

# The Impact of Respiratory Symptoms on Healthcare Utilisation The Primary and Secondary Care Interface

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## ABSTRACT

**Background** There is evidence that the prevalence of asthma is increasing but little is known about the contribution made by respiratory illness to the combined workload of primary and secondary healthcare.

**Aim:** To examine the relationship between self-reported respiratory symptoms in adults and health care utilisation.

**Methods** Two general practice populations received a postal questionnaire regarding respiratory symptoms in 1993. A random sample of 736 adult respondents was stratified according to number of positive responses to six key questions (to indicate likelihood of asthma diagnosis). Their records were searched for utilisation of healthcare services, to include both primary and secondary sectors.

**Results** Positive responses to the key questions were associated with increased relative risk of having a GP consultation, home visit investigation and prescription issued for lower respiratory problems. Those with higher numbers of positive responses had increased relative risk of out-patient or A & E attendance as well as in-patient admission.

**Conclusion:** The principal finding of this study is that respiratory symptoms are significantly positively associated with utilisation of health care services for lower and upper respiratory problems. This study provides quantitative evidence of the interface between primary and secondary care in two general practice populations. It provides a method for predicting health care utilisation in both primary and secondary sectors based on reported respiratory symptoms.

**Key word** : Adults, Cost, Utilisation, Asthma, Primary care, Secondary care

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Date Submitted: 21/02/00  
Date Accepted: 30/08/00

*Prim. Care Respir*  
2001 **10**(3) 461-6

## Introduction

There is evidence for increased prevalence and change in the natural history of respiratory symptoms.<sup>1</sup> The possible impact of this on the healthcare system is poorly understood. Respiratory illness is a common reason for consultation<sup>3</sup> and the chronicity and level of symptoms means that most patient care occurs within the primary care sector.<sup>2</sup> However, in order to assess the total impact of a particular condition on health service utilisation, both primary and secondary care need to be considered. Accurate health service planning and resource management will only be possible when these factors are taken into account together with others such as the socio-economic status of the population served,<sup>4</sup> disease prevalence and severity and availability of services.

This study examines the hypothesis that self-reported respiratory symptoms are related to use of both primary and secondary services and aims to quantify these relationships for various categories of healthcare utilisation. An important feature of the method is its ability to examine over various levels of symptom including those who are symptom-free. It forms part of the Wythenshawe Community Asthma Project (WYCAP), a long-term prospective study into the natural history of respiratory symptoms in South Manchester.

## Method

A postal questionnaire was sent in 1993 to all patients (1206) over the age of 16 years registered with two general practices in South Manchester.<sup>6</sup> The questions were based on the European Community Respiratory Health Questionnaire<sup>7</sup> with additional questions concerning history of hayfever and/or eczema, smoking and history of asthma in first degree relatives. Up to two reminders were sent at four and

six weeks. A total of 8065 completed questionnaires were returned (response rate of 72%). The likelihood of a patient having asthma was assessed according to the number of positive responses to six key questions:

- 1 Have you had wheezing or whistling in your chest at any time in the last twelve months
- 2 Have you woken up with a feeling of tightness in your chest in the last twelve months
- 3 Have you been woken by an attack of shortness of breath at any time in the last twelve months
- 4 Have you been woken at any time by an attack of coughing in the last twelve months
- 5 Has any person in your family (parents, grandparents, sisters, brothers, or your children) had asthma
- 6 Have you ever had hayfever or eczema

Respondents were stratified into four groups: those giving no positive responses to the key questions; those with one to three; four; and five to six positive responses. A diagnosis of asthma is considered likely in those respondents with four or more positive answers to the key respiratory questions. Two hundred patients from each group were randomly selected to enable a stratified analysis.

The selected patients' practice records were searched by a research assistant and a general practitioner for medical service utilisation over two years (1/5/93 to 4/4/95). The data included: general practice consultations, home visits, prescribed medications, investigations, attendance at hospital out-patients, and in-patient admissions. The local hospital Accident and Emergency (A&E) Department records were also searched for visits to the department. In order to minimise information bias, data were recorded on standard form by two researchers who were trained

together and discussed any perceived ambiguities

The practice and hospital consultations were classified into three broad categories based on the morbidity presented: lower respiratory, upper respiratory/EN and non-respiratory. If more than one problem was presented during a GP consultation, a proportion of one consultation was allocated to each relevant category

Prescriptions issued were grouped using British National Formulary (BNF) categories<sup>8</sup> and divided into respiratory (BNF sections 3 'respiratory'; 5. 'antibacterials' and 6.3 'corticosteroids') and non-respiratory (all other BNF sections)

Statistical analyses were carried out using SPSS for Windows<sup>9</sup>. The data were found to be highly skewed so outcome measures were dichotomised into 'none or at least one' service item used for a particular problem. Results are presented as the relative risk of service utilisation in those with one to three, four and five to six positive responses compared to those with positive responses to the six key questions. Confidence intervals for relative risks were calculated in the manner described by Gardner and Altman<sup>10</sup>. The Local Research Ethics Committee for South Manchester gave its approval for this study

### Result

Sufficient information for analysis was available for 736 of the 800 adults selected. Of the remainder, 3 had died and the rest had moved away; their records were either incomplete or unavailable

Median age and inter-quartile range for each group were as follows: 0 positive responses 48.5 (37), one to three positive responses 40.5 (33), four positive responses 39 (34.5) and five to six positive responses 43 (24). The majority of subjects were female (55.3%) and females had significantly higher numbers of positive responses ( $\chi^2$ -test  $p=0.006$ )

During the two-year period, 95% of patients were seen at least once in primary care and 6.2% received home visits. The relative risk of a primary care utilisation event (surgery consultation or home visit) for all categories of condition increased with the number of positive responses (Table 1). However, this was most apparent for lower respiratory utilisation.

There was also an increased relative risk of receiving at least one prescription during the two-year period in those with greater numbers of positive responses (Table 2). This applied to all categories but was most apparent for respiratory drugs

There were 1561 GP requested investigations performed on 455 patients of which only 5.3% were related to lower respiratory complaints (most were chest X-rays) and 2.0% for upper respiratory/EN complaints. 27% of those who reported no symptoms had an investigation for a lower respiratory tract problem. The relative risk for those with one to three positive responses was 1.03 (95%CI 0.99-1.07), four

**Table 1: Relative risk (95% confidence interval) of a primary care utilisation event (one or more GP consultations or home visits over 2 years) in each category of positive responses**

Reason for primary care	Positive response		
	1-3	4	5-6
Any condition	1.49 (0.67-3.31)	1.88 (0.82-4.34)	10.29 (1.38-76.96)
Lower respiratory	1.16 (1.00-1.35)	2.12 (1.70-2.64)	2.4 (1.84-3.23)
Upper respiratory/EN	1.04 (0.84-1.29)	1.17 (0.94-1.46)	6.2 (0.97-1.64)
Non-respirator	1.65 (0.87-3.14)	2.01 (1.04-3.90)	9.2 (1.29-8.41)

**Table 2: Relative risk (95% confidence interval) of a prescription (over years) in each category of positive responses**

Reason for prescription	Positive response		
	1-3	4	5-6
Any condition	2.41 (1.20-4.83)	2.26 (1.18-4.33)	4.63 (1.66-12.92)
Respirator	1.64 (1.25-2.16)	2.80 (1.99-3.95)	4.21 (2.56 - 6.92)
Non-respirator	1.65 (0.98-2.76)	1.95 (1.14-3.33)	3.00 (1.44 - 6.26)

**Table 3: Relative risk (95% confidence interval) of an out-patient consultation (over 2 years) in each category of positive responses**

Reason for out-patient visit	Positive responses		
	1-3	4	5-6
Any condition	1.29 (1.03-1.63)	1.08 (0.88-1.34)	1.19 (0.93-1.51)
Lower respiratory	1.03 (0.9-1.06)	1.11 (1.05-1.17)	1.13 (1.06-1.22)
Upper respiratory/ EN	1.02 (0.97-1.08)	1.01 (0.96-1.06)	0.98 (0.94-1.03)
Non-respirator	1.22 (0.90-3.06)	1.03 (0.91-3.01)	1.02 (0.90-3.05)

positive responses 1.09 (1.03-1.15) and five to six positive responses 1.18 (1.09-1.29)

Table 3 shows details of the sample's utilisation of secondary care services. Although 54.6% of patients had at least one out-patient visit, only 7.9% of the sample attended for a lower respiratory problem and only 3.8% for a first visit. There was an increase in relative risk of an out-patient visit for a lower respiratory problem across the positive response groups, however no such trend was seen for the other morbidity categories.

One or more visits to the Accident & Emergency (A&E) Department were made by 36.4% of the sample, 93.3% of which were for non-respirator complaints. 14.9% of those who reported no symptoms attended A&E (irrespective of morbidity).

Relative risk with

- ~ 1-3 positive responses was 1.20 (95%CI 1.07-1.35)
- ~ 4 positive responses was 1.29 (95%CI 1.14-1.45)
- ~ 5-6 positive responses was 1.14 (95%CI 1.02-1.29)

Over a quarter of patients were admitted to hospital at least once during the two-year period (Table 4). Admissions for lower respiratory problems and for upper respiratory/ENT conditions were slightly more common among those with higher numbers of positive responses

**Table 4: Relative risk (95% confidence interval) of an in-patient admission (over 2 years) in each category of positive responses**

Reason for admission	Positive responses		
	1-3	4	5-6
Any condition	1.05 (0.93-1.19)	1.03 (0.91-1.16)	1.04 (0.91-1.19)
Lower respiratory	1.01 (0.99-1.03)	1.03 (1.00-1.06)	1.05 (1.01-1.10)
Upper respiratory/ EN	1.01 (0.99-1.04)	1.01 (0.99-1.03)	1.03 (0.99-1.06)
Non-respiratory	1.03 (0.91-1.17)	1.00 (0.89-1.12)	0.98 (0.87-1.12)

Some adults used no primary or secondary care services during the two-year period for lower respiratory problems. Of these, 22 had five to six positive responses (11.5% of the response category), 27 had four positive responses (14.3% of the response category), 44 had one to three positives (26.2% of the response category) and 85 had no positive responses to the key symptom questions (45.2% of those with positives)

The majority of the medical services used by the sample was provided in primary care although those with higher numbers of positive responses were significantly more likely also to have secondary care ( $p=0.001$ ). For example, examining lower respiratory problems (Table 5), 28% of those with no positive responses were seen at least once in primary care for lower respiratory condition. Of them, only three (5.7%) were also seen at least once in secondary care within the two-year period. Among those with five or six positive responses, 70% were seen at least once in primary care of whom 23% were also seen at least once in secondary care

**Discussion**

The principal finding of this study is that respiratory symptoms are significantly positively associated with utilisation of healthcare services for lower and upper respiratory problems. This confirms a generally held belief. However, the relative risks of a patient obtaining primary and/or secondary care services hav

not been quantified previously in a single population over the same time period. These data illustrate that most care for asthma occurs within the primary sector<sup>3,1</sup> and that few adults with asthma utilise secondary care as has been shown for children<sup>2</sup>

The method makes use of a simple, cheap and readily completed questionnaire (as evidenced by the high response rate) which can be translated and is based on one already in use world-wide<sup>7</sup>. A further advantage that this method considers reported symptoms rather than recorded diagnosis, enabling consideration of healthcare utilisation of the affected adult population. Response bias was investigated by examining a 5% random sample of non-responders with respect to gender, age, total GP consultations and number of consultations for respiratory complaints in 1993<sup>6</sup>. Non-responders were found to be younger and less likely to have had a consultation in 1993. We did not attempt to estimate the variability in data extraction between researchers

This method can be applied to other populations to estimate the level of unmet need in terms of symptom unreported to the doctor. An estimate of the additional resources required to meet this need can also be made.

An association was found between respiratory symptoms and the prescription of medication for non-respiratory problems. This suggests that co-morbidity (such as the respiratory symptoms of heart disease) is a significant factor, which must be taken into account in resource planning

The mean number of service items per patient is the simplest and most readily understood measure of utilisation. However, the data are highly skewed so use of the mean is statistically inappropriate. We have therefore considered the relative risk of a subject receiving a service item for each symptom group.

'Antibiotics were categorised as 'respiratory

**Table 5: Percentage of adults in each category of positive responses to the 1993 questionnaire having at least one consultation in the primary sector for a lower respiratory problem. Proportion of these who also had secondary care, difference between proportions and 95% confidence intervals for the differences**

	Positive responses [patients per category]				Chi <sup>2</sup>	p for trend
	0 [188] 1%	1-3 [168] 1%	4 [189] 1%	5-6 [191] 1%		
Number having primary care	53 (28.2)	64 (38.1)	125 (66.1)	134 (70.2)		
Proportion also having secondary care	3/53 (5.7%)	7/64 (10.9%)	21/125 (16.8%)	31/134 (23.1%)	10.2	0.00
Difference between proportion	3.2	2.7	3.9	0.7		
95% confidence interval for the difference	3.6 to 3.1	6.6 to 3.7	3.9 to 5.8	3.4 to 5.6		

medication which may have introduced bias. However, the most common 'non-respiratory' reason for antibiotic prescription was urinary tract infection (UTI) and exclusion of five of the most popular antibiotic used almost exclusively for UTI did not materially alter the results

Although the data relate to health care utilisation between 1993 and 1995; they provide a basic framework for calculation of the economic cost of service utilisation.<sup>3</sup>

Unmet need has further economic implications when disability due to symptoms is considered. This investigation will be extended to establish the financial burden of respiratory healthcare and the effect of respiratory symptoms on health-related quality of life.

#### Conclusion

With the emphasis on economy increasing in a changing NHS, evidence to enable cost-benefit analysis must be obtained. Neither cost nor benefit for a population can be determined without first quantifying utilisation within it. This study provides quantitative evidence of the interface between primary and secondary care in two general practice populations. It provides a method for predicting health care utilisation in both primary and secondary sector based on reported respiratory symptoms. ■

#### Acknowledgements

We thank the doctors and staff at the Tregenna Group Practice and the Bowland Medical Practice in Wythenshawe, Tamsin Wright and Sara Kay for help with data collection and Stephen Francis for statistical advice.

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