respectively; t=3.06; df=187; p<0.01). The perceived compliance was not higher for prescriptions with a calculated compliance $\geq$50% (mean report mark 8.0 and 7.9, respectively; t=0.45; df=188; NS). Calculated compliance was more frequent in prescriptions which were judged to be useful (40 vs 17%; Chi-squared 8.85; df=1; p<0.01). For prescriptions with a calculated compliance $\geq$50%, the prescribed frequency per day was lower (2.9 vs 4.0; t=3.47; df=199; p<0.001).

For 20% of the medications, the patients admitted to not knowing the prescribed daily intake. The patients thought the medication to be prescribed as needed, or as a short course, in 24% and 5%, respectively. In 51%, the prescription was correctly perceived to refer to regular medication. Not knowing the prescribed daily intake was not related to the kind of medication. The percentage of perceived "as needed" prescriptions was highest in inhaled β_2-mimetics (37%).

The relation between calculated compliance and perceived prescription is shown in table 3. The proportion of compliant patients was highest among those who perceived their prescription as referring to regular medication (51/99). Compliance was much lower in the other categories of perceived prescriptions.

Compliance on patient-level

The 201 prescriptions of regular medication referred to 156 patients, with a mean of 1.3 regular prescriptions per patient. For patients who received more than one regular prescription, their compliance percentage was calculated as the mean of the percentages per prescription. Using the same cut-off point of $\geq$50%, 47 (30%) patients may be considered to be compliant. Only three patients reported using more than 150% of the daily prescribed amount.

Compliant patients were older than noncompliers (table 4), but no difference existed with respect to gender, marital status or education. A greater proportion of compliers was seen at some time by a chest physician. Compliant patients more often had daily symptoms and were more often prescribed two or more regular medications compared to noncompliers. Compliers were less optimistic, but differed nonsignificantly with respect to their score on the Stigma-scale. Multivariate comparison revealed that next to the number of medications which were prescribed to be taken regularly, the following variables contributed significantly to the discriminant function (and thereby to a high compliance): daily symptoms, ever seen by a chest physician, high age, low stigma, and poor education. Based on this discriminant function, 77% of cases could be correctly classified as compliant or noncompliant.

Table 3. – Calculated compliance by perceived prescription. (n=195 prescriptions)

	Calculated compliance		Total
	<50%	$\geq$50%	
Regular	48	51	99
Short course	10	0	10
As needed	41	6	47
Unknown	31	8	39
Total	130	65	195

Data represent absolute numbers of prescriptions.

Table 4. – Characteristics of compliers versus non-compliers (n=156 patients)

	Compliers (n=47)	Non-compliers (n=109)	p
Mean age(SD)	40(16)	33(16)	**
Ever seen by chest physician %	45	16	***
Daily symptoms %	64	20	***
Prescribed $\geq$2 regular medications %	64	28	***
Mean Optimism-score(SD)	22.6(3.6)	24.6(3.7)	**
Mean Stigma-score(SD)	9.6(3.6)	10.2(4.2)	NS

NS: nonsignificant; **: p<0.01; ***: p<0.001.

Discussion

In this study, in general practice, we found compliance with regular pulmonary medication to be rather poor. Only one in three patients used at least half of the prescribed amount of medication daily. Of patients with daily symptoms, 58% could be considered to be compliant.

The population studied was defined as being cared for by a general practitioner, and having been prescribed regular pulmonary medication. No attempt was made to select patients based on diagnosis or severity of disease. Obviously, patients having been prescribed regular, continuous medication will often have more severe pulmonary problems, compared to those without regular medication. In contrast, patients cared for by general practitioners may well have less severe diseases compared to those referred to a chest physician. However, we are of the opinion that when a doctor writes out a prescription saying that a patient has to take regular medication, noncompliance is a problem irrespective of the diagnosis or the severity of disease.

We assessed compliance by asking the patient about the use of medication and comparing it with the prescribed amount. This method is supposed to be less reliable compared to direct methods, such as the assessment of the theophylline concentration in serum or saliva [17]. However, as over-reporting of the use of medication is more likely than under-reporting [18], the real number of compliant patients in our population is likely to be even less than 30%. The use of the self-assessed report mark revealed less noncompliance. This may be

explained by social desirability, which may affect the self-assessed report mark more than it does the reported use.

Using the prescribed amount as a gold standard of compliance may be biased, because it may not reflect the current intentions of the doctor. The information stored in the dispensary's computer may be based on repeat prescriptions, and agreed otherwise between doctor and patient in the meantime. Although this bias may have resulted in some additional noncompliers, we do not believe that it has affected our results to any large extent.

It should be noted that noncompliance is not always bad for the patient. A flexible and responsible use of medication can, in some cases, result in better "outcome" than slavishly complying to the doctor's prescription [19]. In addition, as far as β_2-agonists are concerned, there is recent evidence that using bronchodilators only when patients feel they need them, results in fewer symptoms and a slower decline of lung function, compared to daily use [20, 21]. However, in these cases, the prescription should be adjusted, rather than accepting the discrepancy between prescribed and actual use of medication and thereby, implicitly classifying a patient as noncompliant.

Our results in general practice patients are in agreement with those in more severe patients [22]. Also, in less severe patients in general practice more effort is needed to improve compliance. Improvements have been obtained by providing better information to the patient about the therapy. Written information in addition to oral explanation is preferable [23]. Once the patient has received and understood the information about his disease and his treatment, he can be better involved in making decisions about the treatment. Often, patients tend to be more compliant to a therapeutic regimen when they have actively participated in the decision concerning their treatment, and feel responsible for it [24]. In our study, as well as in the literature, compliance with once-daily therapy is higher compared to twice-daily or more, suggesting that therapy should not be too complex [25]. Tailoring therapy, or matching the medication schedule to the patients' regular daily activities, is also important [26].

Perhaps the simplest first step in improving compliance is to ask patients about their perception of the therapy: perceived prescription, perceived usefulness, and reported daily intake. This approach serves three goals. Firstly, misconceptions on the side of the patient can be clarified. Secondly, the prescription can be adjusted to meet the expectations and ability of a patient to use medication. Thirdly, communicating about therapy, provided it is not a "top-down" approach, may make patients more emancipated and responsible for their therapy.

The present findings suggest that noncompliance is a serious problem for general practice patients with asthma or COPD. Medication noncompliance may well be an important factor in the paradox of current treatment possibilities *versus* disappointing medical outcome [22]. Blaming the patient for noncompliance, however, comes close to blaming the victim. Improving medication compliance should be a shared responsibility of patients and doctors. From this point of view, paying attention to patient education and improving compliance is one of the cornerstones of quality care in asthma or COPD.

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