Medical care of asthma and wheezing illness in children: a community survey

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SUMMARY A survey was carried out to investigate the medical care of asthma and wheezing illness in a school population. Children with current wheezing illness were identified by a screening questionnaire to the parents of 5100 children in one school cohort from all schools in an outer London borough. Of the 89% who responded, 11.1% reported wheezing within the past 12 months. Parents of a sample of 284 wheezy children aged about 9 were interviewed at home about their child’s illness and the related use of drugs and services. There was evidence of substantial underuse of services and this was not associated with social, family, or general practice factors. Considerable proportions of children were not having drug treatment, were receiving only non-antiasthmatic drugs, or were using antiasthmatic drugs incorrectly. The most important social and family factor associated with undertreatment was poor maternal mental health, and this factor appeared to explain the observed association of manual social class with undertreatment. Only about half of the most severe group were labelled as having “asthma,” and those with this label were more likely to be receiving treatment and using outpatient services. The results show that the potential of modern treatment to prevent disability due to wheezing illness is not being realised despite the existence of a free and accessible health service.

Little progress has been made in preventing the onset of the asthmatic tendency or in controlling factors that precipitate episodes. The prevention of disability and of life threatening episodes therefore relies mainly on the use of drugs. Since the mid 1960s the range and efficacy of antiasthmatic drugs has considerably improved. The treatment strategy has tended towards prevention by drugs, and in some quarters towards the objective of keeping the child as free from wheeze as possible.

It is uncertain whether these therapeutic advances have made a substantial impact on the problem of asthma at a community level. Of particular concern is the fact that mortality remains at the same level as in the period before the advances in treatment and that hospital admissions are rising steeply. There is evidence that asthma continues to be an important cause of morbidity and school absence (HR Anderson, J C Palmer, report to Southwest Thames Health Authority, 1981). All this raises questions about the distribution and quality of the ambulatory care of childhood asthma. We have therefore conducted a cross sectional survey of wheezy children living in the London Borough of Croydon in order to investigate the use of drugs and services by wheezy children in this community, and its association with social, family, health service, and illness factors. Preliminary findings relating to aspects of drug use over the previous month have been reported previously.

Methods

A population sample of children with current wheezing was obtained by sending a postal questionnaire to the parents of one school cohort, consisting of all children born between August 1969 and September 1970 and attending local authority or private schools in the London Borough of Croydon. The screening questions were: “has your child ever had asthma?” If no, “Has he or she ever had an episode of wheeziness in the chest?” If the reply was “yes” to either question, the number of episodes over the past 12 months was recorded.

From 4813 local authority and 295 private school children screened (total 5108) replies were received from 87%, of whom 11.1% reported wheezing illness in the past 12 months. The sample for home interview
of the parents was selected to include all of those with five or more episodes over the past 12 months (110), a 52% sample of those with fewer episodes (200), and 111 randomly selected non-wheezy children. Of this sample of 421, 376 (89%) were successfully interviewed. The interviews were conducted by two trained interviewers and took place from six to 12 months after the screening survey. The mean age at interview was 8.9 years (range 7.9 – 11.0, SD 0.47).

The interview obtained information about morbidity and school absence due to wheezing; use of the general practitioner, school health, and hospital services; and use of prescribed and non-prescribed drugs for wheezing and other illnesses. Drugs in current use were inspected by the interviewer and reports of general practitioner (GP) and hospital outpatients (OP) attendance were checked among a subsample. Throughout the interview the illness was referred to in terms of “wheeze” not “asthma,” and in this paper we shall refer to “wheezy” children and “wheezing illness.” Socioeconomic data obtained included parents’ birth places, education, occupation, and hours of employment; mother’s physical and mental health, marital status, and ethnic group (by observation); tenure; crowding; number and ages of other children in the household; and use of a car or telephone. General practice factors elicited were: distance from the practice, number of doctors in the practice, and presence or otherwise of an appointment system.

In examining the effects of various factors on medical care it was necessary to control for the level of morbidity. As an indicator of long term morbidity from asthma, the number of days of school absence due to wheezing reported in the past year was used. This had the advantages of being easy to categorise, cumulative, of intrinsic importance, and of correlating well with all other indicators of both long and short term morbidity (HR Anderson, JC Palmer, report to S W Thames Regional Health Authority, 1981). For indicating short term morbidity, the report of wheeze symptom and restriction of activity over the month before interview was used. For categorical data, the significance of associations was tested using the chi-square test. Some were subjected to multifactorial analysis to examine the effect of a particular factor on drug use while adjusting for the effect of another factor. This was done by fitting a two factor logistic model to the proportion using drugs.6

### Results

**USE OF SERVICES**

Table 1 shows the use of services for wheezing illness and their association with school absence due to wheezing. Service use increased with increasing levels of severity though a minority (10%) of those with the most severe grade of illness (31 or more days’ school absence in the previous year) reported no contact with a GP or outpatient doctor. Of the 10% reporting more than four surgery visits, 58% had seen the same doctor on each occasion. The great majority of visits to the GP’s surgery at which the GP was not seen were for repeat prescriptions. The report of GP use over the past year was checked in 41 subjects and the agreement with GP records was 80%.

The proportion reporting outpatient attendance rose from 3% in the mildest to 32% in the most severe

### Table 1 Use of services for wheezing illness, by school absence due to wheezing

<table>
<thead>
<tr>
<th>Use of services for wheezing illness</th>
<th>Days school absence in past year</th>
<th>Total* (adjusted)†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None (n=94)</td>
<td>1-10 (n=94)</td>
</tr>
<tr>
<td>GP surgery visit, past year</td>
<td>17 %</td>
<td>50 %</td>
</tr>
<tr>
<td>&gt;4 surgery visits, past year</td>
<td>3 %</td>
<td>4 %</td>
</tr>
<tr>
<td>GP home visit, past year</td>
<td>1 %</td>
<td>12 %</td>
</tr>
<tr>
<td>All GP contact, past year</td>
<td>17 %</td>
<td>54 %</td>
</tr>
<tr>
<td>Surgery visit without GP contact, ever</td>
<td>15 %</td>
<td>30 %</td>
</tr>
<tr>
<td>OP visit ever</td>
<td>11 %</td>
<td>31 %</td>
</tr>
<tr>
<td>OP visit, past year</td>
<td>3 %</td>
<td>7 %</td>
</tr>
<tr>
<td>&gt;4 OP visits, past year</td>
<td>0 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Current OP appointment</td>
<td>2 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Any GP or OP contact, past year</td>
<td>19 %</td>
<td>56 %</td>
</tr>
<tr>
<td>Casualty attendance, without admission, past 3 years</td>
<td>1 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Hospital admission, past 3 years</td>
<td>0 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Communication with school health service, past year</td>
<td>6 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Use of chemist for advice or non-prescribed medicines</td>
<td>44 %</td>
<td>40 %</td>
</tr>
</tbody>
</table>

*Includes seven with no information about the number of days of school absence.
†Adjusted for sampling fraction to give prevalence among total sample of wheezy children.
OP = Outpatients.
group. Over the previous three years 4% had attended casualty but had not been admitted, and 5% had been admitted to hospital at least once; for the most severe group these proportions were 15% and 22% respectively. About one third (37%) of the most recent admissions had resulted from self presentation to hospital. Of the most recent casualty attendances (without admission), 91% had presented as a result of their own decision, though 38% of these had seen the GP earlier in that episode. For those attending the two main district hospitals in the area, hospital attendance was confirmed. It was noted, however, that outpatient diagnoses were sometimes of eczema or ear, nose, and throat problems rather than of wheezing illness or asthma.

The use of special tests or treatments tended to be more frequent among the most severe cases (table 2). Although the use of lung function tests increased with severity, only 32% of the most severe cases had ever had a test, and lung function testing by the GP was rare.

Wheezy children were similar to controls in their use of all main services (GP, casualty, outpatients, inpatients) for reasons apart from wheezing illness. All families in this survey were registered with a GP. Those who lived more than one mile away from the surgery were more likely to have had a home visit (p<0.05) but apart from this, no other characteristic of the practice was associated with any type of service use.

**USE OF DRUGS**

In the three months before interview 37% of wheezy children had taken at least one drug for wheezing illness (table 3). Nevertheless, the proportion was considerably less (26%) for drugs with antiasthmatic pharmacological properties. Most non-antiasthmatic drugs were decongestants and cough remedies (5%), antihistamines (6%), and antibiotics (9%). Most (88%) of the bronchodilators in use were of the adrenergic type and about half (45%) were being administered by inhalation. Use of more than two different bronchodilator preparations was reported by 7% of bronchodilator users. The pattern of use of antiasthmatic drugs over the 14 days before interview varied with the type of drug. For sodium cromoglycate or inhaled steroids, 79% had been taken on more than 10 days and 87% on more than

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**Table 2** Special investigations and treatments received by wheezy children, by school absence due to wheezing illness

<table>
<thead>
<tr>
<th>Test or treatment</th>
<th>None (n=94)</th>
<th>1-10 (n=94)</th>
<th>11-30 (n=48)</th>
<th>&gt;=31 (n=41)</th>
<th>Total (adjusted) (n=284)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung function test, ever</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Lung function test by GP, past year</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise test, ever</td>
<td>6</td>
<td>9</td>
<td>17</td>
<td>32</td>
<td>11</td>
</tr>
<tr>
<td>Chest x ray, ever*</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Skin testing, ever</td>
<td>22</td>
<td>32</td>
<td>56</td>
<td>56</td>
<td>35</td>
</tr>
<tr>
<td>Blood test, ever†</td>
<td>39</td>
<td>46</td>
<td>52</td>
<td>51</td>
<td>45</td>
</tr>
<tr>
<td>Physiotherapy, ever</td>
<td>2</td>
<td>9</td>
<td>15</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>Desensitisation</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

*Proportion reported by the control group was 9% (n=92).
†Proportion reported by the control group was 33% (n=92).

**Table 3** Percentage of children using drugs for wheezing illness over a three month period, by school absence

<table>
<thead>
<tr>
<th>Class of drug</th>
<th>None (n=94)</th>
<th>1-10 (n=94)</th>
<th>11-30 (n=48)</th>
<th>&gt;=31 (n=41)</th>
<th>Total (adjusted) (n=284)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchodilator</td>
<td>7</td>
<td>23</td>
<td>35</td>
<td>51</td>
<td>21</td>
</tr>
<tr>
<td>Preventive:</td>
<td>9</td>
<td>17</td>
<td>29</td>
<td>41</td>
<td>16</td>
</tr>
<tr>
<td>Cromoglycate</td>
<td>(9)</td>
<td>(17)</td>
<td>(29)</td>
<td>(37)</td>
<td>16</td>
</tr>
<tr>
<td>Inhaled steroids</td>
<td>(0)</td>
<td>(0)</td>
<td>(4)</td>
<td>(15)</td>
<td>2</td>
</tr>
<tr>
<td>All antiasthmatic</td>
<td>13</td>
<td>30</td>
<td>42</td>
<td>56</td>
<td>26</td>
</tr>
<tr>
<td>Non-antiasthmatic drugs only treatment</td>
<td>5</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>All drugs taken for wheezing illness</td>
<td>18</td>
<td>43</td>
<td>55</td>
<td>68</td>
<td>37</td>
</tr>
</tbody>
</table>

*Includes seven with no information about days of school absence. Adjusted for sampling fraction to give estimate for total sample of wheezing children.
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five days. A converse pattern was seen for bronchodilator drugs of which 24% had been taken on more than 10 days and 33% on more than five days. Use of non-antiasthmatic drugs followed the latter pattern.

The parents were asked whether, if the child were to suffer an attack they would treat it straight away, or “wait and see” what happened before deciding. Overall, 47% said that they would treat straight away, 45% said that they would wait and see, and 7% were unable to answer. Parents of those with the most school absence were more likely to “wait and see” (61%) than those with no school absence (26%).

Table 3 indicates that some children with considerable degrees of morbidity were not being treated, but because the time periods of school absence and drug use in this table do not correspond, more precise judgments cannot be made. The impression of undertreatment is confirmed, however, when drug treatment and morbidity over the month before interview are considered (table 4). Just over half of those with wheeze symptom reported using antiasthmatic drugs, and the proportions rose slightly to 62% in those with restricted activities and 59% in those who had needed to stay in bed.

Of 124 children reported to have exercise induced wheezing, only 24 (19%) had ever taken a drug beforehand to prevent this. Prevention of exercise induced wheezing was not affected by whether there was interference with sporting activities or physical education. Of those with more than two weeks' school absence, 25% reported that the schools had ever administered medicines at school; on the other hand, 7% reported that the schools had refused to do so when asked.

Over the previous three months, 23% of wheezy children had also used drugs for reasons apart from wheezing illness; this was higher than reported by controls (17%). The most prominent differences were observed for drugs acting on the respiratory system (wheezy children 35%, controls 21%), antiallergic drugs (wheezy children 7%, controls 1%), and drugs acting on the central nervous system—mainly analgesics—(wheezy children 51%, controls 36%). No differences were observed for drugs used for upper respiratory, skin, or alimentary problems, or for antibiotics or nutritional preparations.

The use of antiasthmatic drugs in the past three months was strongly associated with a history of service contact and this effect remained significant for outpatient but not GP contact after controlling for the degree of school absence (table 5). Treatment over the past month was also associated with GP or outpatient attendance and both remained significant after controlling for morbidity (wheeze symptom, restriction of activity). Drug treatment was not associated with any of the general practice characteristics elicited.

**Socioeconomic and Family Factors**

Socioeconomic and family factors were not associated with any indicator of service use or with any general practice characteristics. The use of antiasthmatic drugs, however, was significantly less frequent in children whose mothers had been treated by a doctor for nerves or depression (p<0.01) or whose fathers were in a manual occupation (p<0.05). The increased use of preventive medicines was positively associated with the duration of the mother’s education (p<0.05). These associations were present for all three recall periods (two weeks, one month, and three months). Controlling for morbidity removed the effect of social class on drug use, indicating that the social class effect may have been a reflection of differential morbidity. In contrast, the effects of the mother's mental health and duration of education on drug use remained significant after controlling for morbidity.

These three factors, father’s social class, mother’s mental health, and mother’s duration of education were all associated with one another (p<0.01). Using a two factor logistic analysis, the effect of social class

<table>
<thead>
<tr>
<th>Morbidity from asthma or wheezing</th>
<th>Antiasthmatic</th>
<th>Preventive</th>
<th>Non-antiasthmatic only</th>
<th>All drugs for wheezing illness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Episodes of wheezing</td>
<td>71</td>
<td>52</td>
<td>35</td>
<td>18</td>
</tr>
<tr>
<td>No episodes but wheezing reported</td>
<td>31</td>
<td>58</td>
<td>42</td>
<td>10</td>
</tr>
<tr>
<td>All with wheezing</td>
<td>102</td>
<td>54</td>
<td>37</td>
<td>16</td>
</tr>
<tr>
<td>Woken at night</td>
<td>41</td>
<td>71</td>
<td>44</td>
<td>10</td>
</tr>
<tr>
<td>Episodes sufficient to impair speaking</td>
<td>13</td>
<td>85</td>
<td>31</td>
<td>8</td>
</tr>
<tr>
<td>Activities restricted</td>
<td>45</td>
<td>62</td>
<td>44</td>
<td>18</td>
</tr>
<tr>
<td>At least one day in bed</td>
<td>29</td>
<td>59</td>
<td>34</td>
<td>24</td>
</tr>
<tr>
<td>No wheeze reported</td>
<td>182</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4 Percentage of children using drugs for wheezing illness over a four week period, by symptoms and disability.
on drug treatment over the past month was found to be non-significant after adjusting for the mother’s mental health and the mother’s education. In contrast, the effects of the mother’s mental health on treatment remained significant after adjusting for social class (p<0.01) and the level of her education (p<0.05, preventive drugs only). The effect of the mother’s education on the use of preventive drugs remained significant after adjusting for her mental health (p<0.05), but not after adjusting for social class. It can be concluded that social class and education are so closely related that their effects are difficult to distinguish. The mother’s mental health, however, is clearly a separate influence, not explained by either social class or education. Social and family factors were not associated with the prevention of exercise induced wheezing.

ILLNESS LABEL
Those children described in the screening questionnaire as having “asthma” tended to be more severe (table 6). Nevertheless, of those who had lost more than six weeks of school in the past year, only 50% were referred to as having “asthma.” After controlling for severity, the illness label asthma remained strongly associated with the use of outpatients, but not with use of the GP or any of the practice characteristics. At each level of severity, the illness label asthma was associated with a much greater use of antiasthmatic drugs over the past three months. Conversely, it was associated with a lesser use of non-antiasthmatic drugs and of a pharmacy for advice or purchase of non-prescribed medicines. Use of the label showed a similar effect on antiasthmatic treatment over the past month which remained

Table 5 Effect of service contact on treatment with antiasthmatic drugs in past three months, controlling for school absence

<table>
<thead>
<tr>
<th>Days school absence in past year</th>
<th>None</th>
<th>1–10</th>
<th>11–30</th>
<th>&gt;31</th>
<th>Total†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GP contact, past year:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>16 (25)</td>
<td>51 (33)</td>
<td>40 (45)</td>
<td>35 (57)</td>
<td>145 (41)</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>78 (10)</td>
<td>43 (26)</td>
<td>8 (25)</td>
<td>6 (30)</td>
<td>139 (18)</td>
</tr>
<tr>
<td><strong>OP contact, past year:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>3 (67)</td>
<td>7 (71)</td>
<td>9 (100)</td>
<td>13 (92)</td>
<td>33 (85)</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>91 (11)</td>
<td>87 (26)</td>
<td>39 (28)</td>
<td>28 (39)</td>
<td>251 (22)</td>
</tr>
<tr>
<td><strong>OP contact, ever:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>10 (50)</td>
<td>29 (48)</td>
<td>20 (75)</td>
<td>18 (78)</td>
<td>83 (60)</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>84 (8)</td>
<td>65 (22)</td>
<td>28 (18)</td>
<td>23 (39)</td>
<td>201 (17)</td>
</tr>
</tbody>
</table>

*p<0.001. Service contact versus non-service contact, combining χ².
†Includes seven with no information about school absence.
OP = Outpatients.

Table 6 Percentage of children using various services and drugs for wheezing illness, by school absence and illness label

<table>
<thead>
<tr>
<th>Use of services and drugs for wheezing illness</th>
<th>None</th>
<th>1–10</th>
<th>11–30</th>
<th>&gt;31</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GP surgery visit, past year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>30</td>
<td>47</td>
<td>52</td>
<td>78</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>14</td>
<td>52</td>
<td>52</td>
<td>78</td>
</tr>
<tr>
<td><strong>OP visit, ever</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>30</td>
<td>4</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>4</td>
<td>52</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td><strong>OP visit, past year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>15</td>
<td>0</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>5</td>
<td>52</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td><strong>Antihistaminic drugs, past three months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>40</td>
<td>66</td>
<td>44</td>
<td>30</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>6</td>
<td>11</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td><strong>Preventive drugs, non-antiasthmatic only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>25</td>
<td>4</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>5</td>
<td>52</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td><strong>Has sought medicine or advice from chemist, ever</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (% treated)</td>
<td>35</td>
<td>50</td>
<td>48</td>
<td>30</td>
</tr>
<tr>
<td>No (% treated)</td>
<td>44</td>
<td>50</td>
<td>48</td>
<td>30</td>
</tr>
</tbody>
</table>

*p<0.001, asthma v wheeze, controlling for school absence.
A = “Asthma”.
W = “Wheeze”.
OP = Outpatient.
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highly significant (p<0.001) after adjusting for the level of morbidity and service contact.

The only socioeconomic and family factor associated with the asthma label was poor mental health of the mother (negative association p<0.05), but the effect of the label on drug treatment in the past month remained highly significant (p<0.001) after controlling for this factor.

Discussion
The screening questionnaire was sufficiently sensitive to identify most children with wheezing illness. In view also of the good response and the inclusion of both local authority and private schools the results are likely to be a good reflection of the situation in Croydon, if not elsewhere. No simple or valid method is available for identifying and assessing wheezing illness on a community basis using lung function tests. At the outset, therefore, it was decided to use the symptom of wheezing to identify and assess these children since this is the cardinal manifestation of asthma, and there is good evidence to suggest that the essential pathophysiological basis of wheezing is similar whether it is mild or severe, or diagnosed as asthma. Furthermore, it is mainly this symptom and its attendant disability that is complained of by patients and treated by most doctors.

Because of its cross sectional nature, this study lacked the capacity to demonstrate that one type of care was better than another in outcome terms. Interpretation therefore requires that judgments be made about the appropriateness of care in relation to the needs of the patient. This is particularly difficult with wheezing illness, which tends to have a fluctuating course and variable response to treatment. Thus in a patient under treatment the presence of morbidity reflects both the need for, and outcome of, care. To look at the results from an evaluative standpoint, it is simplest to categorise these children into one of four groups, according to the presence or absence of morbidity and according to whether or not medical care is being received.

Morbidity present, treatment absent—This group is easy to identify and depending on the level of morbidity judged to require treatment, can most easily be judged to be in a state of need. While opinions might vary as to whether mild symptoms of wheeze need to be treated, there would be little argument about the need for treatment in the 40% whose activities were restricted but who had received no antiasthmatic treatment over the past month. Similarly, it might be judged that the loss of six weeks' schooling indicated a level of severity that required specialist referral or a lung function test, or that an attempt should have been made to prevent exercise induced asthma.

Morbidity present, treatment received—Here, one evaluative approach might be to use unfavourable outcomes to indicate inadequate care. The difficulty with this is that we do not know at what level of outcome this judgment would be justified. The presence of severe morbidity might reflect the severity of illness despite good treatment, or the inadequate treatment of potentially controllable disease. Most clinicians with whom we have discussed these results regard the loss of more than six weeks' school a year as potentially avoidable with good care. An alternative approach would be to examine the process of care but the problem with this is that standards of process by which judgments might be made have not been agreed. We were, nevertheless, able to identify some clear deficiencies. These included the use of non-antiasthmatic drugs as the only treatment for wheezing, the use of antiasthmatic drugs in inappropriate combinations and dosages, the lack of coordination or cooperation with schools, and the high use of pharmacies.

Morbidity absent, treatment received—This group is difficult to evaluate because symptoms might be absent either because of preventive treatment or because the disease happens to be in natural remission. The point at which preventive treatment should be stopped, in the absence of morbidity, is not well defined.

Morbidity absent, treatment absent—This last category, those who have no morbidity and are not receiving care, is not important, at least so far as immediate management is concerned.

Little or no evidence was found to suggest that undertreatment was due to lack of access or availability of services or drugs. All families in this survey were registered with a GP, most lived reasonably close to the surgery, and most, more frequently those with severe symptoms, had attended the GP in the past year for wheezing or other problems. All service use and drugs are free of charge for this age group. The characteristics of the general practice did not affect use. Social and family factors did not affect GP or hospital use, indicating that social inequalities of access, the subject of much recent concern, are not relevant to the care of this disease in children in this area. The use of outpatients, was, after controlling for morbidity and illness label, associated with greater drug use. Since outpatient use was not associated with socioeconomic or family factors, it is more likely that this is an effect of outpatient care itself. This gives an indication of what might be achieved in general practice, since the same drugs are available on prescription in either context.

Since the data obtained in this study were obtained by interviewing patients, it is not easy to identify the extent to which therapeutic inadequacies lay with the
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