

# Use of a postal questionnaire to estimate the likely under-diagnosis of asthma-like illness in adults

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## SUMMARY

**Background.** Asthma is thought to be under-diagnosed.

**Aim.** To estimate how many adults in two practices may have unknown asthma-like illness.

**Method.** Results from a postal respiratory questionnaire, sent to 11 206 adults registered with two practices, were linked with practice records to identify patients who may have unknown asthma-like illness.

**Results.** The questionnaire replies were almost identical in both practices; 30.4% of respondents [95% confidence interval (CI) 29.4–31.4] reported wheezing and 14.1% (95% CI 13.3–14.9) had been woken by breathlessness during the previous year. Using a simple scoring system, 1112 (13.8%) of the respondents were judged possibly to have asthma-like illness; 529 (6.6%) had not previously been diagnosed as having asthma and had not received asthma treatments.

**Conclusion.** The frequency of asthma-like symptoms was high. A large proportion of adults in the practices may have an unknown asthma-like illness which warrants further evaluation.

**Keywords:** asthma; under-diagnosis; respiratory questionnaire.

## Introduction

THE prevalence of asthma appears to be increasing.<sup>1-5</sup> However, many patients with asthma may still be unknown to the medical services.<sup>6,7</sup> Not only does this deny patients effective treatments that can improve asthma-associated morbidity and mortality, it also causes problems when trying to allocate appropriate resources. Although several studies have estimated the prevalence of respiratory symptoms in adults,<sup>2,8,9</sup> none have linked their findings with the respondents' medical records. We report here a study that was able to link these two pieces of information in order to obtain an estimate of the number of adults, in two practices in Manchester, who may have currently unknown asthma-like illness and who would warrant further evaluation.

## Method

In May 1993, a postal questionnaire (see Appendix 1) was sent to all patients aged 16 years and over registered with two general

practices on the same housing estate in south Manchester. A similar number of adult patients were available in each practice (5735 and 5471, respectively) with a similar sex distribution. Most of the patients were of lower social class. Practice I had a slightly more elderly population, with 22.8% of patients being aged over 64 years compared with 16.4% in Practice II. Both practices are within 2 miles of Manchester International Airport and are bordered by two motorways. Each employs practice nurses trained in asthma care. The questionnaire included the European Community Respiratory Health Questionnaire,<sup>10</sup> and questions about family history of asthma and current smoking habits. Almost all of the responses consisted of yes/no answers. For the purpose of this study, patients were deemed to possibly have an asthma-like illness if they replied 'yes' to four or more of the following: wheezing, waking with tightness in chest, waking with breathlessness, waking with cough (all in the previous year), family history of asthma, personal history of hay fever or eczema. The practice records of these patients were then examined to determine whether they contained any mention of ever being diagnosed as having asthma or of receiving a prescription for asthma medication in the previous year. Patients without such corroborative evidence were regarded as having an unknown asthma-like illness which warrants further evaluation.

Non-responders were sent reminders 4 and 8 weeks after the first mailing. Patients who had still not responded included those no longer living at the address ('ghosts') and those still at the mailing address who failed to reply ('true non-responders'). The number of 'ghost' patients was estimated by identifying, from a 5% random sample all non-responders, those who were neither on the 1993 Electoral Register, nor in the telephone directory, and who had not consulted the practice during 1993. In order to establish if true non-responders were materially different from responders, a random 5% sample from both groups was compared with respect to their age, gender, practice record of asthma diagnosis or treatment for asthma, number of respiratory-related consultations and total number of consultations in 1993.

The 95% confidence intervals (CI) for proportions and differences between proportions were estimated using the Confidence Interval Analysis Program.<sup>11</sup> Trend tests were calculated using the Mantel-Haenszel test for linear association (SPSS/PC).<sup>12</sup>

## Results

The response rates were similar in both practices; the combined unadjusted rate was 72.2%, and after adjustment for 'ghost' patients, this rose to 76.3%. Moreover, the replies both to individual questions and various combinations of symptoms were also very similar; hence, our presentation of combined results from both practices. Almost one-third (30.4%) of respondents reported that they had wheezed during the previous 12 months, and a similar proportion had been woken by cough (31.0%) (Table 1). Of those who wheezed, 66.3% (95% CI 63.6–69.0) said that they had been breathless when they wheezed and 75.9% (95% CI 73.4–78.3) experienced wheezing in the absence of a cold. Approximately one-fifth (21.5%) of patients had been woken by tightness in the chest and 14.1% by shortness of breath. The prevalence of wheezing and being woken by short-

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**Table 1.** Proportion of people with respiratory symptoms by age.

	Total percentage (n = 8065)* (95% CI)	Age (years)					Trend test P-value
		16-24 (n = 1240)	25-34 (n = 1601)	35-44 (n = 1348)	45-64 (n = 1968)	65 + (n = 1908)	
Wheezing†	30.4 (29.4-31.4)	29.3	25.3	31.0	30.4	35.0	< 0.0001
Woken with tightness in chest†	21.5 (20.6-22.4)	19.7	20.1	23.5	22.8	21.1	0.13
Woken by shortness of breath†	14.1 (13.4-14.9)	10.2	10.9	13.3	16.0	18.0	< 0.0001
Woken by cough†	31.0 (29.9-32.0)	28.8	31.3	32.3	32.3	29.8	0.59
Family history of asthma	39.4 (38.3-40.5)	48.6	47.4	49.0	37.1	22.0	< 0.0001
History of hay fever and eczema	23.0 (22.0-23.9)	31.1	27.9	25.2	20.2	14.7	< 0.0001
None of the above questions	32.8 (31.8-33.9)	28.5	27.3	27.0	33.7	43.9	
Asthma attack†	8.2 (7.6-8.8)	8.4	6.2	7.4	9.0	9.5	< 0.01
Current medication for asthma	12.1 (11.4-12.9)	11.9	9.3	8.7	12.4	16.9	< 0.0001

CI = Confidence Interval.

\*These figures refer to the total number of responders. As there were minor variations in the number of respondents to individual questions percentages refer to these actual numbers.

†In the last 12 months.

ness of breath tended to increase with age. More than 8% of respondents reported that they had suffered from an attack of asthma in the previous year, and 12.1% said they were currently receiving medication for asthma. Older respondents were more likely to report having an asthma attack in the past year and to have been receiving asthma medication. However, they were less likely to have a family history of asthma or a history of atopic disease.

Women were more likely to have been woken by cough than men (35.2 versus 25.7%; difference 9.5%; 95% CI 7.5-11.5), and to give a history of eczema or hay fever (25.6 versus 19.7%; difference 5.9%; 95% CI 4.1-7.7). There were no other important gender differences to individual questions.

Smokers reported a higher prevalence of all the respiratory symptoms than non-smokers, with a clear dose gradient. For example, 24.6% of non-smokers, 36.4% of those smoking 1-15

cigarettes daily, and 44.2% of those smoking more than this amount had wheezed in the previous year (trend test  $P < 0.0001$ ).

According to our definition, 1112 subjects (13.8% of all respondents; 95% CI 13.0-14.5) had asthma-like illness (Table 2). It was similar in the different age groups, but greater in women and smokers. After examining the practice records, 529 (6.6% of all respondents; 95% CI 6.0-7.1) were unknown to the medical services. This is likely to be the maximum level of under-diagnosis, as some patients will not be thought to be asthmatic when reviewed. However, breathlessness when wheezing or wheezing in the absence of a cold may indicate more severe respiratory illness, and possibly, a greater chance of being diagnosed asthmatic at review. There were 420 subjects (5.7% of all respondents; 95% CI 4.7-5.7) who were not currently known to the medical services but who had an asthma-like illness which included these more severe respiratory symptoms.

**Table 2.** Number of respondents in the practices with asthma like illness and no corroborative evidence in the notes by age, gender and smoking habits.

	Respondents with asthma-like illness*		Respondents without corroborative evidence of asthma†	
	Number	Percentage (95% CI)	Number	Percentage (95% CI)
Age (years):				
16-24	191	15.4 (13.4-17.4)	79	6.4 (5.1-7.9)
25-34	208	13.0 (11.3-14.6)	122	7.6 (6.4-9.0)
35-44	204	15.1 (13.2-17.0)	112	8.3 (6.9-9.9)
45-64	271	13.8 (12.2-15.3)	118	6.0 (5.0-7.1)
65 +	238	12.5 (11.0-14.0)	98	5.1 (4.2-6.2)
Test for trend		$P = 0.24$		$P = 0.08$
Gender:				
Female	681	18.9 (17.6-20.2)	318	8.8 (7.9-9.8)
Male	431	9.7 (8.8-10.5)	211	4.7 (4.1-5.4)
Daily cigarette consumption:				
0	587	11.7 (10.8-12.6)	233	4.6 (4.1-5.2)
1-15	251	16.2 (14.3-18.0)	129	8.3 (7.0-9.8)
16 +	266	18.7 (16.7-20.7)	164	11.5 (9.9-13.2)
Test for trend		$P < 0.0001$		$P < 0.0001$
All patients	1112	13.8 (13.0-14.5)	529	6.6 (6.0-7.1)

\* Patients who said yes to four or more questions about wheezing, waking with tightness in chest, waking with breathlessness, waking with cough (all in the previous year), family history of asthma and personal history of hay fever or eczema.

† Corroborative evidence taken to be any mention of every being diagnosed as asthmatic or receiving a prescription for asthma treatment in the previous 12 months in the patient's records.

Compared with those who replied, non-responders were younger and less likely to have consulted during 1993 than respondents, but similar in all other parameters assessed. Differences between responders and non-responders were similar in the two practices.

### Discussion

A notable finding in our study was the consistency of results between the two practices. In both populations, the prevalence of asthma-like symptoms was high, greater than those reported previously. For example, in a postal survey of 9000 individuals aged 18–84 years identified from the Electoral Register in Western Australia,<sup>2</sup> 24.2% (95% CI 23.0–25.4) of respondents reported wheezing in the previous year. A survey of 15 000 patients aged 20–44 years identified from the Electoral Register in East Anglia,<sup>9</sup> found that 25.4% (95% CI 24.6–28.3) had wheezed in the past year, compared with 28.3% (95% CI 26.8–29.7%) of similarly aged subjects in our study. In the East Anglian study, 8.1% (95% CI 7.5–9.6) of respondents reported being woken by breathlessness compared with 11.6% (95% CI 10.6–12.7) in our study. This observation is particularly noteworthy because other work has shown that being woken by shortness of breath correlates well with bronchial hyper-reactivity to histamine,<sup>13</sup> a phenomenon which is accepted to be associated with clinically diagnosed asthma. In our study, a larger proportion of patients aged 20–44 years stated they were currently using asthma medication (9.2%; 95% CI 8.4–10.1) than in the East Anglian survey (6.4%; 95% CI 6.1–7.1).

There are a number of possible explanations for these observations, including differences in populations examined (e.g. social class, gender and smoking habits), as well as geographic and environmental factors. There may also have been temporal changes in the prevalence of symptoms, as the surveys were carried out several years apart.

Using our arbitrary definition, over 13% of adults in the practices had asthma-like illness. The higher prevalence in women is supported by data from the recent Fourth National Morbidity Survey.<sup>3</sup> A positive relationship between cigarette smoking and a clinical diagnosis of asthma has also been reported before.<sup>14–16</sup> Up to half of these patients appeared to be unknown to the practices. Part of the discrepancy may be caused by incomplete practice records, although both practices had been fully computerized for several years at the time of the survey, with illnesses and prescriptions being recorded during normal consultations; also, some patients may have been given alternative diagnoses, such as chronic obstructive airways disease, when reviewed. Therefore, our results can only indicate the maximum number of patients with asthma-like illness that were unknown to the practices. Careful clinical review of each of these patients is needed to determine their asthma status. In these two populations, this would entail examining 529 subjects (6.6% of respondents). This is obviously a major undertaking with important resource implications. An alternative might be to examine only those patients who also had an extra marker of severity; for example, those who were breathless when they wheezed or who had wheezed even in the absence of a cold. Even using these more strict criteria, the number requiring to be screened was substantial — 420 patients (5.7% of all respondents).

It is important to recognize that our results are derived from two practices in south Manchester and may not be representative of other areas. Further work must be carried out in order to determine whether the same high prevalence of symptoms and potentially large number of patients with asthma-like illness unknown to the medical services exist elsewhere.

### Appendix 1. Questionnaire for adults.

Please tick *each* question

- |   |                 |
|---|-----------------|
| 1. What is your date of birth?  | ____/____/____  |
| 2. Are you:   | MALE _ FEMALE _ |
| 3. Have you had wheezing or whistling in your chest at any time <i>in the last 12 months?</i>             | NO _ YES _      |
| IF 'NO', GO TO QUESTION 4, IF 'YES':  |                 |
| 3.1 Have you been at all breathless when the wheezing noise was present?                                  | NO _ YES _      |
| 3.2 Have you had this wheezing or whistling when you did not have a cold?                                 | NO _ YES _      |
| 4. Have you woken up with a feeling of tightness in your chest <i>in the last 12 months?</i>              | NO _ YES _      |
| 5. Have you been woken by an attack of shortness of breath at any time <i>in the last 12 months?</i>      | NO _ YES _      |
| 6. Have you been woken by an attack of coughing at any time <i>in the last 12 months?</i>                 | NO _ YES _      |
| 7. Have you had an attack of asthma <i>in the last 12 months?</i>   | NO _ YES _      |
| 8. Are you currently taking any medicine (including inhalers, aerosols or tables) for asthma?             | NO _ YES _      |
| 9. Has any person in your family (parents, grandparents, sisters, brothers, or your children) had asthma? | NO _ YES _      |
| 10. Have you ever had hay fever or eczema?  | NO _ YES _      |
| 11. How many cigarettes do you smoke each day?  | _____ per day   |

THANK YOU FOR YOUR HELP

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