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PRACTICE OBSERVED

Practice Research

Active approach to recognising asthma in general practice

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Abstract

The general practice medical records of 214 children born in 1977 were scrutinised for a diagnosis of asthma. In 18 (8%) of these a diagnosis of asthma had been entered. Using a scoring system based on the medical record a further group of children who were thought likely to have undiagnosed asthma was exercise tested. Twelve children (6%) had demonstrable exercise induced asthma. In addition, seven children (3%) had both frequent respiratory symptoms and borderline exercise test results, indicating that they too had clinically important airways obstruction. As expected, histories of atopic eczema, nocturnal cough, persistent cough (more than one week), and wheezing appeared often in the medical records of the children with asthma. In combinations these diagnostic clues were more than 50% predictive of asthma. A more active approach in general practice to the diagnosis of asthma in children is both necessary and possible.

Introduction

Asthma in children continues to be underdiagnosed.[1,2] The incidence of frequent wheezing in children may be as high as 11% in the primary school age group.[3,4] The results of studies, however, in which parents have been asked if a diagnosis of asthma has been offered to them infer that diagnostic rates are under 5%.[1,4] In one of these studies only half of a group of children who had lost more than six weeks from school owing to wheezy illnesses had been labelled as asthmatic.[4] The benefits of recognising and subsequently treating these children are obvious. The effect on school attendance alone may be dramatic.[1] In addition to these children, there exists a group, perhaps a further 8%, in whom episodes of wheezing and other related symptoms occur less often[3] but are not necessarily less clinically important. How then are these children to be identified?

Asthma may present in several ways in childhood. Recurrent wheezing should suggest asthma; the label of "wheezy bronchitis" has lost its popularity since it has been accepted that the underlying mechanism is no different from that which occurs in asthma.[4-6] Persisting cough and night time cough are similarly now recognised as features of asthma and often may precede classical symptoms.[7-10] Atopic eczema is also associated with an increased incidence of asthma. None of these features, however, is alone a reliable predictor of asthma, but combinations of them should make the likelihood of asthma progressively more certain.

Making a diagnosis of asthma thus depends largely on taking an adequate history. Physical examination may be helpful, but demonstrating airways lability (most conveniently done by observing changes in the peak expiratory flow rate under differing conditions) is the only objective way of confirming the diagnosis.

Exercise induced asthma, although much emphasised recently, is often poorly managed in practice.[4,11,12] The mechanisms are still not fully understood, but heat loss and drying of the mucosa in the bronchial tree during exercise seem to be partly responsible.[13,14] When susceptible individuals take vigorous exercise there is usually an initial period of bronchodilation followed by a precipitous bronchoconstriction, with an associated fall in peak expiratory flow rate. This may last from minutes to an hour or more. Given the right conditions, this postexercise bronchoconstriction occurs in 70-90% of children with asthma,[15] and being readily measurable it is thus often used as a diagnostic test.

For diagnosis, six minutes of free running seems to be the optimal stimulus for inducing measurable exercise induced asthma.[16] The postexercise fall in peak expiratory flow rate is conventionally expressed as a percentage of the pre-exercise value. Normal children show little fall in peak expiratory flow rate after exercise; 95% of 548 normal children studied by Burr *et al* had falls of less than 15% after exercise.[17] A fall in peak expiratory flow rate of 20% or more after exercise confirms a diagnosis of asthma.[13] A fall of between 15 and

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20% suggests a significant degree of airways obstruction[17] and is considered diagnostic by some.[18]

The aims of this study were: (*a*) To assess the usefulness and practicality of screening medical records for clues leading to a diagnosis of asthma. (*b*) To give an exercise test to a group of high risk "non asthmatic" children who had been recognised from screening the medical record. (*c*) To analyse the predictive values of the individual component parts or "clues" found during screening.

Patients and methods

The medical records of all 225 children who had been born in 1977 were identified using the age-sex registers of three Edinburgh group practices; 214 of these records contained continuous clinical notes from 1977. The 11 children whose records were incomplete because of missing clinical material were excluded from further study.

An open ended cumulative "score" was given to each of these 214 medical records by allocating one point for each and every mention of the following features (thereby weighting both persisting and recurrent predictive features):

(1) Atopic eczema: any eczema recorded after six months of age.

(2) Nocturnal cough: specifically emphasised—for example, "night time cough," "worse at night," etc.

(3) Persisting cough: lasting more than one week or "still coughing," "cough persists," etc.

(4) Wheezing: or "rhonchi."

(5) Bronchodilator used: including steroids and sodium cromoglycate.

Any patient whose notes contained the word "asthma" as either a definite or a possible diagnosis was classified as having asthma for this study. The 18 children (8%) in this category were excused from exercise tests but were taken into account later for the calculations of predictive values.

ANALYSIS

An arbitrary screening score of four or more was chosen to define a "high risk" group. The 60 "non-asthmatic" children from this group were invited to attend for exercise tests. Forty randomly selected children from the larger group with scores of three or less were also invited to attend. (Non-attenders were sent a second invitation, but continuing non-attendance was then reluctantly accepted. This was to honour a commitment given to the three practices that parents would not be pressured into attending.)

I conducted conventional exercise tests. Each consisted of six minutes of free running in the open air. After familiarising the children with a Wright peak flow meter the maximum peak expiratory flow rates achieved after three attempts were recorded at two minute intervals before, during, and for 15 minutes after the exercise. A pretest rate of at least 80% expected for height (derived from published tables) and a postexercise pulse rate of at least 170 beats per minute were accepted as proof of a satisfactory test.[15] Temperature and humidity were neither controlled nor recorded, the tests taking place in a variety of weather conditions between August and November.

The study population was divided into subgroups based on screening and the results of the exercise tests (table I): in group A were the children who were known to have asthma; group B consisted of those children with falls in peak expiratory flow rate of 20% or more after exercise; and children in group C had positive exercise tests in the 15-20% range. In group D were those children with falls of 0-15% in peak expiratory flow rate; group E contained the non-attenders with scores of four or more (and the one child with an unsatisfactory exercise test), an unknown number of whom may also have had asthma. The remaining untested children, with scores of three or less, were allocated to group F. The predictive values of the component parts of the screening score were then calculated individually and in combinations.

Results

Figure 1 shows the distribution of screening scores; 78 (36%) patients scored four points or more. All eighteen (8%) of the 214 scrutinised records in which a diagnosis of asthma had been made scored seven points or more. Of the 100 patients who had been invited for exercise testing, 50 attended. The mean (SD) scores of the attenders and non-attenders in the high risk group were similar: 34 attenders 7·1 (2·6), 26 non-attenders 6·6 (2·6). In the low risk group the mean (SD) score of the 24 non-attenders was 0·9 (1·1) compared with 1·9 (1·3) for the 16 attenders.

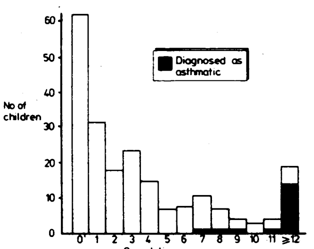

FIG 1—Distribution of scores from 214 medical records.

Of the 50 tests conducted, 49 were acceptable (using the stated criteria), one child consistently refusing to cooperate. The postexercise bronchoconstriction was calculated as a percentage fall in peak expiratory flow rate from the resting (pre-exercise) level. Figure 2 shows the results of the 49 acceptable tests. There is a positive correlation between the screening score and the size of postexercise bronchoconstriction (Kendall's tied rank correlation, $p<0·01$). Twelve children had measured falls in peak expiratory flow rates of 20% or more after exercise, and a further seven children had measured falls of between 15 and 20%. All 19 came from the group with scores of four or more. The mean fall in flow rates of the 16 children from the low risk group was 7·9%.

The component parts of the medical record screening score were related to the subgroups A-F, defined by the screen and the exercise test results. Table I gives the relative frequencies of these predictive clues, and table II gives

TABLE I—*Breakdown of children in the sample into subgroups A-F, with relative frequencies of individual predictive "clues"*

		Predictive feature				
Group	No	Atopic eczema	Nocturnal cough	Persistent cough	Wheeze	Bronchodilator
(A) Known to have asthma	18	9	14	17	16	18
(B) >20% fall in peak flow rate	12	4	4	12	10	9
(C) 15-20% fall in peak flow rate	7	3	5	7	3	3
(D) 0-15% fall in peak flow rate	30	10	13	20	17	11
(E) Non-attenders (scores ≥4)*	27	5	11	26	20	13
(F) Untested (scores ≤3)	120	14	15	38	20	7
Sample total	214 (100%)	45 (21%)	62 (29%)	120 (56%)	86 (40%)	61 (29%)

* Includes one child with an unsatisfactory exercise test

their values for predicting asthma (redefined as groups A + B + C). Nocturnal cough was the symptom most predictive of asthma, with a 45% positive predictive value. Any combination of the diagnostic clues was more than 50% predictive. (The maximum of the "range" quoted assumes that all of the relevant non-attenders (from group E, table I) were asthmatic; the minimum assumes that none of them was asthmatic.)

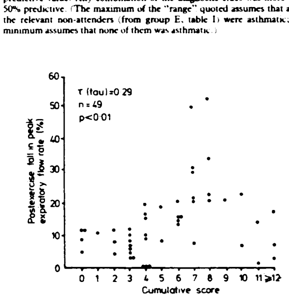

FIG 2—Distribution of results of exercise test against score.

TABLE II—*Predictive values of the clues found in the medical records*

Predictive "clue"	No of children	Positive predictive value (%)*	Range (%)†
Atopic eczema (AE)	40	40	35-46
Nocturnal cough (NC)	51	45	37-55
Persistent cough (PC)	94	[illegible]	30-51
Wheezing (Wh)	66	44	34-57
Bronchodilator prescribed (Bd)	48	56	44-66
AE + NC	19	53	42-57
AE + PC	25	60	52-66
AE + Wh	21	66	58-71
NC + PC	39	59	46-68
NC + Wh	29	62	51-68
PC + Wh	52	57	42-69
NC + PC + Wh	26	69	56-75
AE + NC + PC	14	71	62-75
AE + NC + PC + Wh	9	78	
AE + NC + PC + Wh + Bd	7	86	

* Calculated thus: (No of children with given predictive features plus asthma/Total No of children with given features) × 100% (asthma here is defined as groups A + B + C of table I).
† The maximum assumes all of the relevant non-attenders to be asthmatic; the minimum assumes that none of the non-attenders was asthmatic; where no range is given there were no non-attenders with this combination of predictive features.

Discussion

The cumulative prevalence of asthma in this sample of children reached 14%, with a further 3% having probable asthma. These may still be underestimates as false negative results of exercise tests are found in 10-30% of people with asthma.[1] This may explain some of the negative tests in the higher scoring group shown in fig 2. In addition, some of the non-attenders with scores of four or more may also have had asthma. The low response rates, particularly from the low risk group, may reflect generally low levels of medical contact; also the parents of these lower scoring children would have had less reason to identify with the subject of the study. Even with above average rates of recognising asthma in the three practices before the study it was possible to double the diagnostic rate in the way described. If this sample is representative a group practice of 10 000 patients (having perhaps 1200 children between the ages of 2 and 12) would have more than 100 children who suffer, or have suffered from, unrecognised asthma.

By screening the medical record it was possible to identify a "high risk" group of children, which contained a substantial number of children with unrecognised asthma. Because the distribution of the screening scores depends on variables such as the detail of record keeping and the ages of the patients the cut off score may vary among practices, and the threshold that is appropriate elsewhere might not be the four points chosen for this project. The unconventional "each and every mention" approach to the screening score weights in favour of persisting and recurring predictive clues, and this results in an extension of the range of scores found. This extension has facilitated the definition of the cut off score threshold needed to divide the sample into low risk and high risk groups. When the data from this study were reworked, using a closed and narrower 0-5 scale, it was impossible to divide the sample at any usable point, and the ability to define the higher risk group was lost.

One pitfall of this approach is the possibility that one isolated illness, such as pertussis, could place a child inappropriately in the high risk group. Because it is unusual to find documented bacteriological confirmation of pertussis in general practice records it seems safer, for the purposes of screening, to include such children in the group with potential asthma until proved otherwise.

The nature of the scoring system also ensures that all high risk children who were tested have at some time complained of symptoms. Any exercise induced asthma that was demonstrated is therefore likely to be of clinical as well as experimental importance. Other predictive associations, such as a family history of asthma, may be added to the screen. This information, however, is often missing from a child's medical records, and collecting it would require an additional questionnaire.

The testing was acceptable, even enjoyable, to almost all of the children. Exercise testing for asthma is a straightforward diagnostic procedure that may be easily carried out in general practice to confirm clinical suspicions.

The predictive values of the features described underline once again the other presentations of childhood asthma. A decision to embark on a therapeutic trial of a bronchodilator in a symptomatic child who has a history of any one of these diagnostic clues would be clinically justifiable, and the presence of any combination of the clues (being more than 50% predictive) would seem to require such a trial.

Future studies of asthma in general practice should include not only children who are known to have asthma, but also those whose asthma is unrecognised who are identified by methods such as those described.

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Progress in Practice

Diabetes care: whose responsibility?

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An ad hoc group of interested general practitioners throughout Britain met recently in response to the joint report of the Royal College of Physicians and the British Diabetic Association, *The Provision of Medical Care for Adult Diabetic Patients in the United Kingdom 1984*. The report points out that the current services for diabetic patients are largely led by consultants and there are major deficiencies in services for diabetic care in areas within the United Kingdom.

We agree with this report that primary health care services play a vital part in the care of patients with diabetes. Interestingly, the Royal College of Physicians and the British Diabetic Association have proposed discussions with the Royal College of General Practitioners on the current development of services for diabetic care. We have suggested to all three organisations that to begin to improve the standard of primary health care of diabetic patients a register of general practitioners who are concerned with developing this work be compiled, possibly by a joint working party. We think that the formulation of a register is mandatory if a high standard of care is to be developed and maintained.

We have agreed that this care should include (1) surveillance of metabolic control; (2) monitoring complications; and (3) education of ourselves and our patients. In an attempt to fulfil these aims practices following up their diabetic patients should have (1) a method of identification of patients with an adequate recall system; (2) adequate structured records; (3) equipment, including (*a*) a patient register, (*b*) weighing scales, (*c*) eye charts, (*d*) sphygmomanometer, (*e*) ophthalmoscope, (*f*) equipment to test urine, (*g*) equipment to test the peripheral sensory nervous system, and (*h*) access to biochemical monitoring; (4) the following ancillary facilities: (*a*) access to foot care, (*b*) dietary advice, (*c*) patient education, (*d*) nursing care, (*e*) eye surveillance, and (*f*) specialist support; (5) access to educational support of staff; and (6) evaluation and periodic review of structure, aims, and achievements.

We hope that a register of interested practices will also help prospective studies in such areas as the economics and clinical effectiveness of practice based management schemes and the respective roles of shared care and miniclinic systems, as proposed by Home and Walford.[1]

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Multicultural medicine

Hooka—The hooka is a smoking apparatus: a flask half filled with water is connected through a pipe to an earthenware funnel containing tobacco paste, which is covered with a stone disc over which there are lighted coals; another pipe from the side of the flask above the water level is connected to a mouthpiece. As with the chestpiece of a stethoscope, this mouthpiece is never sterilised. One person inhales the smoke that originates from the tobacco paste filtered through the water through the mouthpiece, and then it is passed to the next person and so on among the family, relatives, and visitors, who sit around in a circle most evenings after dinner for a "pow-wow." This custom is popular not only in the Asian subcontinent but also with Arabs, Iranians, Chinese, and south east Asians. This was a sight familiar to British Army personnel when visiting these areas. This form of smoking is as dangerous as any other and its use should be elicited through direct questioning. The Sikh religion, however, forbids smoking, and to a devout Sikh this would be an offensive question. Therefore an indirect approach is more tactful.—BASHIR QURESHI, general practitioner, Hounslow, Middlesex.

Betel (pan) chewing—It is a unique Asian habit—an after dinner delicacy—enjoyed by a tenth of the world's population. Its ingredients have a great physiological value. After all, cultural habits are based on the so called scientific thinking of when they originated. The betel leaf is a source of vitamin C. The betal nut is an astringent. Limestone paste (calcium hydroxide) is a rich source of calcium and stimulates salivation. Catechu is not only an astringent but also a source of iron. Rose hips contain vitamin C and have a pleasant taste. Turmeric is used for colouring and silver foil is thought to be an aphrodisiac. Every betel seller will ask the customer whether he would like betel with or without tobacco. Most will choose tobacco. A few may choose to try additional "special ingredients," which may be hard drugs such as cocaine, LSD (lysergide), etc.

The results of recent studies have shown that oral cancers are more common in ethnic minority groups, and carcinoma of the cheek is most common among the betel chewing population.[1,2] Betel chewing may be responsible for this in two ways. Firstly, an unspecified amount of tobacco is kept against the inside of the cheek for long periods. This may affect the buccal mucosa directly. Secondly, limestone paste (calcium hydroxide), if not mixed sufficiently with water, has an abrasive action and can cause an ulcer which may become chronic and develop carcinogenic changes, resulting in cancer of the cheek.—BASHIR QURESHI, general practitioner, Hounslow, Middlesex.

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