Audit of the effect of a nurse run asthma clinic on workload and patient morbidity in a general practice

IAN CHARLTON

GILLIAN CHARLTON

JUDY BROOMFIELD

MARK A MULLEE

SUMMARY. The aim of this study was to assess the effect of a nurse run asthma clinic on practice workload and the morbidity of patients in a four partner general practice. One hundred and fifteen asthmatic patients were studied and comparisons were made between the 12 months prior to the introduction of the clinic and the first 12 months after the clinic started. Morbidity was measured in terms of: the number of courses of oral steroids, the number of emergency salbutamol nebulizations, and the number of days lost from work or school. The number of consultations with the general practitioners were recorded. The repeat prescribing register was also monitored throughout the study to examine the effect of the clinic on prescribing in the practice.

Consultations with general practitioners fell from a total of 818 to 414 during the study period (P<0.001). This was offset by 496 consultations with the nurse in the first 12 months of the clinic. As a result of attending the nurse clinic significant reductions (P<0.01) were found in the patients' requirements for courses of oral steroids, acute nebulizations and days lost from work or school. The results for the 46 children were similar to those for the 69 adults, confirming that the asthma clinic was effective for all ages. The clinic coincided with an increase in the number of patients receiving regular bronchodilator therapy and prophylactic medication. Eighty per cent of patients had their medication modified as a result of attending the clinic. The cost of prescribing remained remarkably stable.

Although there were improvements in these morbidity criteria it is not known which factor had the greatest impact: the self-management plans, the use of peak flow meters, the increased number of patient contacts or the nurse herself.

Introduction

ASTHMA causes considerable morbidity. Six per cent of the British population suffer from asthma[1] and 2000 deaths result from asthma each year.[2] Barritt[3] and Speight and colleagues,[4] have shown that up to 40% of general practice asthmatic patients have less than optimal control. Improving patient understanding and compliance with therapy may be one way of improving morbidity. A method by which this can be achieved is the establishment of nurse run asthma clinics in general practice.

Fireman and colleagues,[5] found considerable improvement in 13 asthmatic children attending a nurse run hospital based clinic compared with a control group. Although the study group was small, the intervention of the clinic led to a significant reduction in the number of asthma attacks and the number of days lost from school. Beasley and colleagues,[6] in a study of 36 adult patients attending a hospital asthma clinic, showed significant improvement in all morbidity criteria when a self-management programme incorporating peak flow meters was used. In a controlled study of 339 patients over a one year period Hilton and colleagues[7] found that patient education programmes made little difference to patient morbidity. They concluded that a different approach was required and suggested that techniques that alter patient behaviour and that are administered by specially trained staff may be more successful than simple education. This clinic approach has been studied by Pearson,[8] who set up a general practice based nurse run clinic, and in a small study of 19 male adult asthmatic patients showed a reduction in the use of nebulizers as a result of nurse intervention.

The aim of this study was to measure the morbidity of patients who were attending a nurse run asthma clinic and compare the morbidity before and after the clinic was set up.

Method

The study was a trainee project carried out in a four partner practice with 8049 patients in the market town of Aylsham in Norfolk. An asthma clinic run by a practice nurse was set up in November 1987. Letters were sent to all patients on the repeat prescribing register who were using prophylactic asthma medication. These patients were selected for the study because they were regarded as having moderate to severe asthma which might be causing considerable morbidity. Patients were invited to make an appointment to attend the asthma clinic.

Asthma clinic

The clinics were run on three afternoons (a total of 10 hours) per week by a practice nurse who had attended a three day course at an asthma training centre.

At the first interview the nurse conducted a standardized assessment which involved taking a history of the patient's asthma, allergy status, provoking factors, regular medication and current symptoms. A reversibility test was performed. At this stage the nurse corrected or revised the patient's inhaler technique. All patients received a brief explanation of the mechanism of their asthma and the function of their medications. This was reinforced by the booklet *Understanding asthma*[9] which was given to all patients, together with anti-smoking literature. Each patients was assigned a self-management plan and instructed how to use it. Patients were randomly allocated to self-management plans based on either peak flow measurements or symptoms only.[10] This paper reports results for these two groups combined.

The first interview usually took 45 minutes. One week later the patients were reviewed by the nurse for a further 15 minutes,

I Charlton, MRCGP, research fellow, Department of Primary Medical Care, University of Southampton. G Charlton, BSc, RGN, practice nurse, J Broomfield, RGN, practice nurse, Aylsham, Norfolk. M A Mullee, MSc, senior faculty statistical programmer, Department of Medical Statistics and Computing, University of Southampton.
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when once again spirometry was performed and inhaler technique checked. Progress with self monitoring and self management were checked and if necessary medication was altered following discussion with the patient's general practitioner.

All the patients were than asked to attend for review at eight weekly intervals or more frequently if necessary. Patients were sent reminder letters at the time of their eight-weekly appointments. Topics such as smoking, holidays, provoking factors and emergency treatments were discussed in the course of these follow-up visits. Patients were advised that they could seek their own doctor's help whenever they wished. If the nurse was unhappy about the patient's progress, she either sought advice from one of the general practitioners or asked the patient to return to his or her own general practitioner for further management.

Measures

The morbidity of patients was measured in terms of the number of courses of oral steroids prescribed, the number of emergency salbutamol nebulizations given and time lost from work or school. Patients were asked to complete a questionnaire before their first clinic appointment and again 12 months later asking how much time they had lost from work or school in the six month period prior to the clinic and during the first six months of the clinic. The distribution of workload in the practice was measured by recording the number of home or surgery consultations for asthma with any of the general practitioners. This information was extracted from the patients' records over the two year period of the study and grouped into six monthly periods: two in the year before the clinic was set up and two in the year after the clinic was set up.

Information about prescribing was gathered in two ways. First, the repeat prescribing records were monitored from May 1987 to May 1990. This established the number of patients requiring regular bronchodilator therapy and the proportion who were receiving prophylactic treatment. Secondly, information on what types of maintenance medication patients were being prescribed in the month prior to attending the clinic was collected and compared with the maintenance medication prescribed in the twelfth month after attending the clinic. The cost of one month's treatment was calculated from the *British national formulary.* This information was used to determine the monthly cost of maintenance treatments before and after attendance at the clinic.

Analysis

Analyses were performed using the statistical packages SPSS/PC+ version 3.0[11] and Minitab version 7.1.[12] Changes in the actual number of consultations with the doctor, courses of oral steroids, number of acute salbutamol nebulizations and time lost from work and school were analysed using the Wilcoxon signed rank test. The variables were also classified dichotomously into patients who did or did not consult, require oral steroids, need nebulizations and lose time from work or school. The changes in the number of patients requiring intervention before versus after the asthma clinic were analysed using McNemar's test.

Results

The repeat prescribing register identified 235 patients (2.9% of the practice) taking prophylactic asthma therapy. After the clinic had been running for 18 months 115 patients had attended the clinic and been observed for 12 months. The quantity of medication taken by patients who required maintenance steroids or home nebulization during the study period could not be determined and these patients were excluded from the relevant analyses. The 115 patients consisted of 46 children (24 male, 22 female) aged 16 years or less with a mean age of 9.3 years, and 69 adults (26 male, 43 female) with a mean age of 56.2 years. The 120 patients that did not attend the clinic or complete one year of follow up were of a similar age–sex distribution.

Effect of clinic on consultations and medication

The number of consultations with the general practitioner, courses of oral steroids and salbutamol nebulizations in the 12 months before and after the clinic is shown in Figures 1–3 for the whole group and for adults and children separately.

In the two six month periods before the clinic, the 115 patients made 418 and 400 consultations with the general practitioner (annual total 818) (Figure 1). This fell to 164 and 250 in the first two six month periods of the clinic (annual total 414). This reduction was offset by the 336 and 160 attendances at the asthma clinic (annual total 496). For the whole group there was a median of 6.0 asthma consultations per patient per year in the period before the asthma clinic (interquartile range 3.0 to 9.0). In the 12 months of the clinic this fell significantly to a median of 1.0 consultations per patient per year (quartiles 0.0 to 4.0; $P<0.001$, Wilcoxon signed rank test). The median number of consultations with the nurse at the asthma clinic was 4.0.

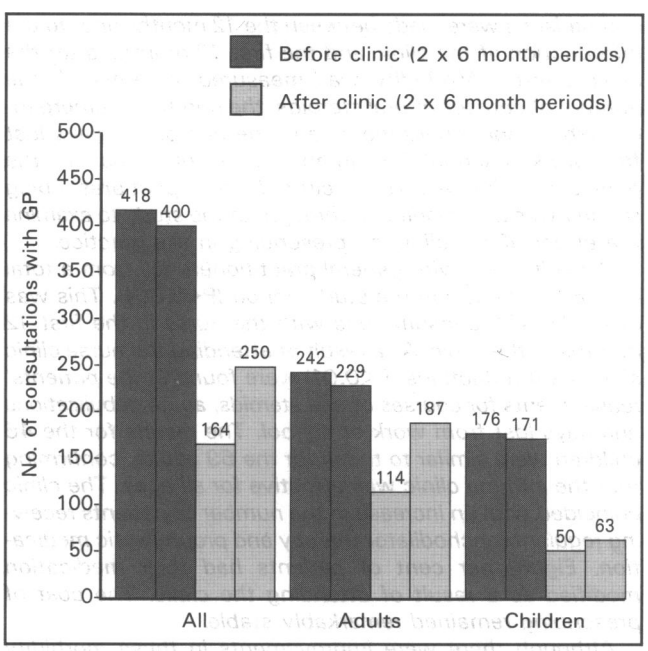

Figure 1. *Number of consultations with the general practitioner: comparison of two six month periods before the asthma clinic with the two six month periods after the clinic (n = 115 patients).*

The total number of courses of oral steroids fell during the clinic period (Figure 2). The median number of courses of oral steroids per patient fell significantly ($P<0.001$) from 1.0 (quartiles 0.0 to 2.0) before the clinic to 0.0 after the intervention (quartiles 0.0 to 1.0). The total number of nebulizations also fell (Figure 3). For all the morbidity criteria there was a dramatic drop in the first six months after the clinic started and some rebound in the second six months.

An identical analysis using the Wilcoxon signed rank test and McNemar's test was carried out for the sub-groups of children and adults. Similar trends were evident in these groups as for the group as a whole.

The number of patients consulting the doctor, using oral steroids and requiring salbutamol nebulizations before and after the clinic is shown in Table 1. The proportion of patients receiving one or more consultation fell from 94% (108/115) in the 12

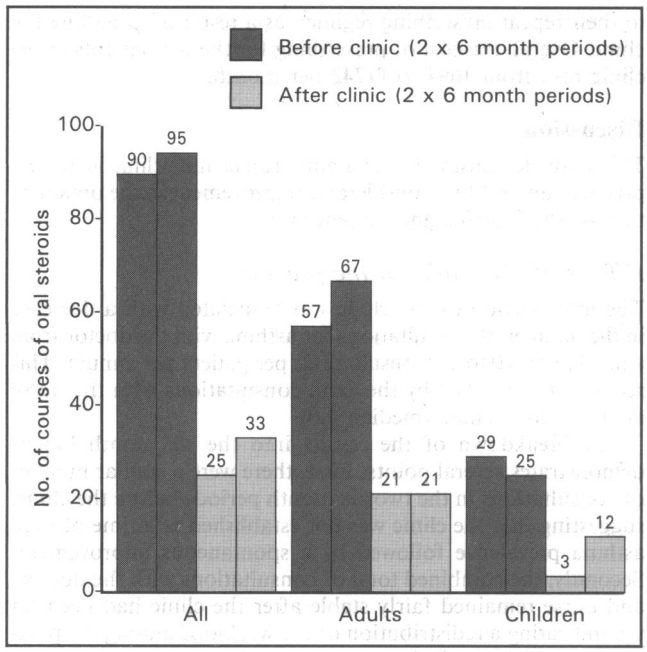

Figure 2. *Number of courses of oral steroids: comparison of two six month periods before the asthma clinic with the two six month periods after the clinic (n = 106 patients).*

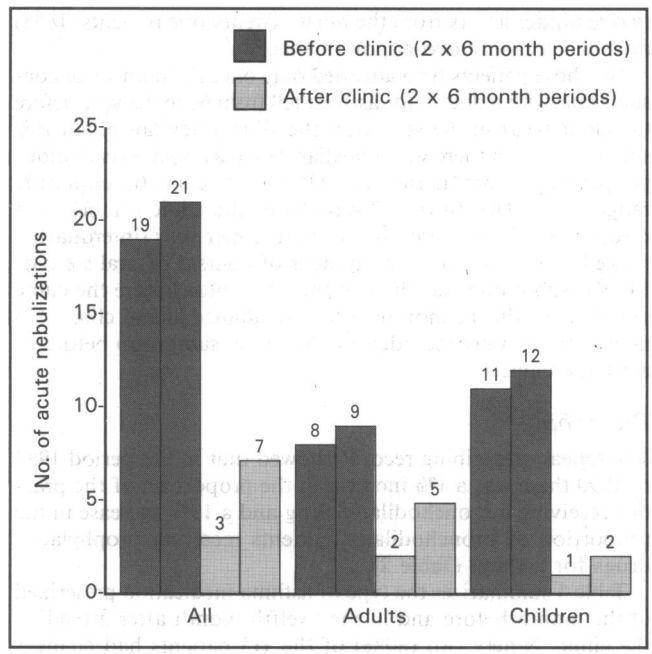

Figure 3. *Number of acute nebulizations: comparison of two six month periods before the asthma clinic with the two six month periods after the clinic (n = 109 patients).*

months before the clinic to 57% (66/115) in the first 12 months of the clinic. In the 12 months before the clinic, 57% (60/106) of patients required courses of oral steroids. During the 12 months of intervention, this fell to 25% (27/106) of patients. The effect of the clinic on the use of acute salbutamol nebulizations is also given in Table 1. In the 12 months before the clinic, 17% (19/109) of patients required nebulizations. This fell to 6% (7/109) of patients during the first 12 months of the clinic.

Effect of the clinic on time lost from work or school

Forty two patients had complete data for the time lost from work or school for both the six month period prior to the clinic and during the first six months of the clinic. Thirty one per cent (13/42) of patients lost time in the six months before the clinic compared with 24% (10/42) in the first six months of the clinic. The total number of days lost fell from 128 before to 83 after the start of the clinic. Using McNemar's test there were no significant changes in the number of patients losing time from work or school (95% confidence intervals −0.20 to 0.10). Using the Wilcoxon signed rank test there was no significant reduction in the median number of days lost when comparing the six months before the clinic with the first six months of the clinic (95% confidence intervals −1.0 to 0.0).

Of the 42 patients attending work or school, eight failed to revisit the clinic in the second six months, leaving 34 patients with complete data for both the six months before the clinic and the second six months of the clinic. Thirty two per cent (11/34) of these patients lost time before the clinic. This fell to 18% (6/34) during the second six months of the clinic. The total number of days lost fell from 107 before to 32 after the clinic. Using McNemar's test there were no significant changes in the number of patients losing time from work or school (95% confidence intervals −0.20 to 0.03). Using the Wilcoxon signed rank test there was a significant reduction ($P<0.01$) in the median number of days lost when comparing the six months before the clinic with the second six months of the clinic (95% confidence intervals −2.5 to 0.0).

Patients who failed to return for follow up

At the end of the study 10 of the 115 patients (9%) (five children and five adults) had attended for the initial appointment only and failed to return for follow-up visits to the clinic despite

Table 1. Number of patients requiring consultations with the general practitioner, courses of oral steroids and acute nebulizations: comparison of 12 months before the asthma clinic with 12 months after the clinic started.

	Number of patients consulting:				Difference in proportions of after−before (95% confidence interval)	McNemar's χ^2	
	Neither before nor after clinic	Before but not after clinic	After but not before clinic	Both before and after clinic			
Number of patients consulting	4	45	3	63	−0.36 (−0.46 to −0.27)	36.75	$P<0.001$
Number of patients requiring oral steroids	39	40	7	20	−0.31 (−0.42 to −0.20)	23.17	$P<0.001$
Number of patients requiring acute nebulization	86	16	4	3	−0.11 (−0.19 to −0.03)	7.20	$P<0.01$

two reminder letters from the nurse. Twenty one patients (18%) attended for only two appointments.

For those patients who attended only once the number of consultations with a doctor for asthma fell from 60 in the year before the clinic to 31 in the year after the clinic attendance. For this small sub-group there was a median of 6.0 asthma consultations per patient per year in the period before the clinic (interquartile range 3.0 to 9.0). In the 12 months of the clinic this fell to a median of 3.0 consultations per patient per year (interquartile range 0.0 to 5.0). The total number of courses of oral steroids for this sub-group was three in the 12 months before the clinic and four in the 12 months after attendance at the clinic. No nebulizations were recorded by this small sub-group before or after the clinic.

Prescribing

The repeat prescribing records showed that in the period 1987 to 1990 there was a 1% increase in the proportion of the practice receiving a bronchodilator drug and a 19% increase in the proportion of bronchodilator patients receiving prophylactic drugs for asthma (Table 2).

Table 3 summarizes the type of asthma medication prescribed in the month before and in the twelfth month after attending the clinic. Ninety two (80%) of the 115 patients had changes to their repeat prescribing regimen as a result of attending the clinic. Overall the cost of prescribing for the 115 patients at the clinic rose from 1694 to £1742 per month.

Table 2. Proportion of practice population receiving bronchodilators and proportion of bronchodilator patients receiving prophylactics.

	No. of patients registered	No. (%) using broncho-dilators	No. of patients using prophylactics (% of those using bronchodilator)
May 1987	8065	387 (*4.8*)	202 (*52*)
May 1988	8137	415 (*5.1*)	235 (*57*)
May 1989	8086	469 (*5.8*)	299 (*64*)
May 1990	7913	459 (*5.8*)	327 (*71*)

Table 3. Types of asthma medication prescribed in the month before and in the twelfth month after attending the clinic.

Type	No. of patients prescribed drug	
	Before clinic started	After clinic started
Bronchodilators		
Salbutamol:		
MDI	81	73
Rotacaps®	16	16
Diskhaler®	—	1
Syrup	2	0
Terbutaline MDI	4	1
Fenoterol or ipratropium	7	26
Theophyllines	13	8
Total[a]	123	125
Prophylactics		
Beclomethasone:		
MDI 50μg	35	6
MDI 100μg	36	59
MDI 250μg	9	28
Rotacaps® 100μg	5	9
Rotacaps® 200μg	12	4
Diskhaler®	—	6
Sodium cromoglycate	13	1
Prednisolone (maintenance)	5	2
Total	115	115

[a]A number of patients were using more than one type of bronchodilator.

Discussion

This study demonstrates that a nurse run asthma clinic in general practice can lead to a considerable improvement in the organization of the practice and patient care.

Effects of the clinic on the practice

The introduction of the clinic was associated with a decrease in the number of consultations for asthma with the doctor from a median of 6.0 to 1.0 consultations per patient per annum. This reduction was offset by the extra consultations with the nurse at the asthma clinic (median 4.0).

The breakdown of the results into the six month blocks demonstrates several points. First, there were a similar number of consultations in the two six month periods before the clinic, suggesting that the clinic was not established at a time of high asthma prevalence followed by a spontaneous improvement. Secondly, the combined total of consultations with the doctors and nurse remained fairly stable after the clinic had been set up, indicating a redistribution of the workload among the practice team. Thirdly, the improvement in the morbidity measures, including the consultation rates with the doctor, were not sustained in the second six months of the clinic. This may have been due to the novelty of the clinic wearing off or a proportion of the patients not accepting the clinic concept and wishing to be cared for by their general practitioner. The introduction of a new partner halfway through the study may also have affected the consulting pattern of the patients. Consideration needs to be given to who initiated the consultation. Further research on the Aylsham children has found that between 40% and 50% of consultations are doctor-initiated, presumably for follow-up care; the remainder are patient-initiated as a result of deteriorating asthma.[13]

The reduction in the use of emergency salbutamol nebulizers represents a considerable reduction in the number of out of hours surgery consultations and home visits for asthma. This has obvious advantages for the running of a practice. For the general practitioner there was a considerable reduction in patient contacts. If the decrease in consultations for these 115 patients was extrapolated to the entire population of moderate to severe asthmatics (235 patients) this would represent a saving of 826 doctor consultations per year.

The costs to the practice were largely those of the nurse's salary. If the 70% staff reimbursement and tax deduction on the remaining 30% are considered, then the 10 hours per week of the nurse's time (at £8 per hour) will cost each general practitioner £218 per year.

The clinic also drew our attention to a very difficult group of patients, 9% of the total, who after one visit to the clinic did not re-attend. Although follow-up attendance for this group was poor they did show a reduction in consultations with the doctor. This may be due to the improved inhaler technique and more appropriate prescribing that even one clinic attendance created. This group deserve particular attention because they represent the people who have difficulty in coping with the health care system, may deny the existence of asthma, or perhaps use their asthma as an instrument to manipulate others. They represent a high risk group and require closer attention by the doctor.

Effect of the clinic on the patient

Over the first 12 month period of the clinic there was a reduction in the number of patients needing nebulizations and courses

of oral steroids. There was also a reduction in the amounts of these therapies used. These results are comparable to those achieved by Beasley and colleagues in their hospital based study[6] and reflect a decrease in severe attacks. The reduction in time lost from work or school is particularly encouraging. This obviously has substantial implications for children's education and also for an asthmatic's ability to maintain regular employment.

Our results suggest that the asthma clinic worked equally well for children and adults. This means a practice can develop a common policy for all patients.

Effect of the clinic on prescribing

Establishing the asthma clinic resulted in a greater number of patients being labelled as having asthma and starting regular medication. The increased awareness and more detailed assessment led to an increase in the proportion of patients receiving prophylactic medication from 52% in May 1987 to 71% in May 1990. Although this alone could have been responsible for the changes seen in patient morbidity it is unlikely that such changes would have occurred without the restructuring of care that the clinic initiated.

The asthma clinic resulted in a shift towards higher potency inhaled steroids being prescribed. This did not necessarily mean an increase in the inhaled steroid dose as many patients were prescribed beclomethasone 50 μg, four puffs four times per day, prior to attending the clinic. By changing these patients to beclomethasone 100 μg, two puffs twice per day or beclomethasone 250 μg one puff twice per day, compliance improved.

The overall cost of the repeat prescribing regimens remained remarkably stable (£1694 per month to £1742 per month) and this supports the view that the nurse clinic did not greatly increase the cost of the treatment regimens.

Our impression was that there was a critical time in which the patient was most susceptible to change and therefore ready to embrace the concepts of the clinic and the self-management plan. The timing of an intervention is an important consideration and may be worthy of future research. In our group it appeared to be about a week after an acute exacerbation when the experience was still fresh in the mind. At the time of the exacerbation the patient is merely interested in getting better and is not in the frame of mind to accept new information. When the patient's condition is well controlled, or causing no concern, he or she is also unlikely to change.

The patients received a programme that included several elements — more education, the use of self-management plans, regular recall, improved inhaler technique, seeing a practice nurse and often more regular use of inhaled steroids — and we were not able to determine which one of these contributed most to the improved morbidity. To determine which factor carries the most influence may be impracticable as well as unrealistic. Sibbald[14] examined self care in acute asthma and concluded: 'The results suggest that there is no single important factor or group of factors governing patients' management of acute asthma. Health education might therefore prove more effective if it paid less attention to the possible causes of poor self-care and instead offered pragmatic advice on changing behaviour.' We feel the nurse run asthma clinic was able to meet this challenge.

The nurse run asthma clinic represents one way of dealing with asthma patients in general practice. The results show that a nurse in general practice using organized care and self-management plans, can effectively manage asthma and help reduce the number of general practitioner consultations for asthma, the need for oral steroids, acute salbutamol nebulizations, and time lost from work and school.

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Address for correspondence

Dr Ian Charlton, Primary Medical Care, University of Southampton, Aldermoor Health Centre, Aldermoor Close, Southampton SO1 6ST.