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SHORT COMMUNICATION

Using a revised asthma morbidity index to identify varying patterns of morbidity in U.K. general practices

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Abstract Both in terms of morbidity and mortality, the therapeutic and organizational management of asthma pose a considerable and continuing challenge to healthcare delivery. One element in attempts to meet this challenge is the recognition of appropriate outcome measures to assess progress in tackling the burden of this disease. This study therefore aimed to assess pragmatically the effectiveness of a revised asthma morbidity index in identifying varying patterns of morbidity in U.K. general practices. A postal survey was conducted of 2762 patients believed to have or have had asthma from the lists of 12 general practices within the Eden Valley in Cumbria, using a questionnaire which combined the revised Jones morbidity index with questions on age, medication and perception of current asthma. Prescribing data were also recovered for 11 of the practices for the quarter within which the postal survey was conducted. Responses were obtained from 2123 subjects (77%), of whom 1474 (70%) believed themselves to be currently asthmatic. In this group, 18% reported low morbidity, 34% medium morbidity and 48% high morbidity. Age and inhaled steroid use were both positively and significantly associated with high morbidity. Those taking inhaled steroids were 1·4 times more likely to report high morbidity than those not taking steroids. The prescribed corticosteroid/bronchodilator ratio for cost was both negatively and significantly associated with high morbidity. The revised morbidity index is a simple tool of use in the surveillance of asthma in primary care. It identifies spectra of morbidity which vary between practices, which may be of use in assessing the quality of asthma care provided in the community.

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INTRODUCTION

The therapeutic and organizational management of asthma poses a considerable and continuing challenge to healthcare delivery. One element in attempts to meet this challenge is the recognition of pragmatic outcome measures to assess progress in tackling the burden of asthma.

The original Jones morbidity index, based on the simple yes/no answers to three straight-forward, clinically relevant questions and producing categories of low, medium and high morbidity significantly associated with lung function (1,2), has been much used in U.K. general practice and found useful for one-off enquiries but required the inclusion of a temporal qualifier to enable repeated testing (see Fig. 1 for revised version). Evidence of the susceptibility to change of the revised index in the setting of a nurse-run asthma clinic in primary care—and indeed of the effectiveness of such care— has already been established (3). Data on the relationship of the revised index to lung function indicate a stronger relationship than with the original version and the predictive validity of the instrument has been demonstrated (4). Thus, the index has been shown to be useful despite including a question about work or school absence which does not refer to all those with asthma.

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During the last four weeks:

1. Have you been in a wheezy or asthmatic condition at least once a week?
2. Have you had time off work or school because of your asthma?
3. Have you suffered from attacks of wheezing or coughing during the night?

NO to all questions	=	LOW morbidity
One YES answer	=	MEDIUM morbidity
Two or three YES answers	=	HIGH morbidity

Note: Clearly, questions 1 and 3 can be answered 'yes' or 'no' by all respondents, but question 2 will be 'not applicable' to those who do not attend work or school. For the purposes of morbidity classification, a 'not applicable' answer is regarded similarly to 'no'. The words 'or coughing' were added to question 3 for the purposes of this survey.

Fig. 1 The Revised Jones Morbidity Index.

Uses of the index to date have focused on individual outcomes and utility, but clearly a further possibility is the aggregation of data across communities such as the registered lists of general practitioners for comparative purposes. We have conducted a further evaluation of the revised form of the Jones morbidity index using postal questionnaires in the setting of routine general practice to address its use in identifying whether morbidity varied between practices.

METHODS

The study was conducted in the 12 practices which form the Eden Valley General Practice Research Group situated in the eastern part of Cumbria in north-west England. All but one of these practices come under the aegis of the North Cumbria Health Authority, Carlisle, U.K., with the other reporting to Durham. Each practice was asked to identify all those subjects of any age registered on their lists with asthma past or present. The precise method of so doing was deliberately left to each practice, since our purpose was to use the already validated morbidity index pragmatically in routine practice. A simple, single page questionnaire was mailed to each subject with one reminder to non-respondents after 6 weeks. Mailings concerning children were addressed to their parents or guardians. The questionnaire comprised six items: (1) do you think you have asthma now?; (2)–(4) the three questions of the revised Jones morbidity index (see Fig. 1); (5) please list any treatment you are currently taking for asthma; and (6) please tick your age (0–4, 5–15, 16–40, 41–65, > 65years). Those subjects answering 'yes' to question 1 were regarded as a subset with 'current asthma', while the whole data set was labelled as 'diagnosed asthma'.

The questionnaires were returned to the Cumbria Primary Care Effectiveness Group in Carlisle and entered onto Microsoft Excel spreadsheets. These data were analysed using STATA V4. Data on list size at the time of the survey were returned by the practices and with their permission data on corticosteroid/bronchodilator cost ratios were obtained for the same quarter as the survey from the Director of Primary Care at the North Cumbria Health Authority. Logistic regression was used on the combined dataset to investigate the effect of age and inhaled steroids on morbidity. Possible practice differences were not allowed for in the model. Since one clinical use of the index is to focus care on those reporting high morbidity, for analytic purposes morbidity was split into two categories: high and medium/low. Spearman's rank correlation coefficient was used to investigate an association between the percentage of patients in a practice reporting high morbidity and the practice corticosteroid/bronchodilator cost ratio and also associations between prevalence of asthma and the proportions of those reporting high morbidity. This latter analysis was intended to address whether rising prevalence was accounted for by more mild cases.

RESULTS

The 12 practices had a combined list size of 47 752, of whom 2762 (5·8%) were regarded as having or having had asthma. Fully completed responses were obtained from 2123 subjects (77%), of whom 1474 believed themselves to be currently asthmatic (70% of respondents, 3·1% of the whole population). Response rates in individual practices varied from 69% to 85% (see Table 1). The practice list sizes varied from 1995 to 13 000, with a median of 3000. The percentages of subjects with asthma varied from 4·0 to 10·1 (Table 1), and of those with current asthma from 2·2 to 5·0 (Table 2).

Overall, 714 subjects (34%) reported low morbidity, 617 (29%) reported medium morbidity and 792 (37%) high morbidity. Forty-seven records were not complete. The percentages of high morbidity varied between practices from 30% to 58% (Table 1). There was a very strong negative relationship between prevalence of diagnosed asthma and proportion of those with diagnosed asthma reporting high morbidity (Spearman correlation= $-$ 0·78, P=0·003). There was no significant relationship between the prevalence of current asthma and the proportion of those with current asthma reporting high morbidity (Spearman correlation=$-$0·42, P=0·18).

Since those perceiving themselves to be currently asthmatic were also much more likely to report high morbidity (47% *vs*. 12%, chi-squared 549, 2 df, $P<0.001$) and to be taking inhaled steroids (65% *vs*. 20%, chi-squared 819, 2 df, $P<0·001$), further analysis is restricted to this group alone. The breakdown of morbidity for those currently asthmatic was 271 (18%) low, 503 (34%) medium and 700 (47%) high; significant variations existed

Table 1 Morbidity breakdown for all patients with asthma

Practice	Prevalence of asthma (%)	Response rate to questionnaires (%)	Morbidity (% of practice asthmatics)			
			Low	Medium	High	Total
1	5·8	76	207 (36)	154 (27)	214 (37)	575
2	5·9	79	37 (40)	28 (30)	28 (30)	93
3	6·3	83	89 (39)	69 (30)	72 (31)	230
4	6·1	70	71 (32)	69 (31)	84 (38)	224
5	5·0	69	54 (36)	40 (27)	54 (36)	148
6	4·8	85	28 (21)	45 (34)	58 (44)	131
7	4·3	78	11 (14)	21 (27)	45 (58)	77
8	4·0	80	19 (22)	28 (33)	39 (45)	86
9	7·4	75	60 (37)	54 (33)	50 (30)	164
10	4·5	80	28 (29)	24 (25)	45 (46)	97
11	10·1	83	63 (38)	46 (28)	58 (35)	167
12	5·3	82	47 (36)	39 (30)	45 (34)	131
Total	mean 5·8	mean 77	714 (34)	617 (29)	792 (37)	2123

Pearson chi-squared 50, 22 df, P=0·001.
NB 1: Row percentages do not all add up exactly to 100 because of rounding to the nearest integer.
NB 2: Prevalences only of asthma given to preserve anonymity.

Table 2 Morbidity breakdown for current asthmatics only

Practice	Morbidity (% of practice current asthmatics)			
	Low	Medium	High	Total (% of practice list size)
1	94 (23)	127 (31)	193 (47)	414 (4·2)
2	16 (25)	24 (38)	23 (37)	63 (4·1)
3	36 (24)	53 (36)	60 (40)	149 (3·5)
4	25 (16)	61 (38)	75 (47)	161 (5·3)
5	11 (12)	34 (36)	49 (52)	94 (3·1)
6	15 (14)	39 (38)	50 (48)	104 (5·.2)
7	5 (8)	16 (27)	39 (65)	60 (2·9)
8	8 (12)	23 (35)	35 (53)	66 (2·8)
9	22 (22)	35 (36)	41 (42)	98 (4·8)
10	9 (13)	19 (28)	40 (59)	68 (4·3)
11	10 (10)	37 (37)	53 (53)	100 (6·0)
12	20 (21)	35 (36)	42 (43)	97 (3·9)
Total	271 (18)	503 (34)	700 (47)	1474 (4·2)

Pearson chi-squared=40, 22 df, P=0·011.
NB: Row percentages do not all add up exactly to 100 because of rounding to the nearest integer.

between practices as shown in Table 2 (chi-squared 40, 22 df, P=0·011). This group also had a higher proportion of old people and fewer young children than those not currently asthmatic. There were significant variations in the age categories between practices (data not shown). The mean inhaled steroid use in the currently asthmatic group was 65%, but rates varied by practice from 55% to 75%.

The logistic regression analysis showed that age and inhaled steroid use are both associated positively with high morbidity. Those taking inhaled steroids were 1·4 times more likely to report high morbidity than those not (95% confidence interval of odds ratio 1·1–1·8, P=0·001). Those in the 41–65 years age group were 1·3 times more likely to report high morbidity than those in the 0–40 years age group (95% confidence interval of odds ratio 1·0–1·7, P=0·03). Those in the over 65 age group were 1·6 times more likely to report high morbidity than those in the 0–40 years age group (95% confidence interval of odds ratio 1·2–2·1, P=0·001). The effect of age and use of steroids on high morbidity is shown in Table 3. Despite age and use of inhaled steroids both

Table 3. High morbidity by age and inhaled steriod use

Inhaled steriods	Percentage of patients reporting high morbidity			
	Age (years)			
	0–40	41–65	> 65	Total
Yes	37%	43%	54%	41%
No	47%	54%	56%	51%
Total	43%	50%	56%	47%

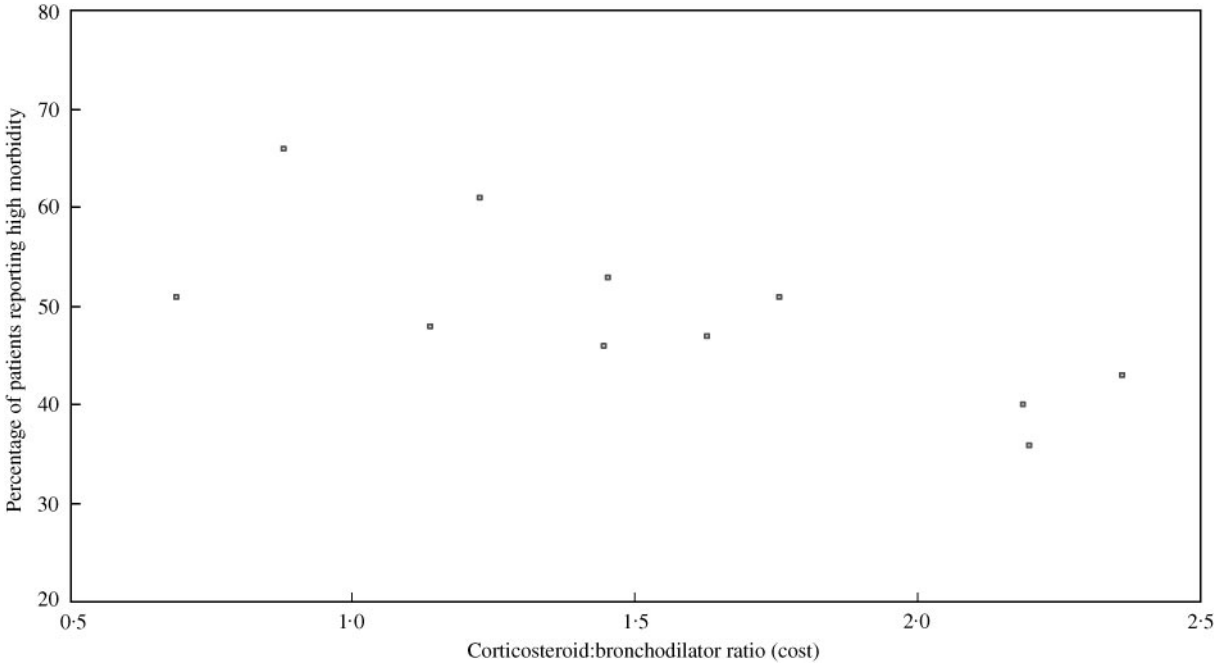

Fig. 2. Association between percentage of current asthmatics with high morbidity and corticosteroid/bronchodilator ratio for cost.

having a statistically significant effect on reported high morbidity, these variables accounted for only 1% of the variability in high morbidity. It is therefore unlikely that differences in the age structure and the prescribing of inhaled steroids between practices could account for the large variability seen between practices in terms of high morbidity.

The mean corticosteroid/bronchodilator ratio by cost was 1·5 (range 0·69–2·4). A plot of these ratios against observed high morbidity is shown in Fig. 2. The trend visible was significant (Spearman's rho −0·73, P=0·01).

DISCUSSION

Postal use of the morbidity index does produce estimates of high morbidity which vary significantly between practices to an extent not fully explained by differences in age, use of inhaled steroids or the prevalence of diagnosed asthma. Furthermore, the use of number of people with asthma on preventative treatment—a key component of required annual reports from practices—has been shown by our data to be potentially misleading (being *positively* associated with high morbidity). However, rising prevalence of diagnosed asthma does appear to be in part explained by greater numbers of more mild cases.

Some cautions in interpreting these data are necessary. Firstly, methods of identifying the asthmatic cohort may well have varied in ways which could have influenced the makeup of the sample. It is for this reason that our analysis has been restricted to those patients who regard themselves as currently asthmatic since we believe these to be a more homogeneous group of patients than those selected as being asthmatics by the different practices. The potential significance of this possibility is likely to be small, but this can only be speculation. Secondly, the self-reported data on use of inhaled steroids was not verified against individual prescription records. Thirdly, the corticosteroid/bronchodilator ratios obtained refer to all the patients in the practices using these drugs (asth-

matic responders and non-responders alike, those with chronic obstructive pulmonary disease and possibly others without a definite diagnostic label) and not just the current asthmatic responders with whose morbidity the ratios have been compared. Fourthly, some patients with definite current asthma may be 'deniers' as suggested by qualitative research (5) and should properly have been included in the current asthma group. This may restrict the generalisability of the results based on those with current asthma. However, the number of practices surveyed and the size of the data set gathered are likely to have minimized any effect of these points on our results—particularly in terms of systematic bias. Lastly, the addition of the words 'or coughing' to the third question of the index may have altered the validity of the instrument.

Little other research comparing outcomes of asthma from across different practices exists, despite such a need being recognised (6). The Scottish GP academic Neville *et al*. have shown that better care is associated with having conducted a recent asthma audit (7) but this is unlikely to be a useful repeatable measure. Corticosteroid/bronchodilator prescribing ratios (8,9), while popular, are at best process proxies for outcome and also may be confounded by diagnostic label. Asthma mortality, admission rates to hospital, attendances at accident and emergency departments and outpatient referrals, while important and interesting markers at a district wide level, are too low for individual practices to be useful comparators of practice performance in asthma care.

The data presented in this study suggest that use of the revised morbidity index in the manner described could be such a useful comparator. It is simple, well received by doctors and patients alike, robust and sensitive to change (3). The current study shows that it picks up variations between practices that go beyond age differences and use of inhaled steroids. The positive association of the latter with high morbidity seems at first sight to be counter-intuitive, but what it reveals is that the mere use of inhaled steroids is insufficient without close and repeated attention to diagnosis, choice of drug, device, dose, inhaler technique and concordance with prescriptions. These are components of quality care which are likely to vary importantly between practices.

The postal method used in this study is helpful for setting baselines, but this could be followed by annual opportunistic surveillance at routine contacts for other purposes. These could not only be with doctors and nurses but also with receptionists or pharmacists when repeat prescriptions are being collected or dispensed. Variations in the percentages of high morbidity reported by individual practices and year-on-year trends could be used to identify models of cost-effective asthma care within and possibly between districts. In addition, practices in the upper or lower quartiles of high morbidity could be examined more closely to seek potentially remediable causes. The benefit to the National Health Service of the approach taken in our study lies more in this possibility than in the provision of precise data on asthma prevalence or morbidity which could not have been provided by our pragmatic methodology.

It is known that outcomes for patients with asthma in the community can be improved by various care initiatives (10–16) but it is less clear which parts of these initiatives make the biggest difference (17,18). Widespread use of the index or something similarly validated may elucidate this issue further. The concept and utility of a three-question asthma morbidity index has been recognized and promoted by a national meeting of asthma experts and enthusiasts (19). A revised version with questions applicable to all those with asthma has been proposed, but validation of the new wording has yet to occur.

In conclusion, postal use of the revised Jones morbidity index across practices identifies varying patterns of morbidity which may be helpful in assessing the quality of asthma care provided in the community.

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