RESPIRATORY MEDICINE (1998) **92**, 1000–1002

Starting home nebulizer therapy: patients' expectations and subsequent outcome at 2 months

A. J. SIMPSON, P. M. TWEEDDALE AND G. K. CROMPTON

Respiratory Medicine Unit, Western General Hospital, Crewe Road South, Edinburgh EH4 2XU, U.K.

Twenty-six patients with severe COPD or asthma completed standard questionnaires before, and 2 months after, starting home nebulized bronchodilator therapy. Patients' perceived illness severity and their expectations of treatment with regard to symptoms were examined in the first questionnaire, and outcome was assessed in the second. Before treatment started patients expected a definite improvement in all symptoms studied. After treatment the group showed only a marginal subjective improvement in all symptoms. The improvement attained with regard to breathlessness, ability to get out and about, and general quality of life was significantly lower than had been expected. While home nebulized bronchodilator therapy is well tolerated and confers some subjective benefit in selected individuals, patients appear to have unrealistically high expectations of treatment.

RESPIR. MED. (1998) **92**, 1000–1002

Introduction

The recent proliferation in availability of inhaled drug delivery systems has been paralleled by increasing debate over the most appropriate mode of delivery to prescribe for individual patients with chronic airflow limitation (1,2). Domiciliary nebulizers are often prescribed for patients with chronic asthma and chronic obstructive pulmonary disease (COPD) who have considerable practical difficulty with other forms of bronchodilator delivery, or who derive little clinical benefit from them. While evidence on the effectiveness of home nebulized bronchodilator therapy has been conflicting (3–5), in recent years evidence has begun to emerge pointing to the relative long-term safety and acceptability of home nebulized therapy in carefully selected groups of patients (6,7).

Most studies examining the effects of home nebulizer therapy have concentrated on analysing symptoms or objective measurements of lung function, and few have considered the expectations of patients about to start treatment with a home nebulizer. We aimed to study the expectations of such patients, particularly with regard to the nebulizer's effect on symptoms.

Patients and Methods

The study was based on two standard questionnaires completed by patients before, and 2 months after starting domiciliary nebulized bronchodilator therapy. The questionnaires were designed in keeping with the guidelines described by Stone (8).

Thirty-nine consecutive patients referred by local consultants for home nebulized treatment were asked to complete the questionnaires. Six patients declined to participate, and seven failed to return the second questionnaire, leaving 26 responses for analysis. Fifteen of the respondents were female. The primary diagnosis was COPD in 18 cases and asthma in six. One patient had pulmonary fibrosis in addition to 'reversible airflow obstruction' and one patient had 'chronic airflow limitation'. Thirteen of 18 patients had a documented response to bronchodilators above that expected by normal variability (9). Eight patients had no documented test with bronchodilators in the laboratory (of whom four had a diagnosis of asthma). The mean FEV_1 was 0·89 l (SD 0·53) and the mean vital capacity 1·94 l (SD 0·68). Twenty-two patients had received treatment via a nebulizer in the acute setting at least once before (18 in hospital, four prescribed by the general practitioner) and one had used a nebulizer previously in an elective setting.

At the time of receiving the home nebulizer, 23 patients were being treated with inhaled β_2-agonists and 21 with inhaled anticholinergics. Sixteen were on treatment with an inhaled glucocorticoid and two were taking oral prednisolone. Six were being treated with an inhaled long-acting β_2-agonist and four were taking an oral theophylline.

The first questionnaire was designed to assess the patients' treatment, their perceived severity of illness, and their expectation of how the nebulizer would affect symptoms. Patients were asked to indicate whether they expected certain symptom complexes (breathlessness, ability to get out and about, cough, perceived 'number of

Received 24 October 1997 and accepted in revised form 2 March 1998

Correspondence should be addressed to: J. Simpson, Rayne Laboratory, Respiratory Medicine Unit, Medical School, Teviot Place, Edinburgh EH8 9AG, U.K.

0954-6111/98/081000+03 $12.00/0

TABLE 1. Patients' descriptions of symptoms before home nebulized bronchodilator therapy

	None	Mild	Severe	Very severe	No response
Breathlessness at rest	2	10	10	4	
Breathlessness on exertion	0	1	10	15	
Cough	4	15	4	2	1
Nocturnal symptoms	0	10	8	8	
Difficulty getting out and about	1	3	13	9	

TABLE 2. Expected and actual symptom scores. Patients ranked whether they expected each symptom to become much better, better, unchanged or worse (before starting home nebulizers) and used the same ranking to describe the actual change in each symptom 2 months after starting home nebulizers. 'Much better' received a score of 2, 'better' 1, 'unchanged' 0, 'worse' −1. Results expressed as mean (SD). Patients answering 'don't know' in first questionnaire excluded

	n	Expected score	Actual score	
Breathlessness	26	1·35 (0·48)	0·69 (0·84)	$P<0·005$
Ability to get out and about	21	1·10 (0·54)	0·24 (0·77)	$P<0·005$
Cough	19	0·68 (0·75)	0·74 (0·73)	n.s.
Number of chest infections	17	0·65 (0·61)	0·29 (0·69)	n.s.
Quality of sleep	22	0·73 (0·63)	0·41 (0·67)	n.s.
Quality of life	22	1·04 (0·58)	0·46 (0·67)	$P<0·005$

n.s.: not significant

chest infections', quality of sleep, and general quality of life) to get worse, stay unchanged, get better, or get much better ('don't know' was also an available option). The response for each symptom was graded from −1 (worse) to 2 (much better). The use of the nebulizer was demonstrated to all patients, clear instructions were given regarding the prescribed frequency of use, and an instruction leaflet was issued.

Two months after starting treatment the second questionnaire was sent by post. This assessed the perceived effect of the nebulizer on the same symptom complexes addressed in the first questionnaire, using the same available responses, and in addition enquired about changes in treatment, frequency of nebulizer use, and side-effects.

Intra-patient comparisons of symptom scores were carried out using Wilcoxon's signed rank test, with significance taken as $P<0·05$.

Results

Before home nebulizers were instituted breathlessness on exertion and difficulty getting out and about were the most troublesome symptoms, being described as severe or very severe by 25 and 22 patients respectively (Table 1).

The average expectation was for an improvement in all symptom complexes studied (Table 2). The greatest benefit was expected for breathlessness, general quality of life, and ability to get out and about.

After home nebulized bronchodilators were started there was a small mean subjective improvement in all symptom complexes (Table 2). For the symptom complexes in which expectation of improvement had been highest (breathlessness, ability to get out and about, and general quality of life), the actual perceived changes after treatment were, statistically, significantly lower than had been expected (Table 2). In contrast, where expectation for improvement in a given symptom was low before treatment started, no statistically significant difference emerged when comparing expected and actual outcomes. No differences in the degree of symptomatic improvement were found when comparing patients with and without documented bronchodilator reversibility (data not shown).

The daily frequency of nebulizer use matched that prescribed in all cases. After 2 months of home nebulized bronchodilators two patients with COPD had stopped using metered dose inhalers. Three patients reported side-effects of nebulized bronchodilator therapy (nausea and vomiting; sore eyes and a facial rash; and dry throat).

Discussion

Recent evidence from a prospective study has suggested that the long-term use of home nebulized bronchodilators is

safe when compared to long-term metered dose inhaler use, and confers continued spirometric advantage for at least 3 years (7). We have studied the views of a small group of patients with severe chronic airflow obstruction starting home nebulized bronchodilators for the first time. Using a simple scoring system we found that, in the shortterm, introduction of the nebulizer resulted in average subjective benefit in all symptoms studied. These findings are generally in keeping with findings elsewhere (4,6). However, the subjective improvements in symptoms were generally small, the greatest benefits being observed in perceived breathlessness and cough. The observed improvement in symptoms might indeed be slightly over-estimated, if one were to assume that seven of 33 patients failing to return the second questionnaire were non-compliant on the grounds of minimal benefit.

The patients studied generally tolerated the introduction of nebulized bronchodilator therapy well with only three out of 26 patients reporting side-effects, which is lower than rates described elsewhere (4,6).

In general patients' expectations of symptomatic improvement far exceeded the subjective improvement derived in the shortterm from nebulized therapy. This trend was most pronounced when the initial expectation of improvement was highest. This implies that most patients have unrealistically high expectations of symptomatic improvement. By identifying those symptom complexes for which expectation out-weighs perceived benefit most strikingly (e.g. breathlessness and ability to get out and about), it should be possible to give patients advice relating to degrees of improvement that might realistically be expected. Such advice could be incorporated into the education given to patients before starting treatment, a process known to improve successful implementation of therapy in children (10).

References

1. Ariyananda PL, Agnew JE, Clarke SW. Aerosol delivery systems for bronchial asthma. *Postgrad Med J* 1996; **72:** 151–156.
2. Pedersen S. Inhalers and nebulizers: which to choose and why. *Respir Med* 1996; **90:** 69–77.
3. Jenkins SC, Heaton RW, Fulton TJ, Moxham J. Comparison of domiciliary nebulized salbutamol and salbutamol from a metered-dose inhaler in stable chronic airflow limitation. *Chest* 1987; **91:** 804–807.
4. Morrison JFJ, Jones PC, Muers MF. Assessing physiological benefit from domiciliary nebulized bronchodilators in severe airflow limitation. *Eur Respir J* 1992; **5:** 424–429.
5. O'Driscoll BR. Nebulisers for chronic obstructive pulmonary disease. *Thorax* 1997; **52** (Suppl. 2): S49–S52.
6. O'Driscoll BR, Kay EA, Taylor RJ, Weatherby H, Chetty MCP, Bernstein A. A long-term prospective assessment of home nebulizer treatment. *Respir Med* 1992; **86:** 317–325.
7. O'Driscoll BR, Bernstein A. A long-term study of symptoms, spirometry and survival amongst home nebulizer users. *Respir Med* 1996; **90:** 561–566.
8. Stone DH. How to do it: design a questionnaire. *Br Med J* 1993; **307:** 1264–1266.
9. Tweeddale PM, Alexander F, McHardy GJR. Short term variability in FEV_1 and bronchodilator responsiveness in patients with obstructive ventilatory defects. *Thorax* 1987; **42:** 487–490.
10. Madge PJ, Nisbet L, McColl JH, Vallance A, Paton JY, Beattie JO. Home nebuliser use in children with asthma in two Scottish health board areas. *Scot Med J* 1995; **40:** 141–143.