

Observations on the structure, process and clinical outcomes of asthma care in general practice

R G NEVILLE

G HOSKINS

B SMITH

R A CLARK

SUMMARY

Background. *There is a need to establish whether the structure of asthma care in general practice is associated with measures of process and with primary and secondary care clinical outcomes. Debate about how to resource general practice asthma care is hampered by a lack of observational data from throughout the United Kingdom (UK).*

Aim. *To observe whether the present system of family health services authority (FHSA) accreditation of asthma clinics, based on measures of structure, is associated with measures of process or clinical outcome.*

Method. *Two hundred and twenty-five UK practitioners enrolled in a project and recorded details of how they organized asthma care. Data from 6732 patients, concerning general practitioner and nurse consultations, asthma attacks, symptom control, emergency treatments and hospital attendances covering a 12-month period, were also provided.*

Results. *FHSA approval for a chronic disease management (CDM) asthma clinic was associated with favourable patterns of structure and process, but not of clinical outcome. Practice audit and the employment of a nurse with an asthma diploma were associated with favourable patterns of structure, process and clinical outcome. Practices (n=143) that had recently audited asthma patient care (n=4259) had fewer patients who had attended an accident and emergency department [121(3%): 96 (4%), odds ratio 1.38, 95% confidence interval 1.04–1.83] or a hospital outpatients department [247 (6%): 180 (7%), 1.28, 1.04–1.56], or who had respiratory symptoms on assessment [2400 (56%): 1465 (59%), 1.34, 1.18–1.52] or days absent from work or school in the past 12 months [375 (9%): 296 (12%), 1.48, 1.25–1.74] than those that had not (82 practices, 2473 patients).*

Conclusion. *Findings from a large UK sample of practices are subject to participant bias and show association rather than causal links. The present FHSA asthma CDM accreditation system, based on structure, is not associated with favourable clinical outcomes. This opens the debate as to whether accreditation should be linked to recent experience of audit, which does appear to be associated with favourable clinical outcomes.*

Keywords: *asthma; structure, process and outcome; nurses; audit; FHSA.*

Introduction

ASTHMA is a major healthcare problem in the UK.¹ Despite effective anti-asthma drugs, morbidity has remained unacceptably high.^{2,3} This has led to initiatives aimed at improving hospital and primary care^{4,5,6,7} including nurse-run clinics, self-management plans,⁵ asthma-assessment packages,¹¹ audit facilitation¹² and integrated care schemes, such as the Grampian Asthma Study of Integrated Care (GRASSIC).^{13,14}

Government legislation, in the form of health promotion clinics (1990 contract) followed by the chronic disease management/health promotion scheme (1992), empowered family health service authorities (FHSAs, or health boards in Scotland and Northern Ireland) to monitor asthma care by inviting bids from practices to run asthma chronic disease management (CDM) clinics. The need to institute a new system rapidly, and a lack of universally accepted outcome measures for asthma,^{15,16} led to FHSAs operating an accreditation system based on measures of process. Practices must count the number of patients on their asthma register (defined as patients receiving anti-asthma therapy), patients receiving preventative therapy, peak flow recordings in the records, and admissions to hospital due to asthma in the past year.

There is no research evidence to support the present accreditation system. This paper examines the variables associated with the structure, process and clinical outcomes of general practice asthma care. The validity of the present system and a possible alternative are examined in relation to clinical outcomes of asthma care.

Methods

Practice recruitment

The recruitment target was to enrol over 200 practices from throughout the UK who would each contribute a maximum of 30 patients in order to generate a sample of over 5000 asthmatics. Using recruitment figures from previous work,⁸ we commissioned a medical mailing house to send an invitation letter to a random sample of 5000 of the UK's 33 000 general practitioners, stratified by region. There were no direct financial incentives to participate, but general practitioners were given the option of enrolling in a distance learning package accredited for post graduate educational allowance.¹⁷ Practice nurses were offered a similar package linked to a certificate of asthma care from the University of Dundee. Practices who wished to participate were sent a project booklet and a patient assessment stamp.¹¹ The booklet sought details about practice size, locality, and the structures in place for asthma care; for example, FHSA recognised clinics, employment and qualifications of practice nurses, and experience of audit.

Patient recruitment

Each participating practice was instructed how to select a repre-

R G Neville, MD, senior lecturer in general practice; G Hoskins, BSc, project co-ordinator; B Smith, data processor; R A Clark, FRCP, chest physician, Tayside Centre for General Practice, University of Dundee, Charleston Drive, Dundee DD2 4AD. Submitted: 25 January 1996; accepted: 23 May 1996.

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sentative sample of 30 patients with asthma: to list in alphabetical order patients of all ages receiving bronchodilator therapy for asthma within the past year (the same method suggested by FHSAs); divide this list into bands of 10 names and number each name within each band 1–10; apply a predetermined random number sequence, issued by the research unit, to each band so as to select one name from each band; and then scroll on to the beginning of the register and continue to apply the random numbers sequence until 30 patients are selected. Practices then invited (by letter or telephone) all 30 patients on this list to attend for a clinical assessment. The clinical assessment used the Tayside Asthma Stamp¹¹ to quantify symptoms within the past month, a measure of peak flow, and a record of days absent from work or school due to asthma in the past month.

The project booklet sought details for all 30 patients enrolled by each practice, including age, sex, anti-asthma therapy, consultations in primary care and hospital contacts due to asthma within the past 12 months. Primary care consultations comprised those with general practitioners or practice nurses for asthma, whether initiated by the patient or the practice, and a description of what took place at consultations for the review of asthma care; for example, assessment of inhaler technique and enquiries about compliance. Recorded hospital contacts included accident and emergency attendances and outpatient attendances and admissions. Information from recent clinical assessments and events documented in case records were also collected for each patient. The completed booklets were returned to the research unit for analysis.

Quality control

Responses from the practices were mapped in order to check that the returns were representative of all UK regions. A telephone helpline was made available to answer queries from practices. Patients who 'did not attend' (DNA) appointments were included in the patient sample and in analysis. Odds ratios with 95% confidence intervals were calculated to compare the structure of practice asthma care with measures of process and clinical outcomes in primary and in secondary care.

All eight participating practices from East Central Scotland were offered and accepted a visit from a trained interviewer (G Hoskins). At the visit, practice personnel were interviewed to check that practices complied with the data recording requirements and method of patient selection. The project was approved by the Tayside Medical Ethics Committee.

Results

Participants

Two hundred and twenty-five practices (target 200) returned usable project booklets. The participants were spread throughout England, Scotland, Wales and Northern Ireland and mapping showed good concordance with the UK population distribution. Partnership size was typical of the UK as a whole, with 23 (10%) single-handed, 29 (13%) two-partner, 42 (19%) three-partner, 43 (19%) four-partner, 33 (15%) five-partner and 45 (20%) greater than five partner practices. Ten practices gave no indication of the number of partners. The patients that were enrolled totalled 6732 (target 5000). Eighteen (0.27%) patients were excluded due to insufficient data. The patients that did not attend a clinical assessment totalled 1276 (19%). Age and sex details of the patient sample are shown in Table 1. Two thousand, two hundred and sixty-one patients (34%) were children aged under 16 years, and 3328 (49%) were male. The subsample of visited practices had all complied with the data recording and patient selection procedures, and had extracted information from case records.

Table 1. Characteristics of the sample of asthma patients used in this study.

Age (years)	Characteristics of patients (n = 6732)			Total
	Male	Female	Unknown	
0-9	782	477	-	1259
10-19	776	619	-	1395
20-29	382	403	-	785
30-39	349	455	-	804
40-49	258	399	-	657
50-59	243	363	-	606
60-69	287	364	-	562
70+	248	314	-	562
Unknown	3	9	1	13

FHSA accreditation

One hundred and sixty-six (74%) practices were accredited to run a CDM clinic as part of their health promotion activities. Patients from FHSA accredited practices showed more process measures of consultations for asthma than non-FHSA accredited practice patients; for example, more patient- and practice-initiated nurse consultations were available (Table 2). Process measures for the review of asthma, such as assessment of inhaler technique, enquiries about drug compliance, issue of self management plans, and follow-up arrangements, were also associated with FHSA accreditation. FHSA accredited practices had more patients who had an acute asthma attack within the past year, and more patients who had taken time off work or school in the last month. This suggests an adverse association with clinical outcomes (Table 2).

Asthma audit

One hundred and forty-three (64%) practices had completed some form of audit of asthma care within the previous three years (typically a local audit, the Action Asthma audit or one linked to a nurse training programme). The 4259 patients from these practices, compared with the 2473 patients from other practices, had received a series of favourable measures of process of care; for example, more patient and practice initiated nurse consultations, and fewer patient initiated doctor consultations for asthma and respiratory infection.

Compared with those that had not, practices that had completed an audit had fewer patients with symptoms on clinical assessment, and fewer patients with days absent from work or school. There were also favourable associations with secondary care measures; for example, fewer patients had attended accident and emergency departments for acute asthma, and fewer patients had attended hospital outpatient departments for asthma management (Table 3).

Nurse diploma

Of all the patients used in the study, 4122 were from one of the 138 practices (61%) which employed a practice nurse with a recognized diploma in asthma care (for example, Stratford Asthma Training Centre¹⁰). These patients had a series of associations

Table 2. FHSA accreditation: process and outcome measures within the past 12 months.

	FHSA CDM accreditation		
	Yes (%)	No (%)	Odds ratio (95% confidence interval)
Total no. of practices (n=225)	166 (74)	59 (26)	-
Total no. of patients (n=6732)	5000	1732	-
Process measures: consultations for asthma (no. of episodes)			
Patient-initiated GP	2910 (58)	1001 (58)	1.02 (0.91-1.14)
Patient-initiated nurse	636 (13)	153 (9)	1.50 (1.24-1.82)*
Practice-initiated GP	1458 (29)	533 (31)	1.08 (0.96-1.22)
Practice-initiated nurse	2748 (55)	852 (49)	1.26 (1.13-1.41)
'Respiratory infections'	2349 (47)	791 (46)	1.05 (0.94-1.18)
Process measures: review of asthma (no. of patients)			
Assessment of inhaler technique	3918 (78)	1291 (75)	1.24 (1.09-1.41)
Enquiry about compliance	3949 (79)	1316 (76)	1.19 (1.04-1.35)
Peak flow measurement	3867 (77)	1276 (74)	1.34 (1.04-1.73)
Issue of self-management plan	2161 (43)	639 (37)	1.30 (1.16-1.46)
Issue of peak flow meter	2351 (47)	801 (46)	1.03 (0.92-1.15)
Formal review	4084 (82)	1372 (79)	1.17 (1.02-1.34)
Follow-up arrangements	3730 (75)	1212 (70)	1.39 (1.14-1.70)
Clinical outcomes: primary care (no. of patients)			
Acute asthma attacks	1204 (24)	351 (20)	1.25 (1.09-1.43)
Courses of systemic steroids	920 (18)	315 (18)	1.10 (0.88-1.17)
Emergency nebulizations	396 (8)	113 (7)	1.23 (0.99-1.54)
Symptoms at most recent assessment	2864 (57)	1001 (58)	1.15 (1.00-1.32)
Days off work or school (in last month)	529 (11)	142 (8)	1.29 (1.05-1.58)
Clinical outcomes: secondary care (no. of patients)			
Accident and emergency attendances	172 (3)	45 (3)	1.34 (0.95-1.89)
Outpatient attendances	321 (6)	106 (6)	1.05 (0.83-1.33)
Hospital admissions	172 (3)	45 (3)	1.34 (0.95-1.89)

* Results where 95% confidence intervals exclude 1.0 are shown in bold type.

Table 3. Recent practice audit of asthma care: process and outcome measures within the past 12 months.

	Recent practice audit of asthma care		
	Yes (%)	No (%)	Odds ratio (95% confidence interval)
Total no. of practices (n=225)	143 (64)	82 (36)	-
Total no. of patients (n=6732)	4259 (63)	2473 (37)	-
Process measures: consultations for asthma (no. of episodes)			
Patient-initiated GP	2367 (56)	1544 (62)	1.33 (1.20-1.47)*
Patient-initiated nurse	538 (13)	251 (10)	1.28 (1.09-1.50)
Practice-initiated GP	1213 (28)	778 (31)	1.15 (1.03-1.29)
Practice-initiated nurse	2469 (58)	1131 (46)	1.64 (1.48-1.81)
'Respiratory Infections'	1944 (46)	1196 (48)	1.12 (1.01-1.23)
Process measures: review of asthma (no. of patients)			
Assessment of inhaler technique	3357 (79)	1852 (75)	1.25 (1.11-1.41)
Enquiry about compliance	3377 (79)	1888 (76)	1.19 (1.05-1.34)
Peak flow measurement	3311 (78)	1832 (74)	1.32 (1.04-1.67)
Issue of self-management plan	1946 (46)	854 (35)	1.59 (1.44-1.77)
Issue of peak flow meter	2197 (52)	955 (39)	1.69 (1.53-1.88)
Formal review	3492 (82)	1964 (79)	1.18 (1.04-1.34)
Follow-up arrangements	3228 (76)	1714 (69)	1.78 (1.48-2.15)
Clinical outcomes: primary care (no. of patients)			
Acute asthma attacks	961 (23)	594 (24)	1.08 (0.96-1.22)
Courses of systemic steroids	796 (19)	439 (18)	1.06 (0.93-1.21)
Emergency nebulizations	306 (7)	203 (8)	1.16 (0.96-1.40)
Symptoms at most recent assessment	2400 (56)	1465 (59)	1.34 (1.18-1.52)
Days off work or school (in last month)	375 (9)	296 (12)	1.48 (1.25-1.74)
Clinical outcomes: secondary care (no. of patients)			
Accident and emergency attendances	121 (3)	96 (4)	1.38 (1.04-1.83)
Outpatient attendances	247 (6)	180 (7)	1.28 (1.04-1.56)
Hospital admissions	132 (3)	85 (3)	1.11 (0.84-1.48)

* Results where 95% confidence intervals exclude 1.0 are shown in bold type.

Table 4. Nurse with asthma diploma employed within practice: process and outcome measures within the past 12 months.

	Nurse with asthma diploma		Odds ratio (95% confidence interval)	
	Yes (%)	No (%)		
Total no. of practices (n=225)	138 (61)	87 (39)	-	
Total no. of patients (n=6732)	4122 (61)	2610 (39)	-	
Process measures: consultations for asthma (no. of episodes)				
Patient-initiated GP	2363 (57)	1548 (59)	1.09	(0.98-1.20)
Patient-initiated nurse	552 (13)	237 (9)	1.55	(1.31-1.82)*
Practice-initiated GP	1039 (25)	952 (36)	1.70	(1.53-1.90)
Practice-initiated nurse	2365 (57)	1235 (47)	1.50	(1.36-1.66)
'Respiratory infections'	1869 (45)	1271 (49)	1.14	(1.04-1.26)
Process measures: review of asthma (no. of patients)				
Assessment of inhaler technique	3245 (79)	1964 (75)	1.22	(1.08-1.37)
Enquiry about compliance	3264 (79)	2001 (77)	1.16	(1.03-1.30)
Peak flow measurement	3165 (77)	1978 (76)	1.02	(0.80-1.30)
Issue of self-management plan	1691 (41)	1109 (42)	1.06	(0.96-1.17)
Issue of peak flow meter	1965 (48)	1187 (45)	1.09	(0.99-1.21)
Formal review	3359 (81)	2097 (80)	1.08	(0.95-1.22)
Follow-up arrangements	3054 (74)	1888 (72)	1.11	(0.92-1.34)
Clinical outcomes: primary care (no. of patients)				
Acute asthma attacks	934 (23)	621 (24)	1.07	(0.95-1.20)
Courses of systemic steroids	785 (19)	450 (17)	1.13	(0.99-1.29)
Emergency nebulizations	326 (8)	183 (7)	1.14	(0.94-1.38)
Symptoms at most recent assessment	2424 (59)	1441 (55)	1.18	(1.05-1.33)
Days off work or school(in last month)	389 (9)	282 (11)	1.19	(1.00-1.40)
Clinical outcomes: secondary care (no. of patients)				
Accident and emergency attendances	134 (3)	83 (3)	1.02	(0.77-1.36)
Outpatient attendances	256 (6)	170 (7)	1.05	(0.86-1.29)
Hospital admissions	131 (3)	86 (3)	1.04	(0.78-1.38)

* Results where 95% confidence intervals exclude 1.0 are shown in bold type.

with favourable process of care, and fewer days absent from work or school (Table 4). The account of more respiratory symptoms at recent assessment may reflect the use of a structured clinical assessment by nurses.

Subgroup analysis

Practices with a trained nurse were more likely than others to have completed an audit or to have FHSA accreditation. Practices with all the above 'structures' in place, compared to those with none, not surprisingly showed many associations with clinical outcome. Details are not reported further. Of the total sample of 6732 patients, 4995 (74%) were receiving preventive therapy; 3689 (74%) of those were from FHSA accredited practices; 3130 (76%) from practices with a trained nurse; and 3223 (76%) from practices with audit experience.

Discussion

Accreditation criteria

Practices that employed a nurse with an asthma diploma, or had completed an audit on asthma care, showed a series of associations with favourable clinical outcomes. Decreased use of accident and emergency departments and hospital outpatient clinics by practices who have completed an audit raises the intriguing prospect that well-organised primary care may reduce demand, and, by implication, the costs of secondary care.

The project booklet used in this study sought simple information on practice structure and measures of process and clinical outcome on 30 patients from each practice. According to the participants who were visited by the project co-ordinator, completion of the booklets was less onerous than compiling the figures

requested by FHSAs. Interviews with participating practices showed that they struggled to cope with the bureaucracy and see the present CDM clinic system as an imposition of more paperwork rather than an opportunity to improve patient care. The booklet could serve as a simple clinical audit. Perhaps FHSAs could save themselves, and practices, a great deal of paperwork collection and consider a system which rewarded practices appropriately for employing nurses trained in asthma care, and those that were prepared to carry out a regular clinical audit. Standard data collected from such audits could give a local, regional and national picture of asthma morbidity and service utilization.

Health service managers have a legitimate complaint that decisions on health care provision are sometimes made without scientific evidence. The evidence from this study is based on association not causation, but supports the agreement that if FHSA accreditation of CDM asthma clinics is to change, then an alternative system based on clinical audit may be more appropriate.

Difficulties with the project

The major problem of any national sample of practices and patients is representation. General practitioners who respond to mailing house invitations and express interest in PGEA distance learning courses, are, by definition, self-selected. Therefore, the results must be interpreted accordingly. A target recruitment number appropriate to enrolment in a project was reported because our recruitment aim was to attract a wide geographical spread of practitioners committed to completing a project. The intention was not to attract a high 'response rate' appropriate to a questionnaire methodology. Although the geographical spread and partnership size characteristics of the sample were represen-

tative of the UK, the results will have an 'enthusiast bias'. Barnes and Partridge recently described levels of practice resourcing of asthma care similar to those found in our sample.¹⁹ The method of patient enrolment may be subject to bias. Experience from the practice helpline and practice interviews suggests that practices did follow the correct patient selection procedure, but this does not guarantee a random sample. The validity of our findings are dependent on the integrity of participating doctors and nurses.

Outcome measures

A debate exists as to what outcome measures are appropriate in asthma care.²⁰ Clinical trials tend to concentrate on pulmonary function tests, and hospital studies on prevention of attacks or readmission.²¹ From a patient or general practice perspective, the necessity to attend an accident and emergency department or be admitted to hospital may constitute an adverse clinical outcome, although technically, hospital attendance could be classified as a process or event, not an outcome. Modern general practice information systems record primary care and hospital resource use and, by implication, clinical outcome. This study was designed to observe the associations between different types of structures of asthma care and relate them to clinical outcomes within general practice. It was an unexpected finding that structure was associated with secondary care clinical outcome. Attempts to reduce the burden of asthma on hospital services could legitimately focus on how best to resource and support primary care.

Caution must be used when inferring clinical outcomes from a series of associations. This study was not a controlled trial of asthma audit or of nurses with an asthma diploma, but a series of observations. Practices who employ nurses with special training or who undertake audit may favourably alter patient outcomes in ways unrelated to the variables under study.

The size of this study makes statistically significant associations likely. A series of tests on a range of variables can produce statistically significant findings by chance alone. We have tried to focus on those results which could be clinically important, but accept that, although statistical tests are objective, their interpretation can be subjective. The results suggest how asthma care may be related to days of absence from work or school, and to hospital attendance, and this may well be clinically important. We reported on the number of patients rather than the number of episodes so as to avoid the problem of a small number of patients causing a disproportionate number of episodes.

Conclusion

The study reports an association rather than a causation between practice structure and clinical outcome, and is subject to recruitment bias. The observation that recent practice audit is associated with favourable clinical outcome, but that FHSA asthma CDM accreditation is not, opens the debate as to how best asthma care should be organised, monitored and remunerated

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Address for correspondence

Dr R G Neville, Tayside Centre for General Practice, University of Dundee, Charleston Drive, Dundee DD2 4AD.

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