

## National asthma attack audit 1991-2

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### Abstract

**Objective**—To describe the frequency and characteristics of asthma attacks in the United Kingdom and to compare actual management with recommended guidelines for the management of attacks.

**Design**—Correspondence survey.

**Setting**—218 general practices in the United Kingdom.

**Subjects**—1775 patients of all ages who had a total of 1805 asthma attacks over three months.

**Main outcome measures**—Patient characteristics, place of management of attacks, comparison of actual management with recommended guidelines.

**Results**—Of the 1805 attacks, 300 occurred in boys aged 0-9, 144 in girls aged 0-9, and 118 in women aged 20-29. The estimated frequency of attacks in the community was 14.3 per 1000 patients per year. 1546 (86%) patients with attacks were managed within general practice, 225 (12%) were admitted to hospital, and 34 (2%) were discharged from an accident and emergency department. Two patients died. On initial presentation, 248 (14%) patients were "not breathless," 900 (50%) were "moderately breathless," 535 (30%) were "breathless and distressed," 68 (4%) were "too breathless to talk," and 2 were "moribund." Recording of clinical data was variable. Underuse of nebulised bronchodilators and systemic steroids was apparent in all grades of clinical severity. Contrary to current guidelines for asthma management, "step up" in maintenance therapy after an attack was often not practised.

**Conclusion**—Reported management was at variance with recommended guidelines. This has major implications for the design and distribution of future guidelines.

### Introduction

Asthma kills 2000 people in the United Kingdom every year<sup>1</sup>; it is a major cause of hospital admission in all ages<sup>2,3</sup> and an important cause of work and school absence and has economic and quality of life implications for individual sufferers, their families, and society.<sup>4,6</sup> Optimal treatment of attacks can be life saving but suboptimal treatment or unnecessary delay in the provision of care can be fatal.<sup>7</sup> Hospital studies on asthma attacks have concentrated on specific groups of patients (adults or children) or have been confined to specific geographical areas.<sup>8-10</sup> Studies from the community are few and predominantly based on single practices.<sup>11</sup> No published British studies encompass all ages, all regions, and all sectors of medical care.

Medical audit has a key role in negotiating and monitoring standards of asthma care. The British Thoracic Society's confidential inquiry<sup>7</sup> and the work of Bucknall *et al*<sup>12</sup> and others<sup>13</sup> have been instrumental in encouraging local and national guidelines for the management of acute severe asthma.<sup>14-17</sup> Progress on improving the provision and delivery of acute medical

services depends on knowledge of how asthma attacks are actually managed, rather than on how attacks should be managed.

The General Practitioners in Asthma Group, formed in 1987, exists to encourage good quality care of asthma in primary care, support educational initiatives, and encourage research and audit. The group's research unit was established in 1991 with the remit to study the quality of asthma care in general practice and to provide objective data to contribute to the debate on how and where asthma should be managed. The unit links research with practitioners' educational needs for personalised feedback on clinical performance. This paper reports the main findings from the first national audit of asthma attacks (1991-2), which had two aims—to describe the characteristics of asthma attacks in the community, and to compare current management with recommended guidelines.

### Method

A package of booklets for recording asthma attacks linked to a distance learning programme (accredited for one half day disease management of postgraduate educational allowance) was developed and piloted. The 380 members of the General Practitioners in Asthma Group were invited to participate in the audit. In addition, a medical mailing agency was commissioned to send invitations to participate to 2000 general practitioners stratified to be representative of all regions in the United Kingdom. Practitioners who returned a preprinted postcard expressing further interest were sent the package of recording booklets and distance learning programme. Each practitioner was invited to record details of all patients who presented with an asthma attack during a predetermined three month period. Data were collected in four overlapping blocks of three months starting with September 1991 and ending with January 1992. Practitioners were asked to include all asthma attacks from patients on their lists whether or not they were seen by themselves, a partner, a deputy, or in hospital.

In the absence of a universally agreed published definition for attacks or, for that matter, for asthma, consensus was reached within the steering group to define an attack according to three criteria, as "an episode of respiratory symptoms which prompts an urgent consultation with a doctor, is of sufficient severity to prevent the patient working or attending school or performing domestic duties or playing, and results in increased use of antiasthma medication."

Practitioners were asked to provide details of practice size and whether or not their practice operated an asthma clinic, owned a portable nebuliser, had a register of asthma patients, operated a practice or local protocol for asthma care, or employed a practice nurse with special knowledge of asthma. Details of patients included age, smoking habits, drugs taken before the attack, severity of symptoms, use of a self management plan, or possession of a peak flow meter.

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Consultation details, recording of clinical signs (pulse rate, blood pressure, etc), treatment given, drugs taken after the attack (at the time of final medical contact), and follow up arrangements were sought whether or not the patient was seen by a general practitioner or an accident and emergency department, was admitted to hospital, or experienced a combination of all three. Information was sought on all patients registered with participants, whether seen by them or not.

At the end of the three month study periods the practitioners returned completed booklets to the research unit. The research data were entered on to computer for analysis with the SPSS package and the management of each patient was compared with published recommended guidelines for adults or children.<sup>14-17</sup> Each practitioner was sent a personalised, handwritten critique of their management together with copies of published guidelines and the remainder of the distance learning package.

## Results

### PARTICIPANTS

Of the 380 members of the General Practitioners in Asthma Group, 183 expressed an interest in the project, of whom 103 returned recording booklets for analysis and personalised feedback; 352 practitioners out of the 2000 who received an invitation returned a postcard expressing interest and 115 returned study booklets. In total, 218 general practitioners from all regions of the United Kingdom participated. In all, 159 (73%) participants reported that their practices had an asthma clinic; 167 (77%) practices had a practice nurse with special knowledge of asthma, 204 (94%) owned a nebuliser, 135 (62%) operated a practice asthma protocol, and 179 (82%) had a register of asthma patients.

### PATIENT CHARACTERISTICS

A total of 1748 patients had one attack within the three month study period, 24 had two attacks, and three had three attacks, giving a total of 1805 attacks included in the study. Accurate data on age and sex were supplied for 1389 patients with attacks, 300 of which occurred in boys aged 0-9 and 144 in girls aged 0-9. There were 118 women aged 20-29 who experienced an attack. Table I shows the age-sex distribution of patients, including those admitted to hospital.

A total of 129 practices supplied an accurate "denominator" for the practice population from which patients were derived. Their combined list size was 250 739 and from this population a total of 897 attacks was reported over a three month period. The rate of asthma attacks in this subsample is estimated at 14.3 per 1000 patients per year.

Two hundred and forty one adults were known to be active smokers and 261 children passive smokers. In total, 516 (29%) patients possessed their own peak flow meter and 615 (34%) had been issued with a self management plan. In the previous year 1106 (61%)

TABLE I—Age and sex of patients who had asthma attacks

Age	No of patients with accurate age-sex data			
	Male		Female	
	Total (n=696)	No (%) admitted to hospital	Total (n=660)	No (%) admitted to hospital
0-9	300	47 (16)	144	19 (13)
10-19	138	12 (9)	95	9 (9)
20-29	60	6 (10)	118	13 (11)
30-39	38	4 (11)	68	6 (9)
40-49	26	2 (8)	54	5 (9)
50-59	36	4 (11)	56	0
60-69	48	4 (8)	64	6 (9)
≥70	50	8 (16)	61	10 (16)

TABLE II—Place of management of asthma attacks

	Initial presentation (n=1805)	Referrals (n=192)	Managed exclusively or discharged (n=1805)
General practitioner	1738		1546
Accident and emergency department	26	8	34
Hospital admission	41	184	225

patients had experienced an asthma attack, of whom 415 (38%) possessed a peak flow meter and 457 (41%) a self management plan.

### PLACE OF MANAGEMENT

In all, 1738 (96%) patients in the survey were seen initially by their general practitioner; 41 (2%) referred themselves and were admitted to hospital, and 26 (1%) referred themselves and were managed and discharged by an accident and emergency department. Of those initially seen by the general practitioner, 184 (11%) were referred and admitted to hospital, 8 (<1%) were referred and discharged by an accident and emergency department, and 1546 (89%) were managed solely by the general practitioner (table II). Five patients (2% of those admitted) were mechanically ventilated in an intensive care unit.

Two deaths were reported in the survey; both occurred outside hospital. In each case the patient was reported to be "moribund" when the general practitioner arrived, and resuscitation proved unsuccessful.

### RECORDING OF CLINICAL DATA

In the 1805 asthma attacks studied there was a written record of pulse rate in 968 (54%), blood pressure in 266 (15%), respiratory rate in 1143 (63%), presence or absence of cyanosis in 1275 (71%), and peak flow rate in 1473 (82%). The best documented measure of severity was a simple classification based on each patient's initial state of distress on presentation. This was available in 1749 (97%) patients with asthma attacks: 248 (14%) were "not breathless," 900 (50%) were "moderately breathless," 535 (30%) were "breathless and distressed," 68 (4%) were "too breathless to talk," and two were "moribund," both of whom died (table III).

### TREATMENT

Of the 1546 patients managed exclusively by general practitioners, 477 (31%) received nebulised bronchodilators. Twenty eight (12%) of those in the not breathless category, 197 (23%) of those who were moderately breathless, 217 (54%) of those who were breathless and distressed, and 27 (82%) of those who were too breathless to talk were given nebulised bronchodilators. Nebulised bronchodilators were given to 21 (62%) of the 34 patients managed and discharged from accident and emergency departments and 126 (56%) of the 225 patients admitted to hospital.

Systemic steroids (oral prednisolone or intravenous or intramuscular hydrocortisone) were given to 863 (56%) of the 1546 patients managed exclusively by general practitioners: 54 (22%) of those not breathless, 556 (66%) of those moderately breathless, 208 (52%) of those breathless and distressed, and 28 (85%) of those too breathless to talk. Systemic steroids were given to 14 (41%) of the 34 patients managed in and discharged from accident and emergency departments and 116 (52%) of the 225 patients admitted to hospital (table II).

General practitioners prescribed antibiotics to 489 (32%) patients, accident and emergency departments to six (18%), and hospitals to 49 (22%) patients.

Each patient's maintenance treatment before the asthma attack was classified by the research staff according to British Thoracic Society steps 0-5 (child-

TABLE III—Severity of symptoms and management of asthma attacks

	Severity						Total (n=1805)
	Not breathless (n=248)	Mildly breathless (n=900)	Breathless and distressed (n=535)	Too breathless to talk (n=68)	Moribund (n=2)	Not recorded (n=56)	
Managed exclusively by general practitioner	243	840	401	33	2	27	1546
Given nebulised bronchodilator	28	197	217	27	1	7	477
Given systemic steroids	54	556	208	28	0	17	863
Managed in and discharged from accident and emergency department*	3	10	14	2	0	5	34
Given nebulised bronchodilators	1	5	10	1	0	4	21
Given systemic steroids	1	3	6	1	0	3	14
Admitted to hospital†	2	50	120	33	0	24	225
Given nebulised bronchodilators	2	23	66	22	0	13	126
Given systemic steroids	1	20	59	24	0	12	116

\*Incomplete information supplied for eight patients.

†Incomplete information supplied for 70 patients.

ren were placed in accordance with recent published consensus papers). Details of drugs taken before and at the time of the final medical contact after the attack were incomplete owing to poor quality of discharge letters in 64 patients managed in accident and emergency departments or hospital. In the 1546 patients managed exclusively by the general practitioner in whom details of maintenance treatment before and after the attack were supplied, 349 (23%) had been receiving no treatment (step 0) before the attack, and 51 (15%) of these were not prescribed any maintenance treatment after their attack. A total of 298 (85%) had their treatment "stepped up"; 131 (38%) received bronchodilators alone (step 1) and 161 (46%) received some form of prophylactic maintenance treatment (step 2 or beyond). Before their attack 374 (24%) patients had been receiving bronchodilators alone (step 1); in 147 (39%) maintenance treatment was unchanged or reduced after their attack, and 227 (61%) were prescribed medication from step 2 or beyond. Before their attack 356 (23%) patients had been prescribed treatment at step 2, 275 (77%) of whom remained at step 2 or lower after the attack, and 81 (23%) had their treatment stepped up according to recommended guidelines. Before their attack 303 (20%) patients had been prescribed step 3 medication; 281 (93%) remained at step 3 or lower after the attack and 23 (7%) had their maintenance treatment stepped up. A total of 107 (7%) patients were classified as step 4 and 51 (3%) as step 5 (receiving maintenance oral steroids) before the attack (table III).

## Discussion

The audit of asthma attacks represents an attempt to study the access to, process of, and outcome of asthma attacks in all age groups in all regions of the United Kingdom. The findings confirm that in the early 1990s asthma attacks are a common life threatening problem

TABLE IV—British Thoracic Society steps before and after attacks in patients managed solely by general practitioners (n=1546\*)

Step	No (%) of patients receiving maintenance treatment		No (%) with change in maintenance treatment after attack	
	Before attack	After attack	Unchanged or step down	Step up
0	349 (23)	53 (3)	55 (15)	298 (85)†
1	374 (24)	282 (18)	147 (39)	227 (61)
2	356 (23)	494 (32)	275 (77)	81 (23)
3	303 (20)	504 (33)	281 (93)	23 (7)
4	107 (7)	155 (10)	104 (97)	3 (3)
5	51 (3)	52 (3)	51	

Children were placed on equivalent "BTS Step" according to prescribed prophylactic medication.

\*Medication details incomplete in six patients.

†131 (38%) of patients stepped up from step 0 to step 1 (bronchodilators as required) and 161 (46%) from step 0 to step 2 or beyond (prophylactic medication).

of concern to hospitals and general practitioners alike.

Recruiting the practices through a special interest group and through self selection is likely to have biased results. About a quarter of participants, however, did not operate an asthma clinic or employ a practice nurse trained in asthma care, and a small proportion of participants did not possess a portable nebuliser. The survey was linked to a distance learning package accredited for postgraduate allowance, and this may have encouraged practitioners with varying degrees of expertise in asthma management to participate. The distance learning package included a copy of the British Thoracic Society's guidelines for the management of asthma but was issued after the recording booklets for the study had been completed and returned. The educational impact and subsequent effect on patient management will require further reading.

Attacks were reported more commonly in boys than girls (ratio 2:1), gradually decreasing in frequency through early adult life, but becoming more common at ages 50-59 and above. An exception to this was the large number of women aged 20-29 included in the study. This group has a high doctor-patient contact rate but also includes a proportion of patients with unstable or brittle asthma. The two deaths recorded during this study both occurred in patients who were moribund when first assessed and did not survive long enough to reach hospital. The deaths serve as a reminder that asthma is responsible for a continuing toll of personal tragedy.

The frequency of asthma attacks presenting in the community was estimated at 14.3 per 1000 patients per year. No comparable figures have been published, although the third national morbidity survey reported "asthma presentations."<sup>4</sup> The great majority of attacks, 1546 (86%) of 1805, were managed exclusively outside hospital by general practitioners. Published research on the patterns of care of attacks are dominated by hospital based studies. Self referrals to accident and emergency departments or direct admissions to hospital accounted for only 67 (3.7%) attacks. It should be emphasised that participating practitioners were asked to return details of all patients on their lists who experienced an attack and not simply those whom they saw personally. It is possible, though, that some self referrals and patients who did not consult their own doctor during the course of their attack may not have been notified to participating practitioners and thus were excluded from the study.

The definition used for the survey was a pragmatic attempt to encourage participants to include patients of all grades of severity of attack. Until a definition for asthma itself can be agreed the problem of defining attacks will continue to generate controversy. The definition used here is independent of the variables under study (age, clinical signs, investigations, place of treatment, and clinical outcome).

Recording of objective clinical signs such as pulse rate, blood pressure, and peak flow could be considered suboptimal. Low standards of recording rather than of measuring may be the problem. Some doctors may not see the relevance of recording details of clinical signs. However, a simple grading of severity of attack based on each patient's level of distress with breathing was completed in 97% of cases. Our findings, in common with those of other audit surveys, are a strong argument in favour of simple standardised recording systems for certain medical conditions such as acute chest pain, review of diabetes, major trauma, and burns.

The British Thoracic Society's guidelines recommend that the treatment of acute severe asthma includes nebulised bronchodilators and systemic steroids. The survey highlights possible underuse of nebulisation, which was given to 35% of patients, and of steroids, given to 55%. This may represent a failing by doctors to initiate adequate therapy, but there are other possible explanations. Many of the mild or "not breathless" cases in this survey, particularly children, may have responded to less aggressive intervention. The proportion of attacks treated with nebulised bronchodilators and systemic steroids increased with increasing severity of clinical presentation (table II). Guidelines for acute severe asthma based on hospital experience may not be an appropriate yardstick by which to judge how asthma attacks are measured in the community. It is important to note, though, that a sizable proportion of patients graded as "breathless and distressed" and "too breathless to talk" did not receive the recommended lifesaving antiasthma treatment: nebulised bronchodilators and systemic steroids.

The pattern of maintenance treatment before and after attacks was also at variance with published guidelines. This survey shows that many patients received no follow up and no change to treatment despite experiencing an asthma attack. The issuing of peak flow meters, availability of self management plans, and follow up appointment procedures were other aspects of care where actual practice differed from recommended practice.

General practitioners' management of asthma attacks may differ from published recommendations for several reasons. The guidelines may not have been sufficiently widely disseminated, or they may have been viewed as impractical or unrealistic.<sup>18</sup> The standard of clinical care reported is less than acceptable. A

simple, relevant, and attainable set of goals for the management of acute asthma attacks in the community and in hospital is clearly needed. This needs to be supported by educational initiatives and a means whereby doctors can receive relevant personal feedback on how individual patients have been managed.

The first national asthma attack audit shows that access to medical care for people having asthma attacks continues to be mainly through general practitioners. The process of care differs considerably from recommended guidelines, and the outcome of attacks is a continuing cause for concern. This survey is a baseline against which attempts to effect change can be measured.

We thank all the doctors who took part for their enthusiasm and willingness to participate in critical audit.

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## A MEMORABLE PATIENT

### An encounter in North Yemen

One afternoon in a small hospital in North Yemen, when it was still extremely poor and underdeveloped, a young man wheeled himself into my clinic in a chair.

"Can you make my legs work again doctor?"

Examination showed a complete paraplegia at mid-thoracic level due to a fracture dislocation sustained in a car accident 10 years before.

"No, my friend, I'm afraid that neither I nor any doctor in the world can make them work again."

"Will you cut them both off for me then?"

To gain time for thought I asked him where he came from and how he had come to me. "From Badah," he replied. That was 20 hours drive away.

"Who drove you?"

"Why, I did myself."

"May I see your car?" I asked.

We went outside to where the usual white Toyota pickup stood. Ebony walking sticks had been attached to the clutch and brake pedal and could be used by his left hand. His right hand could use another rod attached to

the accelerator. I thought of the moments during gear changing when both hands would be off the wheel.

"I make my living by carrying my neighbours' produce to market. I can drive my truck and propel myself in my wheelchair but I can't get from one to the other by myself because my legs get in the way. I need help for that. If you cut them off for me I will be independent."

There were no welfare services. So I did bilateral low femoral amputations. They healed well and he drove off.

Six months later, during the grape harvest, he returned bearing gifts. They said there are 36 varieties of grape in North Yemen; he had brought samples of them all.

"Thanks be to Allah and to you doctor. I am an independent man again."

I felt very humble. —MICHAEL PORTER is an orthopaedic surgeon in Birmingham

We welcome contributions to fillers: *A patient who changed my practice; A paper that changed my practice; A memorable patient; The message that I would most like to leave behind*, or similar topics.