

Measuring success in asthma care: a repeat audit

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SUMMARY. An asthma audit was first performed in 1984 in a two-doctor semi-rural training practice in Shropshire with 4400 patients. This paper reports on a repeat of the audit in 1987 in the same practice, following a programme of minimal intervention. Interviews were conducted with 192 asthmatics, 96% of those known to the practice on a manual register.

Between the 1984 and 1987 audits there was a significant increase in ownership of peak flow meters and their use for monitoring progress and an improvement in inhaler technique. There was a general improvement in patients' knowledge about asthma. Inadequate control was shown in 22% of the sample in 1987, but half of these patients were known to be non-compliant. There were significant improvements in scores for asthma disability in night-time symptoms in children ($P < 0.05$) and in daytime symptoms in adults ($P < 0.001$) between 1984 and 1987.

It is concluded that improved levels of asthma care have been achieved in a small practice using checklists, booklets and repeated audit, but without structured follow up or an asthma clinic.

Introduction

A BASELINE audit of asthma care in a two-doctor semi-rural practice in Shropshire in 1984 showed a poor level of knowledge about the disease, a high incidence of symptoms and a considerable amount of sub-optimal treatment.¹ Following a three year period of minimal intervention, which involved structuring the doctor-based consultations with asthmatic patients, the audit was repeated in the same practice in 1987. The final phase of the study was to provide a nurse or doctor-run asthma clinic in the practice and to see how these different patterns of organization affect patient care. The aim of the project therefore was to see if alterations in the structure and process of asthma care improved outcome measures. In particular, the provision of asthma clinics is time-consuming and expensive and we wished to examine whether this investment of resources was justified in terms of benefit to the patient. This paper presents results from the mid-point of the six year study.

Method

Asthma care in the practice

Asthma is defined in the practice as reversible airways obstruction with greater than 15% variability in peak expiratory flow rate. The objectives for good asthma care in the practice were defined as follows:

1. Prompt and accurate diagnosis, including confirmation of diagnosis on the basis of peak expiratory flow rate in patients aged six years and over.
2. Encouragement for moderate and severe asthmatics to have peak expiratory flow meters at home.

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3. Correct selection of inhaler devices to suit each patient, with adequate training and checking so that patients prepare and use their inhalers effectively and remember to breath-hold afterwards.
4. Availability for all patients aged two years and over of inhaled bronchodilator at home, with access for younger patients to bronchodilator via nebulizers lent by the practice.
5. Education about bronchodilator drugs such that patients know the approximate duration of action and call for help if their symptoms return within this period.
6. Encouragement to use bronchodilators before exercise in patients with exercise-induced asthma.
7. Prophylactic drugs offered to all patients with moderate or severe disease, with explanation that the drugs must be taken regularly to be effective, that there is significant delay in onset of action and that prophylactic drugs will not provide any immediate relief in acute asthma.
8. Flexible but regular follow up offered to all moderate/severe asthmatics to include symptom analysis, measurement of peak expiratory flow, checking inhaler technique and reinforcement of educational measures.

Following the initial audit in 1984 an asthma card was designed to fit the Lloyd George envelope. The card contained basic data on the patient's asthma and a checklist for the doctor. Partners and trainees were urged to complete an asthma card for each patient with the disease. Patients with moderate or severe asthma were encouraged to attend for follow up in normal surgery hours but no systematic identification of defaulters was used.

Educational booklets were available for doctors to distribute to patients as they attended; for adults the booklet *Understanding asthma* (Allen and Hanburys) was supplied and for children *Your child and asthma* (Astra Pharmaceuticals) was given. The results from the audit for individual patients seen in 1984 were available to the doctor to help him concentrate on areas needing attention.

Audit

The second audit was performed at the same time of the year as the first (November and December) to avoid seasonal variations. A manual disease register in the practice was used to identify patients with active asthma (symptoms of coughing, wheezing, tightness of chest or breathlessness within the preceding two years) and in 1987 a total of 201 patients were identified out of a practice population of 4400 (4.6%). A trained medical secretary performed interviews on 192 patients (96%), completing a structured questionnaire about symptoms over the previous four months to obtain a disability score (see Table 4).¹ Parents answered these questions for their children. The score ranged from 0 (no disability) to 100 (maximum disability). The 1987 questionnaire repeated questions asked in 1984 but also covered some new areas, such as patient worries about treatment.

The secretary was trained to check peak expiratory flow readings and inhaler technique. Inhaler technique was defined as follows: good technique (patient uses device as instructed including correct preparation, coordinating actuation with inspiration and breath-holding after inhalation); moderate technique (patient inhales and actuates the device correctly, but forgets to shake the inhaler or to breath-hold afterwards); poor technique (patient does not actuate and inhale correctly, irrespective of preparation and breath-holding).

Patients were classified as having mild asthma if their disability

score was 20 or below, their peak expiratory flow rate was 70% of predicted or above and they were only on inhaled bronchodilators as required. Patients were defined as having moderate/severe asthma if they were taking prophylactic therapy, whatever their disability scores, and if they were not taking prophylactics but had a disability score of 25 or above or a peak expiratory flow of less than 70% of predicted. The disability scores of patients on prophylaxis were used to determine the success of therapy. A disability score of 20 or less was defined as adequate control, 25 as borderline and 30 or greater as inadequate control.

Results from each questionnaire were entered on computer in order to produce a summary of each patient's history including individual peak expiratory flow readings before and after bronchodilator therapy, inhaler technique and disability score. The programme summarized areas in which patients' knowledge was deficient and provided prompts on the need for inhaler tuition, changes in therapy, smoking cessation, peak expiratory flow meter purchase and follow up. In addition to individual print-outs for each patient, the programme analysed the audit for the whole group.

Comparisons were made between asthma disability in adults and children for the 1984 and 1987 audits. The two groups were compared using the chi-squared test, though these two samples were not strictly independent.

Results

Of the total 192 patients interviewed in 1987 only 85 had been studied in the 1984 audit. Forty five patients had been missed from the first study either because they had not appeared on the asthma register in 1984 or because they had not been interviewed at that time. A further 42 asthmatic patients had registered at the practice after 1984 and 20 had developed asthma since the last survey. Seventy three of the patients were children aged 9–15 years and 119 were adults aged 16+ years; 129 patients had childhood onset of asthma and 63 adult onset. The distribution by age at interview and by age at onset of asthma symptoms was very similar to the 1984 audit.¹

Diagnosis and trigger factors

The delay between presentation to the doctor and establishing the diagnosis was estimated for each patient. For 92% of the children in the study the diagnosis was established within one month of presentation to the doctor; the delay in diagnosis of 4% (three children) was 12 months or longer. The comparable figures for the adults were 62% and 21%. The common trigger factors for asthma by age of onset are summarized in Table 1 for 1984 and 1987. Patients with adult-onset and childhood-onset disease had surprisingly similar trigger factors with non-allergic trigger factors being the most important in both groups.

Control of asthma

The proportion of adults and children with mild or moderate/severe asthma was similar in the 1984 and 1987 studies. There were slightly more moderate/severe cases in both adults and children in the 1987 study and this suggests that improvements in group symptom scores was not due to the inclusion of more patients with mild disease being studied in the 1987 audit (Table 2). The achievement of the objectives for good care set out by the practice were compared for the 1984 and 1987 audits (Table 3). There was improvement in all the set objectives apart from knowledge about duration of action of bronchodilators. There had been an increase in the use of short courses of oral steroids and in the use of inhaled prophylactic steroids. Prescribing of sodium cromoglycate had declined.

Table 1. Trigger factors for asthma by age of onset.

Trigger factors	Percentage of asthmatics		
	1984 (n = 126)	1987 Child- hood onset (<16 yrs) (n = 129)	1987 Adult onset (16+ yrs) (n = 63)
Upper respiratory tract infection	83	85	84
Exercise	68	80	81
Night time	66	80	70
Change of temperature or humidity	67	67	71
House dust	45	58	41
Emotional upset	56	52	68
Cigarette smoke	47	48	59
Pollen	54	43	38
Pets	39	41	19
Foods	—	12	14
Aspirin	—	2	6
Work environment	22	0	13
Other factors	—	37	37

n = number of asthmatics.

Table 2. Severity of asthma by age at interview.

	No. (%) of asthmatics			
	Children		Adults	
	1984 (n = 53)	1987 (n = 73)	1984 (n = 73)	1987 (n = 119)
Asthma severity ^a				
Moderate/severe asthma	32 (60)	46 (63)	51 (70)	90 (76)
Mild asthma	21 (40)	27 (37)	22 (30)	29 (24)

^aSee text for definition of terms. n = number of asthmatics.

Table 3. Achievement of objectives for good care of asthma.

	Percentage of asthmatics	
	1984 (n = 126)	1987 (n = 192)
<i>Usage of peak expiratory flow (PEF) meter</i>		
PEF measured in surgery	75	97
PEF meter at home	6	20
<i>Inhaler device technique^a</i>		
Good	70	75
Moderate	22	20
Poor	8	5
<i>Inhaled bronchodilator therapy</i>		
Available at home	95	96
Knows correct duration of action	65	61
Knows correct action if bronchodilator fails	38	70
Aware of pre-exercise bronchodilator	43	58
<i>Prophylactic therapy</i>		
On inhaled steroids:		
(Adults) ^b	42	54
(Children) ^b	48	59
On sodium cromoglycate:		
(Adults) ^b	34	45
(Children) ^b	10	2
Adequate understanding of prophylaxis	12	3
Not using prophylactic drugs to relieve acute wheezing	6	0
46	72	
68	87	
<i>Oral steroid therapy</i>		
Short course of oral steroids ever	27	45

n = number of asthmatics. ^aSee text for definition. ^bSee Table 2 for baseline numbers.

No children were on theophyllines or daily oral steroids and all but three were controlled on inhaled steroid regimens within the safe range.⁶ Three children were on higher doses of inhaled steroids; all were requiring additional oral steroids in short courses for acute breakthrough attacks. Growth in these three children was well within the normal range.

Disability scores and peak expiratory flow rates suggested there was adequate control of asthma in 66% of all the patients and borderline control for a further 12%. The remaining 22% of cases had disability scores of 30 or more, suggesting that control was inadequate. Inspection of medical records and personal knowledge of the patients showed that 40% (17/42) of those with high disability scores were known to default from prophylactic treatment or were resistant to the idea of starting or increasing prophylaxis. The remaining patients with high disability scores were thought to be inadequately controlled as a result of medical undertreatment or resistance to currently available drugs.

Results comparing the disability of adults and children in the 1984 and 1987 studies are shown in Table 4. Significant differences were found between 1984 and 1987 for night-time episodes of asthma in children ($P<0.05$) and there were non-significant trends in all the other categories except time in hospital. There were highly significant differences between 1984 and 1987 for daytime episodes of asthma in adults ($P<0.001$).

The 85 patients who took part in both audits were compared separately. More improvements in disability scores were seen in the 25 children, with improvement in symptoms exceeding deterioration in all sections except night cough, where they were

about the same. In the 60 adults improvements exceeded deterioration on exercise and night episodes but the opposite applied to daytime symptoms. For the adults there was a highly significant difference with regard to the peak expiratory flow measurements taken at the two audits with the first mean score being 381 l min^{-1} and the second 412 l min^{-1} (paired-sample 't' test, $t = -4.19$, $P<0.001$). Statistical analysis of the overall disability scores for all 85 patients in both years showed no significant difference.

Admission to hospital with asthma was unusual. In the total sample there was only one admission in the four months preceeding the study (Table 4) and only 16% of the patients had ever been admitted to hospital for asthma.

Patients' views on treatment and follow-up

The 107 patients using inhaled prophylactic therapy were asked specifically if they had any worries about their treatment; 66% expressed concern. Long term side effects of inhaled steroids caused the greatest anxiety and problems such as weight gain and stunting of children's growth were mentioned. Twelve per cent of the patients expressing concern voiced general anxiety about 'being on steroids'. Dislike about 'needing to rely on drugs' was voiced by 21% and another 6% worried that if used too regularly the treatment might stop working, or become addictive (2%).

Regular supervision was achieved for 44% of the 136 patients with moderate/severe asthma. Only two of the 192 asthmatics (1%) were being supervised by a consultant clinic. Patients were asked whether they would like regular follow-up care. In total

Table 4. Asthma disability over the four months preceding the interview.

Disability over previous 4 months	Cumulative score	Percentage of asthmatics scoring on item			
		Children		Adults	
		1984 (n = 53)	1987 (n = 73)	1984 (n = 73)	1987 (n = 119)
<i>Exercise limitation owing to asthma</i>					
None	0	28	38	30	20
Some limitation, eg young person wheezing after cross country run, middle aged person after running for a bus	5	51	55	28	40
Breathless walking uphill at normal speed	10	11	6	19	24
Breathless walking uphill slowly	15	10	1	14	11
Breathless on flat	20	—	—	7	3
Breathless crossing room	25	—	—	2	2
Breathless at rest	30	—	—	0	1
<i>Episodes of night coughing, wheezing, breathlessness or tightness</i>					
None	0	49	48	47	48
<1 per week	5	32	47	30	34
Several times per week	15	15	4	19	13
Every night	20	4	1	4	5
<i>Episodes of daytime coughing, wheezing, breathlessness or tightness</i>					
None	0	23	30	26	19
Average 1 per month	5	36	48	25	28
Average 1 per week	10	18	14	7	25
Several times per week	15	8	6	7	15
Daily	20	15	2	35	13
<i>Time in hospital</i>					
None	0	100	100	100	99
1-6 days	5	0	0	0	1
7+ days	10	0	0	0	0
<i>Time off school/work owing to asthma (or interference with work at home)</i>					
None	0	70	75	77	73
1-6 days	5	22	25	16	18
1-3 weeks	10	6	0	7	5
4+ weeks	20	2	0	0	4

n = total number of asthmatics.

114 patients requested follow up and they were asked how often they wished to attend; 60% suggested four monthly, 25% said six monthly and the remainder asked for annual check-ups. Sixty eight per cent of the moderate/severe group said they would like regular follow up. Patients requesting follow up were asked if they would prefer to attend a normal surgery or a nurse or doctor-run asthma clinic within the practice. A clinic was preferred by 42% but 32% opted for an ordinary surgery and the remaining 26% had no special preference.

Analysis was performed to determine what differences existed between the 114 patients wanting regular supervision and the 78 who did not. Patients requesting follow up had suffered from asthma for a shorter period of time, for example, among the 93 moderate/severe asthmatics requesting follow up the mean was 13.7 years (range 1–56 years) whereas the 43 patients refusing regular follow up had a mean of 18.0 years (range 1–68 years). Patients requesting follow up attended on average for more routine asthma checks, more episodes of acute asthma and consulted more frequently for all causes — 3.2 per patient in two years, 2.4 and 11.2, respectively versus 1.2, 1.3 and 8.4 for patients refusing follow up.

Patient education

Structured record cards were found in 144 (75%) of asthma patients' notes, and the same number had been given a booklet. Asked about the booklet 89% of these patients said they had read it and 79% found it helpful. All patients were asked if they were satisfied with the information given to them by their doctor and 85% said they were.

Discussion

Asthma is a promising area for audit. There is abundant evidence from general practice, hospital and community studies that there is underdiagnosis, inadequate treatment and poor patient education.²⁻⁵ The disease often responds dramatically to treatment and it is likely that improved systematic asthma care might well produce reductions in morbidity within general practice.

Comparisons between the 1984 and 1987 audits in this practice was hampered by the fact that only 44% of the patients in the second audit took part in both studies. This figure illustrates the problem of patient turnover in general practice and that of a disease which can become inactive, particularly in children. The age distributions of the samples studied in 1984 and 1987 were, however, very similar, as were the proportions of adults and children with mild or moderate/severe disease.¹

Delays in diagnosis may result both from patients' reluctance to consult and from doctors' failure to establish the diagnosis once presentation is made. The findings from the 1987 audit are reassuring in that 92% of parents and 62% of adults claimed their doctor had diagnosed asthma within a month of first presentation, but examination of medical records would be a more reliable source of information and will be used in the final audit in 1990. The diagnosis for adults may have taken place as long as 60 years ago and the figures may be measuring diagnostic delays in other practices. Doctors may find diagnosing adult-onset asthma more difficult, particularly in patients who smoke or who have co-existent chest diseases such as chronic bronchitis.

Patients' knowledge about treatment and when to call for help improved generally but could be improved further. Patients seem to find the concept of prophylactic treatment difficult to grasp. Clear explanation and simply written (or tape-recorded) instructions are needed, and as with inhaler technique, knowledge about treatment needs regular checking.

The data for prophylactic therapy in children showed a heavy reliance on inhaled steroids and no child at the time of study

was taking sodium cromoglycate. This was not a deliberate policy and use of sodium cromoglycate in the practice has been reviewed. The need for a four times a day regimen is a great disadvantage, particularly in schoolchildren. Viral infection is the commonest trigger factor in both children and adults, and there was surprisingly little difference in trigger factors between childhood-onset and adult-onset cases. Cromoglycate gives little protection against viral-triggered symptoms.

In total, 59% of our adults were on inhaled steroids, and this is nearly double the proportion found by Horn and Cochrane in their general practitioner adult asthma study.⁷ Furthermore, it was considered that another 17% of our adult asthmatics might benefit from their use. In our practice theophyllines are used as third-line treatment after inhaled bronchodilators and inhaled steroids and this is reflected in their low use (3% of adults and 0% of children).

Worry about drugs and their side effects was common, particularly in patients on inhaled steroids. If concerns are not explored by the doctor or if benefits from prophylaxis seem slight, the patient may well decide against taking prescribed therapy.

Patients had sensible opinions about their need for follow-up care. Those with moderate/severe asthma who declined follow up had generally consulted less both about asthma and all other conditions. There is certainly a preference for an asthma clinic from some, and a clinic could satisfy the follow-up requests from 68% of those wanting supervision.

Improved outcome measures must be the prime rationale for performing audit. Better structure and process may comfort the doctor but reductions in morbidity are what most patients are interested in.

Although some statistically significant improvements in patients' morbidity have occurred, caution is required in interpretation. The original plan was to study a large number of the same patients in both 1984 and 1987, but for the reasons mentioned this was not wholly successful. Asthma morbidity is difficult to quantify and the main outcome measure we have developed is the disability score. The repeatability of this score will be examined in the next phase of the study. The diversity of general practice and human nature introduces many uncontrollable variables in an audit study such as this. Short-term controlled interventions tend to attract the small section of the asthmatic population who can be trusted to blow meters and monitor symptoms diligently on a daily basis for prolonged periods,^{8,9} and their behaviour may not be typical of the average asthmatic patient.

Retrospective symptom scores are difficult to validate. Hilton and colleagues found good correlation between patient reported morbidity and general practitioner assessment.¹⁰ Speight and colleagues found that parent-assessed time lost from school correlated well with school records.¹¹ In our study morbidity was assessed by the interviewer for 96% of known asthmatics and such a proportion would never complete daily symptom record cards for any period of time.

Improving measures of outcome in asthma is made difficult by several factors. There is a group of patients who will tend to ignore medical advice however good the care provided. At the other end of the continuum is a group who will educate themselves and find the care they require however poor the service in primary care. In the middle is the group who may improve when medical care is bettered. In practices prepared to carry out audit there is often a reasonable standard of care before any intervention. Many patients have had asthma for many years and may have fixed irreversibility or suffer from co-existent chronic bronchitis. Some asthma is resistant to treatment and some patients are so concerned about therapeutic side-effects that they prefer to tolerate ill-health. Patients with mild asthma

may have few symptoms to improve.

Nonetheless an encouraging start has been made. Our figures for night symptoms, for example, are considerably better than those found by Turner-Warwick, although her selection process and sampling were quite different.² The third audit should help us investigate what effect a clinic has on asthma care. For practices sceptical about clinics, this study shows that good care is possible without them.

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