Evaluation of a Nurse-run asthma clinic in general practice

Andrew J Cave, Anthony Wright, Jess Dorrett, Michele McErlain

ABSTRACT

Background: Since 1985, nurse-run asthma clinics have been developing and are now widespread in the United Kingdom, having been greatly stimulated by the New Contract for General Practice (1990). To date, there have been few definitive studies evaluating such clinics. This study, in two adjacent general practices in semi-rural Somerset, evaluates the effect of nurse-run clinics on patients' symptoms, pulmonary function, and healthcare utilisation over a four-month period

Methods: One hundred and twenty-nine subjects aged 2-79 years, were recruited from the two practices over a one-year period (1991-1992). All patients identified in either practice who had used preventive therapy in the preceding 12 months were eligible and were included if they had a positive exercise or reversibility (20%) test and had not previously received formal asthma education

A pre- and post-experimental study design was used. Subjects' symptoms, pulmonary function, and healthcare in the preceding eight weeks were assessed at intake and at 16 weeks; the nurse education being delivered at intake, one and four weeks

Results Both mean number of days off work/school and mean number of nights on which waking occurred fell ($p < 0.001$). Peak expiratory flow rate and forced expiratory volumes improved during the study period ($p < 0.001$ and $p < 0.01$ respectively). Use of antibiotics, oral steroids, and rescue bronchodilator use all improved significantly ($p < 0.001$). Physician attendances were also reduced

Conclusions: A nurse-run asthma clinic in general practice is an effective way to improve symptoms, pulmonary function, and health care utilisation for asthmatic patients

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Introductio

Nearly fifteen years ago, Greta Barnes, in a letter to the Journal of the Royal College of General Practitioners [1] described nurse-run asthma clinics in general practice. She and Robert Pearson in Stratford UK, developed a protocol for one-on-one patient education by practice nurses

The New Contract for General Practice 1990 [2] which is based on wellness and health, and financially favours health promotion and health maintenance activities in general practice, has also been a stimulus to the development of such clinics

A 1992 survey of 22 practices by Arthur Hibble in East Anglia has found that practice nurses had almost doubled their working hours since 1989 and in 1992 spent 10% of their time on health promotion activities, 28% of the latter being in asthma clinics [3]

To date, there have been few studies evaluating nurse run clinics [4-6]. Hoskins has recently demonstrated patient satisfaction with nurse-run asthma clinics in General Practice. Previously reported studies have not isolated the nurse education component of educational programs in general practice. In 1986 Mitchell in New Zealand assessed the effects of nurse education conducted in the asthmatics' home. Three hundred and sixty-eight children were involved but there was no demonstrable change in the school attendance, symptoms, or frequency of severe attacks [7]

Usherwood in Sheffield (1988) evaluated a doctor-run clinic comparing 31 children with an equal number from another practice. They found a marginal improvement in absences from school and in the number of home visits and out-of-hours calls. There was no difference in symptoms between the groups but the study group used their inhalers more and had more booked follow-up appointments at the clinic [8]

In 1989, Beasley described a significant improvement in patient morbidity using a self-management plan but this was based on a hospital clinic and lacked control group [9]. Charlton's 1991 study in East Anglia evaluated the combined effect of a nurse-run clinic and a self-management plan but did not distinguish which part of the package was responsible for the observed improvements in steroid use, nebuliser use, physician consultations, and out-of-hours calls [10]

In 1995, Kevin Jones reported a study of peak flow based self-management in general practice but the patients saw either physicians or nurses when attending the clinic [11]. In September 1995, Kevin Jones, writing in the *British Journal of General Practice*, suggested "a randomised-controlled trial of nurse-run asthma care would now be difficult to conduct, and so it may be necessary to accept nurse run asthma care without definitive proof of its clinical effectiveness" [12]. However, Greta Barnes has called for "research programs to evaluate asthma management and measure patient outcomes as a result of health professionals receiving training" [13]. The purpose of this study is to provide a measure of the required proof

Method

The Sit

The study was undertaken in two adjacent genera practices in semi-rural Somerset, England. Eac practice had a practice nurse trained to diploma leve at the National Asthma and Respiratory Trainin Centre (NARTC)

The Subject

The subjects were defined as all patients in the tw practices aged from two to 79 years, inclusive, wh had used preventive therapy in the preceding 1 months. In this way, patients with mild or seasona asthma were excluded from the study

Subjects were recruited from physician consultations from repeat prescription contacts, and from the ne asthma registers in the practices. Subjects wer recruited over a one-year period at a rate that th practice nurses could accommodate in their schedule of approximately one afternoon per week

Patients were eligible for inclusion if the demonstrated 20% reversibility in airflow obstructio measured by peak expiratory flow rate after β-2 agonist inhalation, or if they had a positive exercis test reversed by bronchodilators

Patients were excluded from the study if they regularl used a nebuliser or if they had had contact with th nurse about their asthma before the study started (This involved eight patients in one practice and the did not include the worst or least affected patients.

The Study Desig

The study design is shown in Figure 1. At the intak visit, an initial assessment of the patient's asthma wa made by the nurse. The study was explained, detailed asthmatic history taken, height and weigh recorded, and a predicted maximum peak expirator flow rate calculated.

Diagnosis was confirmed by spirometry before an after bronchodilator therapy. An exercise provocatio

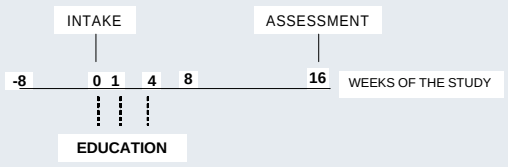


Figure 1: The Study Plan - Before/After Experimental Desig

test was performed if the history indicated. Details o current medications were discussed and advice give on their proper use. Note, no changes were made t therapy or total daily doses. Inhaler technique wa checked with retraining where necessary, and follow up was arranged for one week's time

Details of asthma related morbidity over the precedin eight weeks were obtained from the patient intervie and the patient's chart which, in the U.K., is relativel comprehensive for all physician contacts and hospita visits. The intervention consisted of advice on the us of medication, education in inhaler technique an basic asthma information according to the patien needs and according to the guidelines of the NARTC

Follow-up was arranged for reinforcement of teachin and question answering at one and four weeks Reassessment took place at 16 weeks. At this point details of asthma morbidity during the preceding eigh weeks were again collected; for comparison with th intake data. Note, subjects were then randomised t one of three self-management plans as part of a furthe study not reported here

Analysis of data comparing the pre- and post-intervention data was done b standard statistical methods using the Wilcoxon sign test and tw (independent) sample *t*-test. The following data were compared in three groups

Symptom

- Number of days off work or schoo
- Number of nights when waking due to asthma occurre

Pulmonary Functio

- Spirometry before and after bronchodilator use looking at peak flow rate (PEFR), forced expiratory volume in one second (FE_1), and functional vital capacity (FVC

Healthcare Utilisatio

- Excess bronchodilator use (number of days on which patient used more than two puffs four times in the day if on regular β-2-agonist or on which relief β-2-agonist was used by patients not on a regular β-2-agonist regimen
- Courses of oral steroid
- Courses of oral antibiotic
- Days when nebuliser was use
- Physician consultation
- Home visits for asthm

Result

Table 1 summarises the results; the following table deal with symptoms, pulmonary function an healthcare utilisation separately

Table 1: Result

	n (129)	Mean change	Valu
Days off	21	-0.8	<0.00
Nights Waking	31	-0.6	<0.00
Pre β-2-agonist PEFR**	9	+32.5	<0.00
Pre β-2-agonist FE_1 ≅	6	-0.1	<0.0
Pre β-2-agonist FVC ≅	6	+0.16	<0.0
Post β-2-agonist PEF	71	+29.2	<0.00
Post β-2-agonist FE_1 ≅	5	+0.1	NS
Post β-2-agonist FVC ≅	5	+0.1	0.0
Antibiotics	12	-0.4	<0.00
Steroids	51	-0.2	<0.00
XS Inhaler*	9	-0.9	<0.00
Nebuliser	01	-0.15	<0.0
Consults	11	-1.6	<0.00
Visits	41	-0.1	<0.00

* Data is incomplete because either the patient or the nurse felt that recall or records were unreliable for that patient

** The number of excess inhaler use subjects are particularly low because of poor recall an because some subjects were on regular β-2-agonist medication four times per day (a standard treatment in 1990)

*** The number of subjects who had PEFR measure before β-2-agonist use is lower (97) tha those after (117) because twenty subjects had used the β-2-agonist medication within a few hours prior to their intake interview and their values could not be used

≅ Due to an equipment failure, full spirometry could not be completed at one site for some time during the study and peak flows only are available for some patients

1. Number of Subject

Table 1 shows that the number of subjects varie for each outcome from the total numbers of 129

2. Symptoms (see Figure 2

The mean number of days off work or school fel after the nurse intervention, as did the mea number of nights on which waking occurred. Fo both, the change is highly significant at $p < 0.001$

3. Pulmonary Function (Figure 3

The improvement in peak expiratory flow rat after intervention was highly significant ($p < 0.001$), whether measured before using a β-2 agonist bronchodilator or after use (Figure 3) The improvement in FE_1 measured prior to us of a β-2-agonist bronchodilator was significant a a lower p value possibly due to the smalle number of subjects compared because of spirometr

Figure 2: Symptom

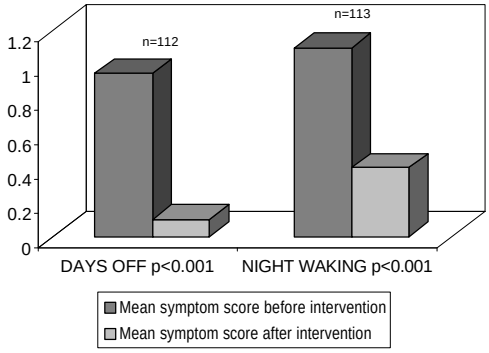
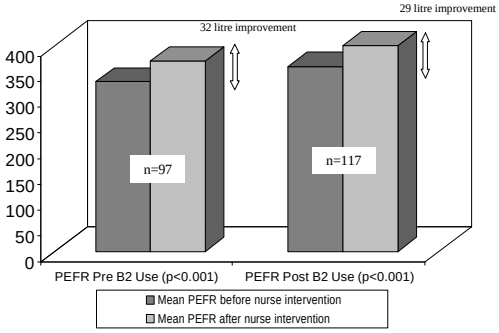


Figure 3a: Pulmonary Functio



***Note: 20 patients had used regular β-2-agonist just prior to the initia assessment so their data was not included

Figure 3b: Pulmonary Functio

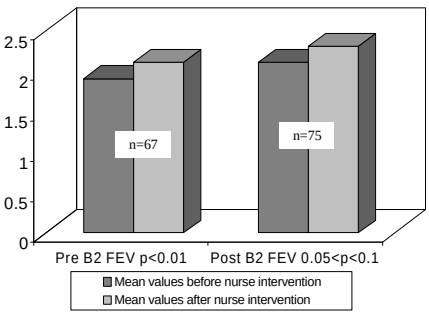
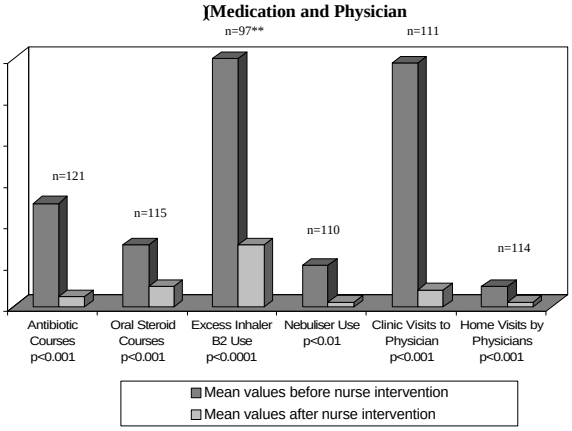


Figure 4: Healthcare Us (Medication and Physician



failure at one of the clinics, and the exclusion o patients who had recently (< 4 hours) used their β-2 agonist inhaler. The numbers of post β-2-agonis subjects is slightly greater because no patients wer excluded but there is less margin for improvement in bronchodilated patient. This is reflected in the smalle p values which are much less significant, if at all, du to reduction in power (> 0.05 for FE_1) (Table 1)

4. Healthcare Use (Medication

Figure 4 shows the effect of the nurse intervention o drug use. The mean numbers of courses of antibiotic and oral steroids were small before the interventio but the reduction after the intervention was stil significant for both drugs at $p < 0.001$. Nebuliser us was very small, regular users being excluded from th study, therefore, the reduction in use, even thoug significant ($p < 0.01$), was less so than for the othe medications

From this table, the most obvious improvement wa the reduction in days on which extra use of β-2 agonist inhaler (as required use) occurred ($p < 0.001$) This is important as it suggests better disease contro as a result of the intervention on top of the improve drug use suggested by the reductions in the othe medications

5. Healthcare Use (Physician Services

Figure 4 shows a highly significant ($p < 0.001$ reduction in consultations for asthma, with th physician both in the clinic and in the patient's home even though the total number of home visits to th subjects was small. Hospital visits, though recorded were too few for analysis

Discussio

The effects of the educational intervention on asthm outcomes have not previously been isolated from th effects of an asthma clinic generally. The curren study attempts to isolate the educational componen without medication changes or the introduction o management plans. Therefore, the period unde observation after the educational intervention is short each subject in fact went on to be randomised into on of several management plans after the sixteen-wee assessment. We have demonstrated a highl significant effect of nurse education on symptoms

pulmonary function, and healthcare utilisation

The nurses who provided the education also collecte data, however every attempt was made to be objectiv in the assessments. This involved not including dat judged at the time of collection to be weak such a patient uncertainty over numbers of rescue Ventoli inhalations. All patients had their data included but no all patients had complete data sets. Difficulties aris with the interpretation of results when the data is no complete for each subject for each variable but we fee justified in the way in which we have handled the dat analysis, preferring to include all the reliable data w obtained and all the subjects, rather than excluding al the patients with incomplete data sets. We believe thi represents a more valid picture of the expected effect in the general practice setting

The findings are limited in their generalisability partl because of the particular environment in which it wa conducted in the UK and partly because of the shor length of follow-up. This last was unavoidable. An longer period would have raised ethical issues o withholding a management plan, now often considere the standard of care. There is an intrinsic weakness i using the before and after design rather than a paralle control group. Patients were often recruited whe attending about their asthma and this may have bee during a bad period for their asthma with a natura tendency to improve anyway. Repeat studies in othe practice settings would be desirable for support o findings but, as Jones has observed [12] d randomise trial against a control group is probably now no acceptable in the UK, even of education alone. In vie of Usherwood's and Beasley's limited success in thei clinics [8,9] we would like to see a comparative trial o practice nurse education against outpatient education o general practitioner education to compare outcomes an effectiveness. The difficulties associated with genera practitioners giving asthma education are describe elsewhere [14-16] It will be noted from Figure 4 tha physician visits, in the surgery or at home, wer reduced but this was at the expense of three visits pe subject to the nurse. In the current climate of th primary healthcare team, this may or may not b considered the preferred mode of delivery for asthm education

Conclusio

This before and after experimental study ha demonstrated that education in a nurse-run asthm clinic in general practice can have a highly significan effect on the symptoms, pulmonary function, and healt care utilisation of patients of all ages with moderatel severe asthma. ■

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Reference

1. Barnes G. Nurse Run Asthma Clinics *J Royal Col Gen Prac* 1985 **3** :447
2. Department of Health and Welsh Office. Genera practice in the National Health Service: a new contract London: HMSO, 1989
3. Hibble A. Practice nurse workload before and afte the introduction of the 1990 contract for genera practitioners. *Br J Gen Prac* 1995 **4** :35-37
4. Dickinson J, Hutton S, Atkin A. Implementing th British Thoracic Society Guidelines: the effect of nurse-run asthma clinic on prescribed treatment in a English general practice. *Resp Me* 1998 **92(2** :264-7
5. Dickinson J, Hutton S, Atkin A, Jones K. Reducin asthma morbidity in the community: the effect of targeted nurse-run asthma clinic in an English genera practice. *Resp Me* 1997 **9** :634-40
6. Hoskins G, Neville RG, Smith B, Clark RG. Th effect of a trained asthma nurse on patient outcome within General Practice. *Asthma in General Practic* 1998 **6(Suppl** :53
7. Mitchell EA, Ferguson
education or by community child health nurses. *Arc Dis in Childhoo* 1986 **6** :1184-9
8. Usherwood TB, Barber JH. Audit of process an outcome in a mini-clinic for children with asthma *Family Pract* 1988 **5(4** :289-93
9. Beasley R, Cushley M, Holgate ST. A self management plan in the treatment of adult asthma *Thorax* 1989 **4** :200
10. Charlton IM, Charton GFA, Broomfield J, Mulle MA. Audit of the effect of a nurse-run asthma clini on workload and patient morbidity in a genera practice. *Br J Gen Prac* 1991 **4** :227-31
11. Jones KP, Mullee MA, Middleton M, Chapman E Holgate ST. Peak flow based asthma self-management a randomised controlled study in general practice *Thora* 1995 **5** :851-7
12. Jones KP, Mullee MA. Practice nurse run asthm care in general practice reduces asthma morbidity scientific fact or medical assumption? *Br J Gen Prac* 1995 **4** :497-9
13. Barnes G. International role of the Nationa Asthma and Respiratory Training Centre (NARTC) i the management of respiratory disease. *Prim Car Respir* 2000 **9(**):S18-19
14. Hilton S, Sibbald B, Anderson HR, Freeling P Controlled evaluation of the effects of patient educatio on asthma morbidity in general practice. *Lance* 1986 **1**:26
15. Cave AJ, Spooner C. Teaching patients abou asthma in a five-minute visit. *Can J CME* 1996;31-8
16. Cave AJ, Koegler PK, Cave DA. A step-wise pla for asthma. The "physician as educator experience" Alberta Chapter, College of Family Physicians o Canada, Annual Scientific Assembly. Banff, Alberta February 1996