SHORT PAPER

Wheeze not current asthma affects quality of life in young adults with asthma

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Background: A study was undertaken to investigate quality of life in asthma, defined by differing criteria, to see which may be most appropriate in epidemiological studies.
Methods: The 426 adults were participants in the follow up phase of the European Community Respiratory Health Survey (ECRHS) in Melbourne. As part of the laboratory visit, participants completed the SF-36 quality of life questionnaire, a detailed respiratory questionnaire, and underwent lung function testing.
Results: Both the physical component summary and the mental component summary scores were significantly worse in those with wheeze in the previous 12 months than in those without wheeze. Only the mental component summary score was significantly worse in those with current asthma than in those without. In contrast, in those with current asthma or bronchial hyperreactivity only, neither of the summary scales was significantly different between cases and controls.
Conclusions: Quality of life is severely impaired in individuals with wheeze in the previous 12 months while individuals with current asthma or bronchial hyperreactivity alone did not appear to have significantly reduced quality of life.

Bronchial hyperreactivity (BHR) to histamine or methacholine has been used as an objective physiological marker of asthma and, in combination with wheeze in the previous 12 months, has been used to define "current asthma" in epidemiological studies. It has been claimed that this definition discriminates a group with more severe asthma than subjective definitions based on self-reported asthma symptoms alone.[1 2] However, subjective measures of asthma severity have been found to correlate much better with measures of quality of life (QoL) than objective physiological measures such as BHR and forced expiratory volume in 1 second (FEV_1).[3] The purpose of this study was to examine the relationship between QoL and symptom based and physiological definitions of asthma in a community setting to determine which definition might be most appropriate.

METHODS

The subjects were participants in the follow up phase of the ECRHS conducted in Melbourne in 1998/9. Full details of the original sampling protocol have been described elsewhere.[4] Participants completed the detailed ECRHS questionnaire, spirometric tests, and a methacholine challenge. QoL was evaluated by the short form (SF-36) health survey which was completed by participants upon arrival at the laboratory. All questionnaires were checked for missing data by one of the trained interviewers after completion. Only the physical component summary (PCS) score and the mental component summary (MCS) score are reported in this analysis which were calculated using the three step procedure recommended by the developer.[5] A total of 426 participants completed the methacholine challenge and were included in this analysis.

Wheeze only was defined as a positive response to the question: "Have you had wheezing or whistling in your chest at any time in the last 12 months?".[1] The ECRHS defined asthma as a positive response to any of the following questions: "Have you had an attack of asthma in the last 12 months?", "Have you been woken by an attack of shortness of breath at any time in last 12 months?", and "Are you currently taking any medicine for asthma?".[4] BHR was defined as a provocative dose of <2 mg methacholine causing a 20% fall in FEV_1 (PD_{20}). Current asthma was defined as a positive response to the question: "Have you had wheezing or whistling in your chest at any time in the last 12 months?" and measured BHR.[1] Doctor diagnosed asthma was defined as a positive response to the question: "Have you ever had asthma?" and then to the question: "Was this confirmed by a doctor?". BHR alone and FEV_1 % predicted were used as purely physiological definitions of asthma.

Comparisons in QoL scores were made between subjects meeting the various definitions of asthma and the remaining subjects who did not meet the criteria. The Mann-Whitney U test was used to test if the distribution of the SF-36 scores was the same across the different definitions and to assess whether SF-36 scores were associated with sex, age, and smoking status. A multivariate regression model was used to test for significance between cases and controls after adjusting for age, sex, and current smoking status. Spearman's rank correlation was used to assess the association between FEV_1 % predicted and SF-36 scores. A p value of <0.05 was considered significant. All analyses were conducted using Stata (Stata for Windows, Stata Corporation 1997, Texas, US). Post hoc power calculations indicated that there was a greater than 80% power to detect a three point difference in PCS and MCS scores between groups.

RESULTS

Participants had a mean (SD) age of 39.7 (6.4) years (range 26–50), 50.0% were women, and 81.5% were Australian born. The mean (SD) FEV_1 was 109.3 (14.5)% predicted. Eighty five participants (25%) were current smokers and 214 (50.2%) reported ever smoking. Doctor diagnosed asthma was reported by 120 participants (28.2%) and an attack of asthma in the previous 12 months was reported by 71 (16.7%).

The key asthma symptom of wheeze in the preceding 12 months was reported by 177 participants (41.5%). Nocturnal shortness of breath (SOB) and spontaneous SOB were reported by 43 (10.1%) and 53 (12.4%) participants, respectively. BHR was demonstrated by 106 participants

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Table 1 Mean (SD) scores for SF-36 summary measures for the different definitions of asthma

	Physical component summary	Adjusted p value	Mental component summary	Adjusted p value
Wheeze only				
Cases (n=177)	52.94 (7.14)	0.006	48.87 (9.30)	0.002
Controls (n=249)	54.69 (6.04)		51.66 (7.49)	
ECRHS				
Cases (n=108)	52.27 (7.64)	0.001	49.08 (8.64)	0.042
Controls (n=318)	54.54 (6.07)		50.99 (8.27)	
Doctor diagnosed asthma				
Cases (n=120)	52.29 (7.53)	0.001	49.55 (8.64)	0.173
Controls (n=306)	54.62 (6.04)		50.88 (8.28)	
Current asthma				
Cases (n=80)	52.90 (7.86)	0.088	48.89 (8.94)	0.064
Controls (n=346)	54.21 (6.22)		50.88 (8.23)	
BHR				
Cases (n=106)	53.46 (7.24)	0.368	49.58 (8.42)	0.272
Controls (n=320)	54.13 (6.33)		50.81 (8.37)	

p values were calculated after adjusting for age, sex, and smoking status by multiple linear regression.

(24.9%). The number of participants who reported that they were currently on medication for their asthma was 145 (34.0%). While 38 (8.9%) reported seeing a GP specifically because of their breathing, only eight (1.9%) reported seeing a specialist physician.

In this population of young adults, sex, age, and current smoking status were not important determinants of QoL scores. SF-36 summary scores for the alternative definitions of asthma are presented in table 1. The PCS and MCS scores were both significantly worse in those with wheeze in the preceding 12 months than in those without wheeze. Similarly, for the ECRHS definition of asthma both the PCS and MCS scores were significantly different between the cases and controls. For doctor diagnosed asthma only the PCS score was significantly worse in adults with self-reported doctor diagnosed asthma than in those without. In contrast to these results, for current asthma neither the PCS nor MCS scores were significantly worse in those with current asthma than in those without. For those with BHR only neither PCS nor MCS scores were significantly different between cases and controls. The rank correlations between FEV_1 % predicted and the PCS and MCS scores were not significant (PCS $\rho=0.3$, $p=0.06$; MCS $\rho=0.2$, $p=0.4$).

DISCUSSION

This is the first study of which we are aware to investigate specifically the relationships between different epidemiological definitions of asthma and reported QoL using the SF-36 questionnaire in a community based sample of young adults. There is some controversy over which symptom questions are the most valid in diagnosing asthma for epidemiological studies.[2] We have found that subjective definitions of asthma such as wheeze in the previous 12 months, the ECRHS definition of asthma, and self-reported doctor diagnosed asthma define individuals with significantly worse QoL. On the other hand, the epidemiological definition of current asthma and purely physiologically based definitions of asthma such as BHR alone or FEV_1 were not associated with significantly worse QoL. These results would suggest that merely having respiratory symptoms of any type is sufficient to adversely affect QoL and, in the context of this particular population, the underlying problem was likely to be asthma.

Data from the French centres of the ECRHS found that subjects with asthma had significantly lower PCS and MCS scores than control subjects using a combination of self-reported symptoms and BHR to define cases.[6] Several other studies have reported strong correlations between poor QoL and subjective measures of asthma severity such as diary obtained symptom scores and β_2 agonist use for the relief of symptoms.[3 7] On the other hand, correlations between objective measures such as FEV_1 have been found to be poor.[8] Our results are consistent with these studies and show that, even for individuals with mostly mild asthma from a community setting, QoL is more strongly associated with self reported "subjective" than objective measures of asthma.

Clinical observations suggest that patients' concerns with regard to their asthma tend to focus on symptom frequency, activity limitation, and avoidance of irritants.[9] For subjects with mild asthma who experience few symptoms QoL is equivalent to or better than population norms but when they experience symptoms their QoL is significantly affected,[10] while individuals with more severe asthma and more frequent respiratory symptoms who have accommodated their lifestyle to this chronic condition might perceive less impact on QoL. This would suggest that most people tend to focus on subjective rather than objective measures of their asthma and, given that QoL is a self-assessed measure, it is not surprising that subjective definitions of asthma correlate more closely than do objective measures of asthma with poor QoL.

In conclusion, we have confirmed that symptom based definitions are more closely related to QoL than are physiological definitions of asthma. We suggest that, for epidemiological studies investigating the social, psychological, and economic costs of asthma, it might be more appropriate to use symptom based definitions when defining subjects. While our conclusions are valid for epidemiological studies of asthma in the community, they should not be generalised to clinical trials of patients with more severe disease. However, we do suggest that in clinical trials QoL measures would provide clinicians with valuable further information.

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SHORT PAPER

Patients' and carers' preferences in two models of care for acute exacerbations of COPD: results of a randomised controlled trial

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Background: Patients with an acute exacerbation of chronic obstructive pulmonary disease (COPD) were randomised to either hospital at home (HaH) or inpatient management, and patient and carer preferred site of management and satisfaction with care received in the two arms was determined.
Methods: Emergency admissions with an acute exacerbation of COPD were randomised to inpatient care or HaH care. After discharge an independent observer administered a questionnaire to both patients and carers on the preferred site of care and scored satisfaction with the care received.
Results: Of 60 patients recruited, 30 were randomised to receive HaH care. Retrospective patient preference for HaH care was 96.3% in the domiciliary arm and 59.3% in the conventional arm; carer preference figures were 85.7% and 42.9%, respectively. There was a higher preference for domiciliary care by both patients and carers in the HaH arm than in the inpatient arm (p=0.001 and p=0.01, respectively). Patients recorded equal satisfaction with care in the two arms (88.1% in the conventional arm, 91.7% in the domiciliary arm); carer scores were 91.3% and 91.9%, respectively.
Conclusions: The results of this study show that both patients and carers were significantly more likely to prefer domiciliary care if they were in the HaH arm. Since patients had to be willing to be looked after at home, both patients' and carers' perceptions of the benefits of HaH care were reinforced by their experience. HaH care of acute exacerbations of COPD is the preferred option in suitable patients.

Recent studies have shown that hospital at home (HaH) management of selected patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) is a safe[1 2] and cost effective option to inpatient care.[2] As HaH schemes have become increasingly popular in recent years in hospitals across the UK, it is important to know their acceptability to patients and carers.

METHODS

Patients with an acute exacerbation of COPD were admitted to the Medical Chest Unit, Castle Hill Hospital and clinical management was instituted according to the British Thoracic Society guidelines.[3] They were reviewed the following morning for possible inclusion in the trial. Both patients and carers gave informed consent for the study. A carer was defined as a provider of emotional or physical support to the patient during his or her illness. Patients were randomised using sealed envelopes to receive either conventional inpatient care or HaH care under a team of two respiratory outreach nurses (RONs). Recruitment into the study was carried out from Monday to Thursday. The RONs were accessible by telephone between 09.00 and 17.00 hours daily. Outside these times patients could obtain advice from the Medical Chest Unit through a direct line.

Subjects

Inclusion criteria:

- Both sexes
- >18 years
- FEV_1/FVC ratio <70%
- FEV_1 reversibility to salbutamol <15% (obtained on a previous admission or clinic visit)

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Table 1 Baseline characteristics of the patients

	Conventional arm (n=30)	Domiciliary arm (n=30)
Age (years)	70.1	69.7
Men (%)	50	53.3
Mean (SD) admission FEV_1 (l)	0.85 (0.34)	1.0 (0.38)*
Mean (SD) admission FVC (l)	1.83 (0.80)	1.99 (0.77)
Mean (SD) symptom score on admission (%)†	63.6 (17.8)	63.0 (13)
Mean (SD) total SGRQ score	67.6 (16.3)	67.9 (10.7)
No living alone	9	9
No in nursing home	1	0
No receiving home help/district nurse	4	4

*p=0.15. †Refer to Appendix 1 on *Thorax* website (www.thoraxjnl.com) for symptoms scored and calculations. The higher the symptom score the better the patient felt.

- Worsening of symptoms with any combination of increased sputum purulence and/or volume, and worsening dyspnoea.

Exclusion criteria

- Concomitant medical conditions requiring admission
- Residence over 15 miles from hospital
- Complications of the exacerbation: acidosis, cor pulmonale, and acute changes on chest radiograph
- Newly diagnosed type 2 respiratory failure
- Social exclusion was discretionary and depended on level of domiciliary support and performance status of the patient.

Assessment

Demographic data, baseline clinical data, and spirometric values were obtained at the first interview. The St George's Respiratory Questionnaire (SGRQ) was also administered at this time. The RONs filled in daily progress charts and symptom score charts (Appendix 1; see *Thorax* website) for patients in both arms of care. The former assessed vital signs, spirometry, oxygen saturation and supplemental oxygen, and nebuliser usage.

HaH care

Patients were sent home within 48 hours of admission on a discharge package that included nebulised or inhaled bronchodilators, oral and inhaled steroids, antibiotics, and oxygen as necessary. The patients' GPs were aware of, but were not involved with, the HaH patients. The RONs monitored the treatment of these patients daily and carried out patient and carer education and reassurance.

Satisfaction questionnaire (Appendix 2)

Within 2 weeks after discharge an observer not otherwise involved in the trial administered the satisfaction questionnaires to the patient and main carer as a structured interview at the patient's home.

Statistical analysis

Fisher's exact *t* test was used to test for an association between patient/carer preference and the site of care group. Satisfaction scores were compared using the Mann-Whitney test. Admission and discharge parameters were compared using a two sample *t* test.

Ethical approval was obtained from the Hull and East Riding local research ethics committee.

RESULTS

Between May 1999 and February 2000 328 patients were admitted on the recruitment days with an acute exacerbation of COPD. Of the 117 (35.7%) medically eligible patients, 22 were excluded on social grounds (living alone with no telephone or living outside the 15 mile radius) and 35 patients/carers withheld consent. The remaining 60 patients took part in the trial and were randomised to receive HaH or inpatient management (30 to each arm). None of the patients had had prior experience of HaH care. All carers were relatives of the patient except in one case where the carers were professional staff in a nursing home.

Six patients failed to complete the trial, three because of clinical deterioration (two in the domiciliary arm were readmitted), one was found to have predominantly asthma, one withdrew consent, and one patient self-discharged from hospital. The questionnaire was not administered to these patients. Twenty seven patients in each arm completed the trial.

Baseline and social characteristics were similar in the two groups at randomisation (table 1). One patient in each arm lived alone with no close family nearby.

The outcome of care given is summarised in table 2. There was no difference between the two arms. Sixteen of the 27 patients (59.3%) in the conventional arm and 26 of the 27 (96.3%) in the domiciliary arm would have preferred domiciliary management. No preference data were available from one patient in the HaH arm. Thirty four carers completed the questionnaires and the respective carer preference figures were 6/14 (42.9%) and 17/20 (85.7%). The patients and carers in the HaH arm were significantly more likely than those in the conventional arm to prefer domiciliary care (Fisher's exact p values 0.001 and 0.01, respectively).

Table 2 Efficacy of care given

	Conventional arm	Domiciliary arm	p value
Mean (SD) improvement in FEV_1 (l)*	0.06 (0.27)	0.16 (0.26)	NS
Mean (SD) improvement in FVC (l)**	0.12 (0.65)	0.17 (0.55)	NS
Mean (SD) improvement in symptom score (%)†	11.6 (12.8)	12.1 (17.3)	NS
Mean no of days in care	5.9	7.4	0.14
Mean (range) no of readmissions per patient at 3 months	0.8 (0–3)	0.4 (0–2)	NS
Readmission rate at 3 months (%)	44.4	33.3	NS
No (%) deaths at 3 months	3 (11%)	1 (3.7%)	NS

*Discharge FEV_1 – admission FEV_1. **Discharge FVC – admission FVC. †Discharge symptom score – admission symptom score.

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Calculation of the satisfaction scores is outlined in Appendix 2 (available on the *Thorax* website). The mean patient satisfaction score with the care package was 88.1% in the conventional arm and 91.7% in the domiciliary arm. Carers' satisfaction scores with the care package were 91.3% and 92.7%, respectively. There were no statistical differences in either score. Transfer between wards and the hospital food were each cited twice as causing dissatisfaction among the inpatients. No other comment was cited more than once by either group.

There was no association between preferred site of management and age or sex of patient, treatment with maintenance steroids, home nebuliser or oxygen, frequency of admissions in the preceding year, symptom score at admission, and whether the patient lived alone or had a partner.

DISCUSSION

No randomised controlled trial has compared patient and carer preference and satisfaction with the domiciliary management of acute exacerbations of COPD and conventional care. High satisfaction scores with domiciliary care in both patients and carers were found in a diverse group of mainly elderly patients studied by Caplan *et al*.[4] However, these observations may not be applicable to potentially life threatening conditions such as acute exacerbations of COPD. In a randomised controlled trial of the efficacy of HaH, Shepperd *et al*[5] reported a preference for inpatient care in their cohort of 32 patients with COPD. In contrast, in a similar trial with 184 patients with an acute exacerbation of COPD,[2] a satisfaction questionnaire was administered to the HaH arm and 95% of respondents reported complete satisfaction with the service. However, they did not ascertain the degree of satisfaction of those in hospital nor were the views of the carers documented.

An important feature of our policy for HaH service was that patients were able to choose conventional hospital treatment. Our sample was therefore biased towards those who felt they were suitable for HaH care, which might explain why a high percentage of patients in the domiciliary arm preferred HaH care. The significantly higher preference for domiciliary care in the HaH arm of patients and carers compared with the inpatient arm suggests that patients' and carers' conceptions of HaH care were positively reinforced by their experience of this form of care. It is possible that a proportion of patients in the conventional arm who preferred inpatient care may have changed their minds had they experienced HaH care. This finding has important implications in settings where HaH care is offered as a service with no choice given to the patients.

The conventionally managed group had daily visits by the RONs to complete the daily progress charts and symptom questionnaires which would not be the case in usual inpatient care. The patients may have felt more "looked after" than normal inpatients would, and the response in this group may therefore have been tempered by the Hawthorne effect affecting its applicability.

In conclusion, our experience in patients who fulfilled the criteria for HaH care of acute exacerbations of COPD shows that both patients and carers were significantly more likely to prefer domiciliary care if they were in the HaH arm, despite satisfaction with care being similar in the two arms. Since patients had to be willing to be looked after at home, both patients' and carers' perceptions of the benefits of HaH care were reinforced by their experience. HaH care of exacerbations of COPD is the preferred option in suitable patients. The results of this study should encourage clinicians to advocate this form of management. They may also help to reassure patients and carers who are offered HaH management.

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Appendices 1 and 2 are available in full on the *Thorax* website (www.thoraxjnl.com).

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