Evaluating health education in asthma – developing the methodology: preliminary communication[1]

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Summary: The results are reported of a preliminary study to a controlled trial evaluating health education in asthma. A questionnaire designed to assess asthma morbidity in the previous twelve months and knowledge of the condition was administered to 50 asthma patients. An independent assessment of morbidity was made by the patient's general practitioners, utilizing case notes and their knowledge of the patients. For each aspect of morbidity, 'severe' asthma as assessed by doctors tended to be associated with increasing disability on questionnaire assessment. Overall, questionnaire 'morbidity scores' were significantly higher in the doctors' 'severe' group. Patients' level of knowledge was low, but no significant correlation was found between patients' level of knowledge and level of morbidity.

The findings suggest that there is a need for health education in asthma, and that the questionnaire used is a valid tool for measuring the impact of such education on patients' morbidity. An outline of the controlled trial for evaluation of health education is given.

Introduction

Despite many recent advances in the treatment of asthma, there has been no apparent reduction in its morbidity. Indeed, there is evidence to suggest that health care facilities for asthma are being used more today than they were twenty-five years ago (DHSS 1971, Anderson 1978).

Although there are probably several reasons for this paradox, one factor of importance may be patients' lack of understanding about asthma and the treatments prescribed for it. Surveys of patients in this country and elsewhere suggest that the general level of knowledge about asthma and its treatments is poor (Paterson & Crompton 1976, Ghory 1977, Reddihough *et al.* 1978, Martin *et al.* 1982). A study from the USA suggests that many asthma patients may take inappropriate steps in self-management during acute attacks (Avery *et al.* 1980). However, it has also been shown that health education may help to reduce morbidity due to asthma. Although few education programmes have yet been attempted, those of Green and Maiman have both reported a short-term decrease in the use of hospital emergency facilities by asthma patients (Green *et al.* 1977, Maiman *et al.* 1979).

We propose to investigate more fully the hypothesis that morbidity due to asthma may be reduced by increasing patients' understanding of their condition. To this end we have begun a controlled trial of health education for asthmatic patients. It differs from previous studies in that it is the first to assess patients' morbidity and knowledge prior to intervention. We present here the results of a preliminary study, whose purpose was to develop the methodology for the trial and to examine the relationship between patients' morbidity and knowledge with respect to asthma.

Methods
The survey was carried out in a randomly selected sample of asthma patients, aged 5 to 65 years, attending a suburban general practice in South West London. Eligible patients were those in whom a clinical diagnosis of asthma had been made, and who had received antiasthmatic medication within the previous 12 months.

Questionnaire
Each patient recruited to the study was administered a questionnaire designed to measure his morbidity, and to assess his knowledge of asthma and its treatments. In assessment of knowledge, some questions tested simple recall of facts, whereas others required an ability to interpret these facts in understanding the condition. Information on patients' ability to self-manage, attitudes to asthma and preferences for any given form of health education was also collected and will be reported elsewhere.

Criteria used in the measurement of morbidity included: frequency of attacks, interference with daily activities, absence from work/school, frequency and severity of night attacks, hospital admissions, outpatient attendance, activities avoided, and amount of antiasthmatic medication taken. The questions were principally of the closed, multiple choice type. Responses were grouped for analysis as shown in Table 1.

In order to obtain an overall measure of morbidity for each patient, a 'morbidity score' was calculated based on his responses to the questionnaire. The number of options in the multiple choice questions varied between 3 and 6. For any given question, each option was given a rating on the scale of 0 to 10 points, the maximum value corresponding to the highest level of morbidity. The patient's scores on each question were then summed and the number of treatments added to this total to obtain his morbidity score.

Criteria used in the measurement of knowledge included: understanding of mechanisms of asthma, compliance with doctors' instructions, understanding of treatments and knowledge of side effects. All questions relating to mechanisms of asthma, compliance and side effects were open, whilst those relating to treatments were both open and closed. The responses were grouped for analysis as shown in Table 2.

In order to obtain an overall measure of knowledge for each patient, a 'knowledge score' was calculated. Response to each of the knowledge questions was rated on a scale of 0 to 10 points, the maximum value corresponding to the highest level of knowledge. The values for understanding of treatment, compliance and side effects were averaged over the number of treatments for each patient. These were then added to the value for understanding of the mechanisms of asthma to obtain the 'knowledge score'.

Doctor assessment
A search of the patients' medical records was carried out by the principal investigator (SH). For each patient, a summary was made of the numbers of reviews, acute attacks and days off work/school in the twelve months prior to questionnaire assessment.

An independent assessment of every patient's morbidity was made by the doctor most familiar with his asthma. The doctor was provided with the summary of the medical record search, and asked to·grade patients' morbidity as follows: (1) Symptomatic despite continuous medication; (2) Severe periodic exacerbations which may require intensive medication; (3) Symptoms controlled, but only by continuous medication; (4) Mild, periodic exacerbations usually responding well to simple therapy; (5) Infrequent, mild attacks. As the number of patients in each category was small, categories 1 to 3 were combined to yield a single group of patients with 'severe' asthma. Categories 4 and 5 were combined to yield a group of patients with 'mild' asthma.

Analysis
Associations between variables were examined by means of the Mann Whitney U test, the Spearman rank correlation coefficient (r) and the contingency chi-square (χ^2) test. In view of the small numbers involved, Yates' correction was applied to the chi-square values.

Results

Of the 68 patients approached, 50 (73%) agreed to participate in the study. There were 28 males and 22 females, with a mean age of 31.5 years and a range of 6–64 years.

The frequency of attacks reported in the questionnaire was compared with the number of reviews and acute episodes recorded in the medical records. There was no significant association between the frequency of attacks and either the number of reviews ($\chi^2 = 0.27$,NS) or the number of acute episodes ($\chi^2 = 0.03$,NS). The number of days absent from work/school, reported in the questionnaire, was compared with that recorded in the medical records. Assuming the doctors' estimates to be correct, the questionnaire underestimated absence in 11 (22%) patients, overestimated absence in 10 (20%) patients, and showed agreement with doctors in 29 (58%) patients. The overall association between doctors and questionnaires on this aspect of morbidity was highly significant ($\chi^2 = 21.62$, $P < 0.01$).

Patients were grouped into mild and severe categories according to their doctors' assessment, and the groups then examined for differences in patients' reponses to the morbidity questions on the questionnaire. Table 1 shows that for most of the aspects of morbidity examined there was a tendency for severe asthma, as assessed by doctors, to be associated with increasing degrees of disability, as assessed by the questionnaire. The

Table 1. *Comparison of questionnaire with doctor-assessed morbidity*

Questionnaire index of morbidity	Doctor assessment		Significance
	Mild No. (%)	Severe No. (%)	
Frequency of attacks:			
2–3 times yearly or less	17 (63)	8 (35)	$\chi^2 = 2.90$
Monthly or more	10 (37)	15 (65)	
Interference with daily activities in past year:			
Yes	14 (52)	9 (39)	$\chi^2 = 0.38$
No	13 (48)	14 (61)	
Activities avoided in past year:			
Yes	12 (44)	9 (39)	$\chi^2 = 0.01$
No	15 (55)	14 (61)	
Absence from work/school in past year:			
Yes	17 (63)	13 (56)	$\chi^2 = 2.52$
No	10 (37)	10 (43)	
No. days absent in past year:			
10 days or less	8 (29)	3 (13)	$\chi^2 = 3.23$
More than 10 days	2 (7)	7 (30)	
Frequency of night attacks:			
Monthly or less	24 (89)	14 (61)	$\chi^2 = 3.29$
Weekly or more	3 (11)	9 (39)	
Severity of night attacks:			
Sleep again easily	6 (22)	9 (39)	$\chi^2 = 0.02$
Sleep difficult or impossible	11 (40)	12 (52)	
Hospital admission for asthma:			
Never	22 (81)	14 (61)	$\chi^2 = 1.69$
Ever	5 (18)	9 (39)	
Outpatient attendance:			
Never	18 (67)	7 (30)	$\chi^2 = 5.15$●
Ever	9 (33)	16 (70)	
Mean morbidity score	41 ± 16	31 ± 16	$z = 2.34$●

● significant at 1% level

questionnaire indices of morbidity which were most closely associated with doctors' assessments included: frequency of attacks, number of days off work/school, frequency of night attacks and outpatient attendance.

An overall comparison between questionnaire and doctor-assessed morbidity was obtained by comparing patients' morbidity scores on the questionnaire with their level of morbidity as assessed by doctors (Table 1). The mean morbidity score was found to be significantly higher in those patients whom doctors regarded as having severe asthma, than in those whom doctors regarded as having mild asthma.

The patients' level of knowledge about asthma and its treatment is summarized in Table 2. Nearly half of the patients (46%) were unaware of what changes occured in their lungs during an asthma attack. Of the 109 treatments being taken by the 50 patients, the mode of action of 36 (33%) was wholly misunderstood, while that of an additional 45 (41%) was only poorly understood. Understanding of side effects was also low, with patients having no knowledge of the potential adverse effects of 59 (53%) of the treatments. Despite these low levels of knowledge, compliance was reportedly high, with 97 (89%) of the treatments apparently being used as doctors had instructed.

The relationship between patients' knowledge of asthma and their morbidity due to this condition was examined by means of the 'knowledge' and 'morbidity' scores derived from questionnaires. Figure 1 shows that there was no significant correlation between patients' knowledge and morbidity scores.

Discussion

This paper describes the pilot study for a controlled trial to evaluate health education in asthma. We wish to test the hypothesis that patients' morbidity due to asthma can be reduced by increasing their understanding of the disease and hence their ability to self-manage. The results of many trials of health education have been disappointing (Moldofsky *et al.* 1979, Lloyd 1970, Whitfield 1979). However, in the field of tertiary prevention (i.e. patient education in established disease), encouraging results have been found in studies where

Table 2. Questionnaire assessment of knowledge

| Index of knowledge	No. (%)
Questions relating to 50 patients	
Understanding of mechanisms of asthma:	
Narrowing of airways	11 (22)
Narrowing of airways by muscles/nerves	9 (18)
Blockage of airways	4 (8)
Blockage of airways by swelling/mucus	3 (6)
Don't know/incorrect	23 (46)
Questions relating to 109 treatments being taken by patients	
Understanding of treatment:	
Low (completely wrong/don't know)	36 (33)
Poor (partially correct on either open or closed questions)	45 (41)
Good (partially correct on both open and closed questions)	28 (26)
Excellent (completely correct on both open and closed questions)	0 (0)
Knowledge of side effects:	
Is aware of side effects	14 (13)
Is not aware of side effects	59 (53)
Not asked	36 (33)
Compliance with doctors' instructions:	
Yes	97 (89)
No	12 (11)
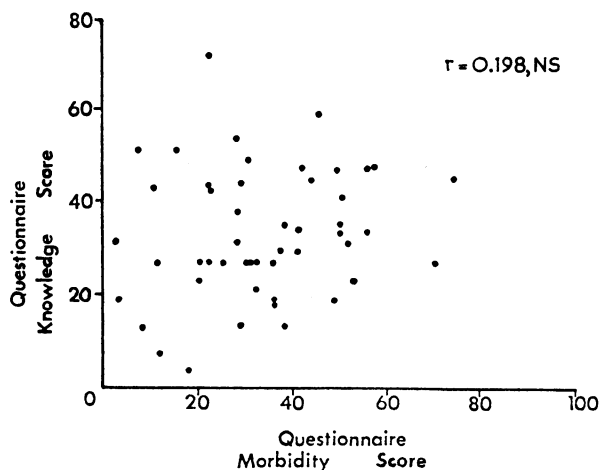
Figure 1. Association between patients' knowledge and morbidity with respect to asthma

educational intervention has been integrated with continuing clinical care (Graber *et al.* 1977, Morell *et al.* 1980). It is in this context that our controlled trial will be performed.

The central problem of such trials lies in the definition of outcome measures. Morbidity is a general concept which, in our opinion, should encompass patients' subjective assessment of their disability, such as activities avoided and degree of sleep disturbance, as well as more objective measures, such as days missed from work and number of hospital admissions. Since health education seeks to change patient's attitudes to their illness, it is important that these attitudes form an integral part of the subjective assessment of their morbidity. It is our intention to combine such subjective and objective indices in the measurement of morbidity, to be obtained by means of an interviewer administered questionnaire.

In the pilot study described here, we have looked at the relationship between morbidity as assessed by our questionnaire, and morbidity as assessed by the doctors most familiar with the patients. A comparison of the two measurements of morbidity showed that an increase in the level of morbidity in one tended to be accompanied by an increase in the level of morbidity in the other. Although some discrepancies were found, they must be expected in view of the complexity of the outcome measure. Therefore, assuming the doctors' assessments are accurate, the findings suggest that the questionnaire measure of morbidity is meaningful. In the absence of a more reliably objective method of assessing morbidity, we feel confident that our questionnaire, which has been modified further in the light of experience gained in the pilot study, will prove an effective tool for measuring morbidity.

We next examined patients' level of knowledge and its relationship to their morbidity, as assessed by questionnaire. The findings confirmed those of previous investigations in showing that patients' knowledge of asthma was poor. Of greater interest was the finding that there was, apparently, no association between patients' knowledge and their morbidity. Thus, the patients with the highest levels of morbidity were not always the least knowledgeable.

The implication of these findings as regards health education for asthmatics is clear. Health education may not necessarily have a measurable impact on severe asthmatics, since some of these patients may already be well informed. Furthermore, the impact on the morbidity of mild asthmatics is likely to be small, since the margin for improvement is small. Clearly, it is those patients whose morbidity is high, but whose understanding of asthma is low, who are the most likely to benefit. Thus in the evaluation of health education, it is essential that pre- and post-intervention assessments of both knowledge and morbidity should be made.

The findings of our preliminary study have shown that there is a need for health education in asthma, and have confirmed that we have a valid tool for measuring the impact of such

health education. It is our intention to implement these findings in a study which will be the first of its kind to afford both a longitudinal and a cross-sectional evaluation of health education in asthma.

On recruitment, patients' knowledge and morbidity with respect to asthma will be assessed using the questionnaire format described here. Patients will then be allocated randomly to one of three study groups as follows: group one will act as controls and have no educational intervention; group two will be offered the minimum health education which might be expected to have an impact on their morbidity; and group three will be offered an intensive educational programme designed to maximize the probability of detecting a reduction in morbidity as a result of health education. One year after recruitment, patients in all three groups will again be assessed by questionnaire. In this way, we will be able to determine whether health education can reduce morbidity due to asthma and, if so, suggest what minimum level of intervention might be needed to achieve this aim.

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