Using information from asthma patients: a trial of information feedback in primary care

Patrick White, Annie Atherton, Graham Hewett, Kate Howells

Abstract

Objective—To test the effects of feedback of information about patients' asthma to primary care teams.

Design—Patients' reports of morbidity, use of health services, and drug use on questionnaire was given to primary care teams. Randomised controlled trial with general practices as the subject of the intervention was used to test effectiveness of supplying information.

Setting—Primary care in district health authority, London.

Subjects—23 general practices, each of which notified at least 20 asthmatic patients aged 15-60 years for each principal. Practices were randomly allocated to an intervention group (receiving feedback of information on control of asthma) or a control group (no feedback).

Intervention—Information on cards inserted in patients' medical records; booklet copies of information for team members; formal presentation to primary care teams; poster displays of data on patients in each practice.

Main outcome measures—Type and frequency of asthma symptoms, use of health services, use of asthma drugs.

Results—Reported morbidity at entry to the study was substantial: 45% (818) patients reported breathlessness at least once a week. Less than half these patients were using inhaled steroids regularly. Intervention and control groups did not differ in practice or patient characteristics on entry to the study. In spite of the potential for improvement no differences were observed between the two practice groups at the end of the study—for example, breathlessness at least once a week in last six months was experienced by 36% in intervention group *v* 35% in control group ($t=-0.27$, $P<0.79$); surgery attendance in last six months by 48% *v* 48% ($t=-0.05$, $P<0.96$); regular use of inhaled steroids by 60% *v* 58% ($t=0.51$, $P<0.62$).

Conclusion—Feedback to general practitioners of information about patients' asthma does not on its own lead to change in the outcome of clinical care.

Introduction

The influence of information feedback has been variable in primary care. Szczepura *et al* found general practitioners receptive to comparative information about practice services and targets.¹ Winkens *et al* showed that feedback on requests for diagnostic tests exerted a strong and sustained influence on the test ordering behaviour of general practitioners.² Mugford *et al*, in a review of 36 reports about feedback in several clinical settings, found only two instances in which information feedback influenced patient outcomes.³ However, in none of these studies, nor in any other

reports we have been able to find, have trials of feedback been based on information derived from patients.

A key issue in the undertreatment and underdiagnosis of asthma may be general practitioners' lack of awareness of the morbidity experienced by their asthma patients.⁴ Patients with asthma are not frequent attenders at the surgery, and many have an ambivalent view about their asthma and the need for asthma treatment.^{5,6}

This study proposed to bridge the gap between patients' experience of asthma and primary care teams' awareness of their patients' morbidity and drug use. The aim of the study was to see if feedback of information derived from patients would help the primary care teams to provide more active treatment for patients who had continuing symptoms and in whom there was room for increased prescribing.

Method

The project was set up as a randomised controlled trial. General practices were randomly allocated to a control or an intervention group. Practices in the intervention group were provided with information about morbidity and drug use that had been reported by patients in their care on patient completed questionnaires. The same information was collected from patients of control practices for a comparative analysis, but this information was not fed back to the control practices.

PRACTICES

All general practices in Camberwell Health Authority were invited to take part. Participating practices were asked to notify all known patients with asthma. A minimum of 20 asthmatic patients aged 15-60 years for each general practitioner principal was set as the entry criterion. To allow stratified randomisation and to compare intervention and control practices, profiles of each practice were drawn up. Information was collected about team members, number of patients, asthma clinics, computerised registers, and fundholding.

Two factors were considered to present potential for bias: the running of an asthma clinic within the practice and the number of respondents per general practitioner to the first questionnaire. Practices were stratified by these two characteristics before being allocated to the intervention or control group.

PATIENTS

Names and addresses of patients with asthma were obtained from asthma registers (manual and computerised), repeat prescription registers, and relevant prescriptions written between June and September 1991. Eligible patients were born between 1 January 1931 and 31 December 1976.

Department of General Practice and Primary Care, King's College School of Medicine and Dentistry, London SE5 9PJ

Patrick White, senior lecturer
Annie Atherton, project manager
Graham Hewett, research assistant
Kate Howells, research assistant

Correspondence to: Dr White.

BMJ 1995;311:1065-9

PATIENT QUESTIONNAIRE

A postal questionnaire for the assessment of morbidity due to asthma had been designed and tested previously.⁷ This questionnaire provided the information for the feedback to intervention practices and for the analysis of the impact of the study. The questionnaire's 27 questions were grouped in sections on morbidity, social impact, and drug use and were formulated as statements. In the questions about symptoms, patients were asked to indicate the frequency of the symptom (box). They were asked about time off work or studies, attendance at surgery, home visits by a doctor, outpatient attendance, admissions to hospital, severe or unpleasant attacks, and breathlessness walking on level ground, uphill, and upstairs. Finally, respondents were asked to name the asthma remedies they were using and the route by and frequency with which they were using them.

THE INTERVENTION

Information collected was given back to all the intervention practices in four ways: on a feedback card inserted by the research team in the patient's medical record; in copies of printed booklets given to doctors, nurses, and practice managers; at a presentation meeting with the primary care teams; and on an individual practice poster for display in each practice.

The feedback card (box) was designed after discussion with some of the practitioners taking part in the project. It was bright orange and was designed to fit in the Lloyd George envelope medical records, standing out sharply just above the regular recording cards. This provided summarised data that might act as a reminder to the general practitioner or nurse either during a consultation or when repeat prescriptions were issued. Feedback labels attached to the front and reverse of the card stated the six month period to which the feedback referred. Feedback labels gave information on breathlessness, wheeze, cough, night waking, breathlessness on level ground, drug use, and

Questionnaire format

The first four questions asked about any very recent chest trouble. In the rest of the questionnaire we will be asking how your chest has been during the six months since last March.

PLEASE ANSWER ALL THE QUESTIONS BY TICKING ONE BOX ONLY

Which of the following statements about breathlessness, wheezing, and coughing BEST describes your chest trouble?

5 DURING THE SIX MONTHS SINCE LAST MARCH

I have had attacks of breathlessness:

every day	☐ 1
on most days	☐ 2
once or twice a week	☐ 3
a few times a month	☐ 4
once or twice a month	☐ 5
less than once a month	☐ 6
not at all	☐ 7

6 DURING THE SIX MONTHS SINCE LAST MARCH

I have had attacks of wheezing:

every day	☐ 1
on most days	☐ 2
once or twice a week	☐ 3
a few times a month	☐ 4
once or twice a month	☐ 5
less than once a month	☐ 6
not at all	☐ 7

Questionnaire content

Frequency of breathlessness
Frequency of wheeze
Frequency of cough
Frequency of night waking
Time lost from work
Number of surgery attendances
Number of hospital attendances
Number of home visits from GP
Number of hospital admissions
Number of severe attacks
Duration of severe attacks
Interference with walking on level ground/uphill/upstairs
Medicines used: route and frequency

ASTHMA FEEDBACK

J Smith
DOB 17/01/61
1 Fratton Park
London

F
CAMBERWELL
SE5 9PJ

662439

In the six months to September 1991:

J Smith DOB 17/01/61 662439 1

BREATHLESS: every day
WHEEZE: every day
COUGH: every day
NIGHT WAKING: on most days

B'LESS WALKING ON LEVEL: most times

DRUG USE: (E=every day; NE=not every day; X=not reported)
Inh.br-dilators E Oral br-dilators X
Inh.steroids X Oral steroids NE
Theophylline X Intal, Tilade, Zaditen X

ASTHMA INDEX: 52.00% (18%=worst, 100%=best)

In the six months to March 1992:

J Smith DOB 17/01/61 662439 2

BREATHLESS: a few times a month
WHEEZE: less than once a month
COUGH: on most days
NIGHT WAKING: less than once a month

B'LESS WALKING ON LEVEL: rarely

DRUG USE: (E=every day; NE=not every day; X=not reported)
Inh.br-dilators NE Oral br-dilators X
Inh.steroids E Oral steroids E
Theophylline X Intal, Tilade, Zaditen X

ASTHMA INDEX: 75.00% (18%=worst, 100%=best)

asthma index. The asthma index was provided at the request of some general practitioners to enable them to categorise their patients in order of severity and to set a threshold for recalling patients. The index was computed by summing the scores from a range of questions in the questionnaire and presenting the result as a percentage of the best possible score had the patient reported no symptoms at all. If patients had not responded to a questionnaire a feedback label attached to the card stated "Questionnaire not returned."

The booklet copies of the feedback duplicated the information on the feedback card and were organised alphabetically by patient's name. They included a list of patients and their asthma indices in order of severity and a list of patients with asthma index adjacent to drug use.

The practice posters measured 48 cm by 60 cm and consisted of laminated plastic and hard card. They summarised data on patients' breathlessness, surgery attendance, and drug use in the individual practices in the study.

FEEDBACK

The first questionnaire was mailed in September 1991 and four further questionnaires were mailed at intervals of six months. The final questionnaire was mailed in September 1993 and was used for outcome assessment only.

To assess usefulness of the feedback, a questionnaire was sent to the 53 general practitioners, nurses, and practice managers in the intervention group practices; results will be reported in detail elsewhere. For the purpose of this paper two questions were considered: "Has the feedback influenced any changes in the way you manage your asthma care?" and "In general, was the feedback helpful in the care of your asthma patients?"

ANALYSIS

Outcome was measured by assessing patients' reports of classic symptoms, contact with medical

services, and drug use. These variables represented aspects of care in which general practitioners could effect change if feedback was having any influence. The morbidity showed if there was room for improvement in the patients' asthma; the reported surgery attendance showed if it was appropriate for the practices to see patients any more frequently; and the reported drug use showed if there was the opportunity for more prescribing of asthma remedies.

In the comparison of intervention and control groups a level of severity was chosen for each morbidity variable. This either seemed to have clinical relevance or divided the study population roughly in half. The percentage of patients in each practice who responded above this level was determined for each variable and used in comparing the groups. The independent two tailed *t* test was used to find differences between the two groups.

Results

THE PRACTICES

Twenty three primary care teams notified at least 20 asthmatic patients per general practitioner in the team. Eleven practices were allocated at random to the intervention group and twelve to the control group. Table I shows the characteristics of participating practices. One practice in the control group joined with a practice from the intervention group in the course of the project. That practice and its patients, which had been in the control group, were removed from the study.

TABLE I—Characteristics of practices in intervention and control groups on entry to study. Mean numbers of patients are per GP in group

	Intervention practices	Control practices
No of practices	11	12
No of general practitioners	28	33
No employing practice nurse	9	9
No running asthma clinic	6	6
No of patients registered	69 970	82 600
Mean No of patients notified	2 498	2 503
Mean (range) No of asthmatic patients notified	30.5 (20.0-51.0)	37.0 (21.0-62.0)
Mean (range) No of respondents to first and final questionnaires	13.3 (7.0-22.6)	13.5 (6.6-19.0)

THE PATIENTS

A total of 2068 patients aged 15-60 who were receiving drug treatment for asthma were notified by the 23 practices. This represented 38% of the estimated total of current patients with asthma (6%) of this age. The first questionnaire was returned by 1294 (69% after exclusion of 196 patients "not known at this address" or "moved away"). A total of 818 patients completed both the first and final questionnaires; these were used in the analysis.

The average age of patients notified to the study in July 1991 was 34.3 (SD 12.22) years; 86% (778) of patients notified were aged under 50 years. The mean of practice means was 34.4 (2.07) years, and the mean age in July 1991 of respondents who completed both the first and final questionnaires was 37.8 (13.0) years.

More women than men were notified to the study (1:15:1). The response to questionnaires was significantly higher among women—1.44:1 completed the first and final questionnaires. Sex ratio did not differ significantly between intervention and control practices ($t = -0.75$; $P < 0.45$).

POTENTIAL FOR IMPROVING MORBIDITY, INCREASING ATTENDANCE, AND INCREASING TREATMENT

Table II summarises the reporting of asthma symptoms at the beginning and end of the study. The distributions of responses to the questions on wheeze,

TABLE II—Percentages (numbers) of respondents reporting all categories of breathlessness, and breathlessness, wheeze, cough, and night waking at least once a week in the first (1991) and final (1993) questionnaires

	First questionnaire (n=818)	Final questionnaire (n=818)
Breathlessness:		
Every day	8.7 (71)	5.9 (48)
On most days	17.6 (144)	13.6 (111)
Once or twice a week	18.5 (151)	17.0 (139)
A few times a month	14.5 (119)	16.5 (135)
Once or twice a month	13.3 (109)	12.1 (99)
Less than once a month	14.8 (121)	19.8 (162)
Not at all	11.5 (94)	13.2 (108)
Breathlessness at least once a week	44.8 (366)	36.5 (299)
Wheeze at least once a week	44.3 (362)	33.7 (276)
Cough at least once a week	52.6 (430)	46.1 (377)
Night waking at least once a week	27.9 (228)	23.1 (189)

cough, and night waking (not in table) were similar to that of breathlessness. The mean percentage of patients in each practice reporting breathlessness at least once a week—45.6% (range 10-73%)—fell to 35.7% (10-58%) in the six months before the end of the study.

In all, 754 (92%) of the respondents who completed both the first and final questionnaires reported using at least one asthma drug on entry to the study. The frequency of reported use of the principal classes of asthma drug at the beginning and end of the study are given in table III. Thirty eight per cent (273) of those using inhaled bronchodilators used them every day, 29% (208) used them most days, and 32% (228) used them when needed but not most days. Of those using inhaled steroids, 75% (326) reported use every day as a routine, 10% (43) most days, and 15% (65) when needed but not most days.

TABLE III—Reported use of the principal classes of asthma drug in the first (1991) and final (1993) questionnaires. Values are percentages (numbers) of respondents

	First questionnaire (n=818)	Final questionnaire (n=818)
Inhaled bronchodilators	87.0 (712)	85.0 (695)
Inhaled steroids	53.1 (434)	60.0 (491)
Oral bronchodilators	3.1 (25)	3.1 (25)
Oral steroids	6.0 (49)	6.0 (49)
Theophylline	13.0 (106)	10.0 (82)
Cromoglycate	4.0 (33)	2.0 (16)

A mean of 85% (range 63-97%) of patients in each practice reported use of inhaled bronchodilators on entry to the study, and 52.4% (30-73%) reported using inhaled steroids. Of the 366 reporting breathlessness at least once a week on entry to the study, 175 (48%) reported using inhaled steroids regularly and 139 (38%) were not using inhaled steroids at all. At the end of the study the number of patients reporting breathlessness at least once a week had fallen to 296, but of these 99 (33%) were not using inhaled steroids at all. Table IV shows the reported use of health services by study subjects at the beginning and end of the study.

The feedback cards, with the first label attached,

TABLE IV—Reported use of health services in the first (1991) and final (1993) questionnaires. Values are percentages (numbers) of respondents

	First questionnaire (n=818)	Final questionnaire (n=818)
Attended nurse or doctor in surgery at all for asthma	61.9 (506)	46.9 (384)
Home visiting by doctor for asthma	6.2 (51)	5.3 (43)
Hospital outpatient attendance for asthma	15.0 (123)	9.4 (77)
Hospital admission for asthma	5.4 (44)	3.1 (25)

TABLE V—Mean (SD) percentages of patients reporting symptoms on first and final questionnaires

Symptoms experienced in past six months	First questionnaire				Final questionnaire			
	Intervention practices	Control practices	t Value	P value	Intervention practices	Control practices	t Value	P value
Breathlessness at least once a week	48.0 (14.1)	43.0 (13.9)	-0.97	0.34	36.0 (14.3)	35.0 (10.9)	-0.27	0.79
Wheeze at least once a week	47.0 (11.8)	44.0 (13.2)	-0.65	0.52	38.0 (11.7)	31.0 (14.4)	-1.35	0.19
Cough at least once a week	51.0 (9.6)	53.0 (14.5)	0.34	0.73	49.0 (13.9)	45.0 (12.1)	-0.73	0.47
Night waking at least once a week	31.0 (9.0)	30.0 (13.6)	-0.16	0.87	27.0 (9.9)	23.0 (11.2)	-0.88	0.39
Any time off work or studies due to asthma	24.0 (8.1)	25.0 (6.6)	0.32	0.75	16.8 (7.3)	19.1 (6.7)	0.77	0.45
At least one severe attack	58.8 (16.1)	54.2 (13.7)	-0.73	0.47	49.3 (13.1)	43.3 (13.2)	-1.08	0.3
Breathless on level ground most times	45.8 (15.2)	41.7 (15.2)	-1.34	0.2	41.3 (17.0)	38.7 (12.7)	-0.41	0.7
Any attendance at surgery (doctor or nurse)	69.1 (13.4)	61.1 (13.9)	-1.37	0.19	48.1 (13.0)	47.8 (20.0)	-0.05	0.96
Regular use of inhaled steroids	52.8 (11.3)	55.8 (12.4)	-0.75	0.46	60.0 (8.55)	57.8 (11.36)	0.51	0.62
Regular use of inhaled bronchodilator	83.6 (10.5)	85.8 (7.2)	-0.57	0.57	84.5 (7.9)	83.4 (9.9)	0.29	0.78

were inserted in the medical record in December 1991, three months after the questionnaire mailing. Booklet copies of the feedback data were given to practice doctors, nurses, and managers at the same time. Thereafter three further batches of feedback labels were placed on the cards, each within three months of the relevant questionnaire mailing. With each batch of feedback labels, booklet copies were also provided. Presentation meetings were held with seven practices; four practices were unable to provide dates for presentation of the feedback data. All practices received individual practice posters, which were displayed in the practices.

INTERVENTION AND CONTROL PRACTICES COMPARED

The age and sex of patients who completed the first and final questionnaires did not differ between intervention and control practices. Differences in reported morbidity, use of health services, and use of drugs were sought between the intervention and control practices at the beginning and at the end of the study (table V), but no significant differences were found. Reported morbidity fell to the same extent in both groups during the study, as did reported use of health services. Reported use of inhaled steroids rose throughout the study to a similar extent in the groups, a practice mean of 60% in the intervention group and 58% in the control group.

USE OF THE FEEDBACK BY THE PRIMARY CARE TEAMS

Thirty questionnaires (57%) were returned by members of primary care teams. Sixteen said the feedback had not influenced any changes in the way they had managed their asthma care, 22 said the feedback was helpful in the care of their asthma patients, and three said it was not helpful.

Discussion

Patient derived information such as that used in this study should be among the most powerful that could be used in the clinical setting. It should be relevant to both the patient and the doctor, and it is likely to be more relevant than information about groups or populations. Yet the information that was gathered from asthma patients and given to the general practitioners and their teams was not associated with any measurable change in the process or outcome of asthma care. Data about groups can be ignored because it may not reflect the experience of the patient in the consultation. Personalised information may also be ignored, but not on the pretext that it is not pertinent. Why did this information have no discernible impact?

ASPECTS OF THE STUDY DESIGN

The intervention and control groups did not differ, either at the beginning or at the end of the study, in any of the variables examined. The sample from each practice identified enough asthmatic patients in whom change could be brought about in response to the

provision of information. If the sample had consisted either of a group of patients who had such mild asthma as to not justify added treatment, or of a group of patients who were already receiving maximum treatment, then the research could not have been done. In every practice at least 25% of patients who completed both the first and final questionnaires seemed to have room to achieve a substantial reduction in symptoms, and in most practices this was true of more than half of the patients. The method of recruiting patients had the effect of including only those people with asthma who were known to the general practitioners. Only 38% of the 5500 asthmatic patients estimated to be registered in the practices were notified by the practices. None the less, the morbidity and drug use reported is likely to be representative of the experience of patients who attend their general practitioners.

Reported morbidity was substantial. There was considerable room for increased prescribing of asthma drugs: only 53% of patients reported using inhaled steroids on entry to the study, and 38% of those who had breathlessness at least once a week reported no use of inhaled steroids at all. Morbidity due to asthma did fall overall, and inhaled steroid use rose to 60%. However, the groups did not differ on either of these criteria or in use of health services, so any change which occurred was not the result of the intervention.

The questionnaire, which served both as the source of information for the intervention and as the outcome measure, provided consistent assessments of practices' patient groups as a whole throughout the study. The range of morbidity and drug use reported supports the face validity of the questionnaire. We decided to use an assessment tool such as the questionnaire and not tests of lung function for two reasons. Firstly, perceived morbidity is likely to be the patient's principal motivation for seeking asthma treatment and is likely to be a strong factor in motivating patients to comply with prescribed medication and to attend for medical care. Secondly, peak flow diaries are not acceptable to many patients in a primary care setting—only a quarter of 1000 patients completed peak flow diaries in a primary care study.⁸

IMPACT OF THE INFORMATION

The information feedback was well received by the practices. The study did not attempt to directly change processes in which the information could be used within the practices. The aim was to test the effect of the information itself. However, without a formal process within which information could be used the information seems to be inert. Mugford *et al* observed that "feedback of information is necessary but not sufficient in the process of maintaining high quality care."⁹ The results of our study support this, even though the information referred to individual patients. Lomas *et al* had no illusions about the difficulty of transforming the way health care workers operate: "Physician and, more notably, provider behaviour is remarkably resistant to change."⁹ These observations

Key messages

- Information from asthma patients indicates substantial continuing morbidity due to asthma
- Despite rising prescribing of inhaled steroids there is still considerable room for more active treatment of asthma in general practice
- Feedback of information collected systematically from patients with asthma does not influence the pattern of attendance, prescribing, or morbidity
- As access to information increases, processes must be developed within which information can be used to augment strategies to bring about change

are contradicted by the findings of Winkens *et al*, who showed the strong influence that feedback of information on ordering laboratory tests had on general practitioners' behaviour. The striking difference between our study and the work of Winkens *et al* is that our study provides information based on the patients' experience whereas Winkens *et al* provided information based on the general practitioners' behaviour.²

Tuckett *et al* reported that general practitioners in the consultation did not value the role of the patient as information provider and "did not usually tailor advice and instructions to known details of the patient's life."¹⁰ This may be a vital clue to understanding why the information in our study had no impact. Bringing about change in general practice requires an understanding of the processes of the system within which change is desired, after which the choice of intervention to bring about the change can be made.¹¹ It is clear from this study that information about patients' health needs is unlikely to be enough on its own to modify the way primary care team members work, even where the need for change seems to be compelling. Our findings point to the need for a context within which information is provided. The motivation to collect and distribute the information came from the researchers. Individual practices did not request it, did not choose the information to be collected, and did not decide on the way it should be presented or used. Lack of involvement in the design of the research process could have been a factor in the failure of the intervention to motivate a change in the care of asthma. However, this was not a factor in the work of Winkens *et al*.²

Information is a key facet of audit in health care. Most workers in audit now emphasise the importance of the process of audit, although many clinicians

continue to view clinical audit as a matter of data collection.¹² The importance of the process of audit is strengthened by these results: an implication is that it would be fruitless to short circuit the audit cycle by simply providing the information around which the work of audit is built. Primary care teams first have to undergo the process of identifying their goals and then choosing the tools to help achieve them. As information systems become more widespread and more sophisticated the range and availability of information will expand. Access to information is also likely to improve, so that the problem facing health care workers will be one of how to choose and prioritise information rather than how to collect and interpret it.

CONCLUSION

In a primary care setting, access to information derived from patients does not lead to change in medical care. Even where information seems to be intrinsically powerful, as in the patient derived information used in this study, it is unlikely in itself to bring about change. The results of this study point to the need to establish a process within which information can be used to augment strategies for change.

We are grateful to the South London primary care teams and their patients who made this research possible.

Funding: Department of Health.

Conflict of interest: None.

- 1 Szczepura A, Wilmot J, Davies C, Fletcher J. Effectiveness and costs of different strategies for information feedback in general practice. *Br J Gen Pract* 1994;43:19-24.
- 2 Winkens RAG, Pop P, Grol RPTM, Kester ADM, Knottnerus JA. Effect of feedback on test ordering behaviour of general practitioners. *BMJ* 1992;304:1093-6.
- 3 Mugford M, Banfield P, O'Hanlon M. Effects of feedback of information on clinical practice; a review. *BMJ* 1991;303:398-402.
- 4 Jones KP. Asthma care in general practice—time for revolution? *Br J Gen Pract* 1991;41:224-6.
- 5 Barritt P, Staples EB. Measuring success in asthma care: a repeat audit. *Br J Gen Pract* 1991;41:232-6.
- 6 Hewett G. *Just a part of me—men's reflections on chronic asthma*. London: South Bank University, 1994. (Occasional papers in sociology and social policy No 1.)
- 7 White PT, Pharoah CA, Anderson HR, Freeling P. Randomised controlled trial of small group education on the outcome of chronic asthma in general practice. *J R Coll Gen Pract* 1989;39:182-6.
- 8 Kendrick A, Higgins C, Laszlo G. Patients' perception of their asthma. *BMJ* 1993;307:1209.
- 9 Lomas J, Sisk JE, Stocking B. From evidence to practice in the United States, United Kingdom and Canada. *Millbank Quarterly* 1993;71:405-10.
- 10 Tuckett D, Boulton M, Olson C, Williams A. *Meetings between experts*. London: Tavistock Publications, 1985.
- 11 Spiegel N, Murphy E, Kinmonth A, Ross F, Bain J, Coates R. Managing change in general practice: a step by step guide. *BMJ* 1992;304:231-4.
- 12 Glover S, ed. *Making medical audit effective*. London: Joint Centre for Education in Medicine, 1992.

(Accepted 14 September 1995)

Moving house: a risk factor for the development of childhood asthma?

C H Hughes, J H Baumer

Following the observation that asthma was commonly seen in children who had previously moved house we undertook a case control study to investigate the timing of house moves, taking account of other factors known to be associated with childhood asthma. A Medline search failed to identify any studies reporting house moves as a risk factor for childhood asthma.

Subjects, methods, and results

We carried out the study in a single, computerised practice serving a suburban population with modern

housing. All children between their 4th and 16th birthdays receiving treatment for asthma in the year to February 1994 were identified from computerised prescription records.

The study subjects were 44 children treated for asthma. One control child without atopy, matched for sex and age, was randomly selected from the practice register for each asthmatic subject. A telephone survey using a structured questionnaire was undertaken and combined with information obtained from the child's and parents' practice records. The two groups were compared for house moves using McNemar's test for matched cases and controls, with adjustment for small numbers. Other differences were assessed using the χ^2 test.

The characteristics of the two groups are shown in the table. The 44 asthmatic children constituted 11.4% of the 4-16 year olds in the practice.

Twenty five (57%) asthmatic children had moved house by the age of onset of asthma, in contrast to

Health Centre, Estover,
Plymouth PL6 8UE
C H Hughes, general
practitioner

Department of Child
Health, Derriford Hospital,
Plymouth PL6 8DH
J H Baumer, consultant
paediatrician

Correspondence to:
Dr Hughes.

BMJ 1995;311:1069-70