Admission to hospital with asthma

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SUMMARY The circumstances surrounding 142 hospital admissions for acute asthma in 110 children during a one year period were examined. Thirty four of 106 (32%) children with previous wheezing had not been diagnosed as asthmatic, nor received effective antiasthmatic medication. Nineteen of 36 (53%) known, but undertreated, asthmatics were under the care of the hospital paediatricians. Twenty-four of 58 (41%) regular school attenders had missed more than 11 days' school in the previous year. Good parental understanding of their child's illness was strongly associated with adequate treatment. Parental understanding was, however, poor in 58 of 137 (42%) admissions. Control of inadequately treated chronic symptoms was obtained by simple and straightforward changes in treatment.

Childhood asthma continues to be underdiagnosed and undertreated^{1 2} and remains an important source of morbidity^{3 4} and mortality.⁵ As the prevalence rate is approximately 11%,^{2 6} every paediatrician and general practitioner will be confronted by children whose lifestyle is compromised by their asthma.

Increasing numbers of asthmatic children are now admitted to hospital. There may be several reasons for this epidemiological change but it should prompt the medical profession to examine the quality of care provided for the asthmatic child.^{3 7}

Community surveys^{1 4} have documented the underdiagnosis and suboptimal management of the asthmatic child. The present study examines the circumstances surrounding the acute asthmatic attack in consecutive children admitted to a general paediatric ward over a one year period.

Patients and methods

A total of 110 children with acute onset of wheezing and a primary diagnosis of asthma were admitted to hospital on 142 occasions. There was a boy:girl ratio of 2.2:1. The mean age at admission was 5.2 years (range 0.8 to 14.4 years). Eighty nine per cent were more than 18 months of age. Mean hospital stay was 3.6 days (range 1 to 10 days).

All children showed reversibility of symptoms with treatment—judged clinically in the very young, and by airways resistance (Siregnost F D S, Siemens) and peak expiratory flow rate measurements in the older children. The four children presenting

with their first attack had subsequent wheezing episodes when followed in the outpatients clinic.

The admitting doctor recorded details of the routine antiasthmatic medication, ready availability in the home, and the degree of parent or patient compliance, or both, with the treatment regimen.

Parents were asked whether the term 'asthma' had ever been used by the child's doctor with regard to his wheezing illness. Their understanding of the disease was graded broadly as 'good', 'moderate', or 'poor'. Their response to the acute attack was noted in terms of therapeutic action and referral routes taken to hospital care.

The frequency of symptoms at home, the amount of school absence caused through them, and their effect on the child's normal activities were analysed, and the overall control of the child's asthma was assessed.

On hospital admission, and before any treatment in hospital, each child received a clinical score based on the degree of wheeze, use of accessory muscles, and pulse rate. (Table 1). No allowance was made for any adrenergic treatment that might have been taken at home. The severity of the acute attack was described on the basis of the total score as mild (0 to 3), moderate (4 to 6), severe (7 to 8) or very severe (9).

During the hayfever season daily grass pollen counts were obtained from the Leeds Regional Public Health Laboratory.

Total serum IgE concentrations were ascertained by the Phadebas paper radioimmunosorbent test

Table 1 *Clinical score*

Clinical score	Wheeze	Accessory muscle use	Pulse rate/minute
0	None	None	80 or less
1	Expiratory	+	81-110
2	Inspiratory and expiratory	++	111-140
3	Heard without stethoscope	+++	> 140

(PRIST) and IgE specific to house dust mite, grass pollen, and cat epithelium by the Phadebas radio-allergosorbent test (RAST). The age related mean value and reference range for the former were supplied by Pharmacia GB. The results of the latter test were graded from 1 to 4, and grades 2 to 4 were considered clinically important.

Results

Full historical and clinical details were obtained in 140 hospital admissions. Ninety eight (70%) were classified as mild or moderate. Sixty two of the 110 (56%) children were less than 5 years old.

Causal factors in the acute asthmatic attack. History, clinical examination, and allergy test results indicated infection as the major precipitating cause of the asthmatic attack on 94 (67%) occasions (all 94 had coryzal symptoms; 20 (21%) were feverish; a further 12 (13%) had had recent home contact with infection, and 13 (14%) had other evidence of infection such as consolidation, pharyngitis, tonsillitis, cervical lymphadenopathy, or otitis media). Allergy alone was implicated on 16 (11%) occasions, the attack being closely associated with exposure to grass pollen (13), house dust mite (2), and dog (1) in atopic subjects. On 12 (9%) occasions both allergy and infection were implicated. Five (4%) episodes were attributed to poor compliance or emotional upset, and in 13 (9%) the cause was unknown.

In 88 of the 94 admissions thought to have been precipitated by acute respiratory tract infection, serum IgE values were available and were more than two standard deviations greater than the mean on 63 occasions. Even with hindsight, however, in only two cases had there been any allergen exposure sufficient to indicate it as a possible major causal factor for the acute asthmatic attack.

Serum IgE concentrations were obtained in 99 of the 110 children. In 77 (78%) they were more than two standard deviations greater than the mean. Only 34 of these 77 (44%) children had definite clinical allergy according to their history, and six

children with normal serum IgE concentrations gave a clear cut history of allergy induced wheeze.

Readmissions. Twenty five of the 110 children were readmitted to hospital—19 on one occasion, five on two, and one on three. Five of these admissions might have been avoided. Failure to ensure adequate parental understanding resulted in the early readmission of a Vietnamese child, and four children were readmitted because of poor prescribing of drugs at the time of the previous discharge from hospital. These patients were receiving suboptimal doses of slow release theophylline twice daily (range 4.7 to 5.8 mg/kg per dose), with subtherapeutic plasma theophylline concentrations (range 0 to 3.1 µg/ml).

Primary care, diagnosis, and treatment. Before each admission, overall care of the child's asthma was supervised by the general practitioner in 69 cases and by the hospital consultant in 73.

Thirty four of 106 (32%) children admitted with a past history of wheezing had not been labelled as asthmatic. Half of these, 13 of whom had received no antiasthmatic treatment at all, were seriously undertreated, suffering frequent and distressing symptoms. Only one had been seen previously by a hospital paediatrician. Twenty four of the 34 (71%) children whose asthma had not been diagnosed were less than 5 years old.

Thirty six of the 72 (50%) children labelled as asthmatic, were thought to be seriously undertreated, but only one was receiving no treatment. Seventeen of these 36 (47%) children were being seen by their general practitioner, and 19 (53%) in the hospital outpatients clinic.

School absence. Twenty four of 58 (41%) children who were of school age or who were regular nursery school attenders had been absent from school more than 10 days in the previous year. Only two of the 24 (8%) children were thought to be having adequate treatment. The parents of eight of the 24 (33%) children did not know that their child had asthma.

Drug supply, compliance, and parental understanding. The parents of 83 children on regular treatment had an adequate supply of drugs at home in all but six (7%) cases, and compliance with prescribed treatment was good in all but 12 (14%). In 10 of these 12 families, poor compliance was associated with poor understanding of the illness, despite the diagnosis of 'asthma' having been made in seven of the 10 children.

Excluding those presenting with their first attack of wheezing, an assessment of parental understand-

Table 2 Parental understanding, primary care, and positive diagnosis

	Parental understanding					
	Poor		Moderate		Good	
Number of hospital admissions	58		20		59	
Routine treatment by general practitioners (GP) or hospital (H)	46 (GP)	12 (H)	6 (GP)	14 (H)	13 (GP)	46 (H)
Number positively diagnosed as 'asthmatic'	13		4		13	
	12		14		46	

ing of asthma was obtained from 137 admissions (Table 2). Good understanding was associated with accurate diagnosis and appropriate treatment. On only seven of 58 (12%) occasions where parental understanding was poor was the child receiving adequate treatment at home, compared with 56 of 79 (71%) occasions where parental understanding was moderate or good.

The parental assessment of the severity of the acute asthmatic attack was usually safe when compared with that of the admitting doctor. One set of parents seriously underestimated, and nine seriously overestimated, the severity of their child's illness.

Most parents responded sensibly to the acute attack and sought medical help in reasonable time—32% within six hours, 38% within seven to 12 hours, 42% within 13 to 18 hours, 12% within 19 to 24 hours, and 14% within one to three days.

Details of the medical personnel first contacted were available in 140 cases. Fifty two (37%) were referred by their general practitioner and 12 (8%) by the practitioner's deputising service. Seventy two (52%) presented directly to the ward or to casualty (in equal proportions), and four (3%) were admitted through the outpatients clinic.

Discussion

The results of this study emphasise the continuing need for improvement in the diagnosis and management of childhood asthma.

There is a persisting reluctance among general practitioners to label the wheezing child as 'asthmatic'. Speight *et al*¹ describe the same problem in their community study of Tyneside children. This reluctance is most manifest in the preschool child, 24 of 61 (39%) under 5 year olds in this study were not

diagnosed and 11 of them suffered frequent asthmatic attacks. The onset of symptoms at less than 3 years of age, however, is not uncommon,^{4 8} and it has been shown that asthma and wheezy bronchitis probably result from the same underlying disorder in the same population.⁸⁻¹⁰ Failure to apply the correct diagnostic term was strongly associated with a failure to prescribe antiasthmatic medication; a finding in agreement with the work of Anderson² and Speight.¹

It is disappointing, however, that even with correct diagnosis and the use of antiasthmatic drugs, children often still receive ineffective treatment (36 of 72 children in this study). Poor control of symptoms in these children before hospital admission was usually due to poor attention to dosage and inhalation technique, a failure to combine effectively prophylactic treatment with drugs for acute relief of symptoms and to make use of available services for checking plasma theophylline concentrations, and an inappropriate use of drugs—prescribing bronchodilator syrup to children over 10 years of age with no attempt to introduce the Rotahaler or aerosol inhaler, and inhalers to children not able to master them. Improved control was obtained by simple and straightforward changes in the routine home medication, by ensuring in outpatient clinics that all children using inhalers had an adequate technique at every attendance, and that the prescribed treatment was still appropriate. The present findings emphasise the need for regular review of the asthmatic child. Repeat prescriptions may no longer be supplying appropriate medicine.

The study emphasises the need for improved primary care by the general practitioner.¹¹ Recent work has shown a high general practitioner referral rate and an increased self referral rate.^{3 7 12} The hospital is of increasing importance as the place of treatment for asthma. Seventy two of 140 (52%) admissions in this study bypassed the general practitioner. Once 'captured' by the hospital, the child is likely to be followed in outpatients, and this will reinforce the tendency to present directly to the hospital in any further attack. Thus the general practitioner is less likely to be involved in his patient's management on occasions when hospital care may be unnecessary. Ninety eight of 140 (70%) admissions were clinically 'mild' or 'moderate' and might have responded to appropriate treatment at home. Moreover, hospital treatment of the chronic symptoms does not necessarily mean optimal treatment. Nineteen of the 36 patients diagnosed asthmatic and judged to be receiving inadequate treatment were attending hospital outpatient clinics. The consultant cannot see each asthmatic child at each visit, and undertreatment is perhaps more likely

when he is seen by a succession of junior doctors than if regularly reviewed by his own general practitioner.

The family generally reacted sensibly to the asthmatic attack and complied well with the treatment prescribed, even if the doctor had failed to ensure that they understood adequately their child's illness. This failure to communicate is a major criticism of the doctor. In 25 cases in which the correct diagnosis of asthma had been made and communicated to the parents, the latter still had little understanding of what 'asthma' really meant to their child. Moreover, in practical terms adequate treatment was strongly associated with good parental understanding.

We recognise the difficulty in distinguishing coryzal symptoms and signs from those of allergy. Nonetheless, the clinical and historical impression of this study supports the contention that most acute childhood asthma is provoked by respiratory virus infections.¹³

The role of allergy remains unclear, as does the relevance of the PRIST and RAST results. Allergy seemed an important causal agent in only 16 (11%) cases and was possibly implicated in a further 12 (9%). Forty three of 77 (56%) children with a serum IgE concentration more than two standard deviations greater than the mean had no historical evidence of serious allergy.

Analysis of the 142 hospital admissions in this study suggests that it is by simple means that better control of asthma in childhood will be achieved—correct diagnosis, attention to detail in treatment so that it is effectively taken and altered as necessary, and proper education of parents and patients.

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