

# Feasibility and effectiveness of a pulmonary rehabilitation programme in a community hospital setting

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## SUMMARY

**Background:** Pulmonary rehabilitation programmes run in secondary care have proved to be one of the most effective interventions for patients with chronic obstructive pulmonary disease (COPD).

**Aim:** To assess whether a pulmonary rehabilitation programme, similar to that run in secondary care, could be established in a primary care-run community hospital and whether it could achieve similar benefits in patients with moderately severe COPD.

**Design of study:** Uncontrolled prospective intervention study.

**Setting:** A primary care-run community hospital.

**Method:** Thirty-four patients with COPD aged between 53 and 80 years of age (mean = 70 years) with a forced expiratory volume (FEV<sub>1</sub>) of 30 to 50% (mean = 40%) predicted were enrolled in a programme established in the activities room at Honiton Community Hospital. Patients were assessed at the start, on completion of the programme, and six months after completion, using spirometry, shuttle-walking distance, and short form-36 (SF-36) and chronic respiratory questionnaire (CRQ) scores.

**Results:** All but one patient completed the programme. There were significant improvements in the walking distance (by a mean of 100 m), in the SF-36, and in all domains of the CRQ. There was no significant change in the FEV<sub>1</sub> or forced vital capacity.

**Conclusion:** Pulmonary rehabilitation programmes can be run in community hospitals. They appear to be as effective as those run in secondary care and patients may find them easier to access.

**Keywords:** COPD; hospitals; community; respiratory function tests.

## Introduction

THERE is now a general recognition of the effectiveness of pulmonary rehabilitation, both at increasing exercise tolerance and at reducing symptoms in patients with chronic obstructive pulmonary disease (COPD). Randomised controlled trials have shown sustained improvements in walking performance and quality of life following both hospital and home-based rehabilitation.<sup>1-13</sup> Programmes are widely available in North America and Europe, and both the American Thoracic Society and the European Respiratory Society have published official statements describing the benefits and essential components of a rehabilitation programme and recommending patient selection criteria.<sup>14-15</sup> The British Thoracic Society has also published a statement on the benefits of pulmonary rehabilitation,<sup>16</sup> but a recent survey suggested that it is only available in one quarter of United Kingdom (UK) hospitals.<sup>17</sup> Eighty per cent of those offering a programme ran outpatient programmes, but 5.5% also offered a home-based programme.

Rehabilitation aims to prevent deconditioning and allow the patient to cope with their disease. Most programmes are hospital-based and comprise individualised exercise programmes and educational talks, but a major component is the sharing of experiences among participants and their spouses. Pulmonary rehabilitation can reduce symptoms, increase mobility, and improve quality of life,<sup>14,16</sup> and it may also reduce hospital readmission rates. The optimal duration of rehabilitation programmes and the optimum frequency of the exercise sessions remains uncertain.<sup>16</sup>

Although they are effective, programmes based in secondary care suffer from a high dropout rate and patients may be deterred from attending because of frequent journeys to the hospital.<sup>6</sup> Those based in the home may be less effective because patients do not perform the prescribed exercises and they miss out on the group therapy aspects of hospital-based programmes.<sup>18</sup> There has been interest in running programmes in primary care, but we are not aware of a programme that has been established in a community hospital. In the UK these hospitals are the successors to the cottage hospitals,<sup>19</sup> and the term does not mean the same in North America. They are now primarily staffed by general practitioners (GPs), and one of their roles is rehabilitation. They often have good physiotherapy facilities. There has been a pulmonary rehabilitation programme based at the Royal Devon and Exeter Hospital since 1995, but we wanted to investigate the feasibility of establishing and running a primary care-led programme at the community hospital in Honiton.

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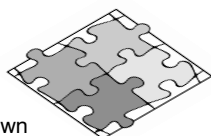
#### HOW THIS FITS IN

##### *What do we know?*

Pulmonary rehabilitation programmes based in secondary care have been shown to be effective ways of improving exercise tolerance and quality of life in patients with COPD, but patients often find it difficult to get to a hospital and up to 20% of patients do not complete the programme.

##### *What does this paper add?*

This study shows that pulmonary rehabilitation programmes can be established in a primary care setting and they can achieve just as good results as those based in secondary care. Primary care trusts should consider establishing programmes.



## Method

Honiton is a small market town in east Devon. It is 18 miles from Exeter which has the nearest secondary care centre. Medical care in Honiton is provided by a single group practice serving a population of over 15 000. The partners also supervise inpatients in the hospital. One of the partners provided the medical lead for the programme.

Honiton hospital has 25 medical beds, a casualty department, and outpatient, physiotherapy and occupational therapy facilities. It is located a short distance from the town centre and has excellent parking facilities.

### *Patient characteristics*

Patients were identified from their practice records and invited to attend for spirometry, reversibility testing, and an interview with the nurse.

Patients were considered suitable for the rehabilitation programme if they met the following criteria: diagnosis of COPD, forced expiratory volume (FEV<sub>1</sub>) 30% to 50% predicted; breathlessness interfering with daily living activities; ability to provide own transport to the hospital; sufficient mobility to travel to the hospital; and no other unstable medical conditions. Patients meeting these criteria were asked if they wished to participate.

During confirmation of the diagnosis, the patients were advised on the best use of their medication and suggestions were made to the patients' GPs regarding possible changes to their drug regimens.

### *Assessment*

Once they had agreed to participate in the rehabilitation programme, patients were assessed by a research nurse and a physiotherapist, who administered quality-of-life questionnaires (chronic respiratory questionnaire [CRQ] and short form-36 questionnaire [SF-36])<sup>20,21</sup> and performed a shuttle-walking test.<sup>22</sup> Patients entered the programme shortly after assessment. Assessments were repeated at the end of the programme and six months after finishing the programme. Both the CRQ and the SF-36 questionnaires produce scores in a number of domains which reflect different aspects of health status, such as dyspnoea or vitality, as well as an overall summary score. Higher scores reflect worse health status.

## *The programme*

The programme was based on the Exeter programme, which was itself based on the Leicester programme,<sup>9</sup> and comprised a 45-minute exercise programme; a 30-minute coffee break, to allow rest and socialisation; and a 45-minute educational session. A physiotherapist and physiotherapy aide supervised each session. Patients attended for two hours twice a week for eight weeks. We aimed to enrol ten patients in each programme. Three courses were run as part of this feasibility study. The sessions were held in the activities room at Honiton Hospital.

The exercise sessions began with a short warm-up and stretch. Patients then performed exercises at ten different stations in rotation. Some of these exercises worked arms, others worked the upper body, and others the legs. Some were designed to be performed aerobically, while others were more anaerobic. The exercises were timed in 30-second bursts and patients recorded the number of repetitions on their charts, together with their breathlessness scores.

The topics covered in the educational sessions were similar to those used in the Exeter programme and were in line with those recommended by the ATS and ERS.<sup>14,15</sup> The speakers were health care workers from the local community, some of whom were already known to the patients, and members of the local social services, sports centre, and self-help groups. They all gave their services free of charge.

### *Statistical analysis*

The study did not include a control group. The significance and magnitude of differences between the baseline, completion, and follow-up assessment spirometric values, walking distances, and CRQ and SF-36 scores, were calculated using paired *t*-tests with the aid of SPSS for Windows 9.0.

## Results

Thirty-four patients were asked if they wished to take part in the programme. Twenty-eight were enrolled: nine in the first programme, ten in the second, and nine in the third. The average age of the patients was 70.3 years, and the range was from between 53 and 80 years of age. There were 25 men and three women. The patients' baseline lung function, shuttle walk distances, and SF-36 and CRQ scores are shown in Table 1. Two of the patients were current smokers.

Only one patient dropped out before completing the programme. This individual was unconvinced of the potential benefits of the programme and failed to participate fully in the exercises. All the other patients completed the programme. One patient had been offered a place in the Exeter programme but had declined because of perceived difficulties in travelling to Exeter twice per week and parking at the hospital. He completed the community-based programme.

The effect of the programme on lung function, walking distance, and quality of life are shown in Table 2. There was no significant change in the FEV<sub>1</sub> or forced vital capacity (FVC) between the baseline and completion assessments, or between the completion and follow-up assessments. There were significant improvements in the distance walked during the shuttle test and in disease-specific quality of life as

assessed by the chronic respiratory questionnaire. With the exception of emotional functioning, there were no significant changes in quality of life at the six-month follow-up. There were clinically and statistically significant improvements in the physical function, vitality and mental health domains of the SF-36 immediately following the programme, and these were also maintained at follow-up.

## Discussion

The aim of this study was to determine whether a pulmonary rehabilitation programme could be run at a community hospital that could produce similar benefits to those reported from secondary care-based programmes. It did not include

a control group, therefore the magnitude of the benefits produced must be viewed with caution, but our principal conclusion is that it is feasible to run pulmonary rehabilitation programmes in the community. The results suggest that clinically-significant benefits can be achieved, and it appeared that running the programme in a primary care setting also resulted in very low dropout rates, unlike in most secondary care-based programmes.

No significant difficulties were encountered in establishing the programme, although inevitably it required a lot of work on the part of the lead clinician. The hospital was able to provide a large room to accommodate the sessions. We were unable to use the physiotherapy department, as this would have disrupted the work there. Only very small amounts of additional equipment were required, such as clipboards for the patients to record their progress. The lead GP co-ordinated the education programme and liaised with the other partners about selection of the patients. All of those involved with the programme described great satisfaction at the response of the patients to the programmes.

The programme was enthusiastically received by the patients and their partners and it generated considerable interest in the community. The local newspaper ran a feature about the programme and the hospital League of Friends were keen to offer support for further programmes.

Recruitment to the first programme relied on the enthusiasm of the nurses and the lead GP in explaining to patients the nature and potential benefits of pulmonary rehabilitation. Thereafter, recruitment of suitable screened patients was more straightforward, as many of them had heard about the programme by word of mouth or had read an article published in the local newspaper. Thus, they already knew a little about the concept of a pulmonary rehabilitation programme.

The patients who entered into this programme appear to have been similar to those entering hospital-based programmes. The baseline lung function results and shuttle

Table 1. Baseline characteristics (n = 27).

	Mean ( $\pm$ SEM)
FEV <sub>1</sub> (l)	0.99 $\pm$ 0.05
FEV <sub>1</sub> (% predicted)	40 $\pm$ 2
FVC (l)	2.36 $\pm$ 0.15
FVC (% predicted)	66 $\pm$ 4
FEV <sub>1</sub> /FVC ratio (%)	44 $\pm$ 2
Shuttle walk distance (m)	199 $\pm$ 22
CRQ domain	
Dyspnoea	3.5 $\pm$ 0.2
Fatigue	4.0 $\pm$ 0.2
Emotion	5.1 $\pm$ 0.2
Mastery	5.2 $\pm$ 0.2
SF-36	
Physical	38.6 $\pm$ 3.9
Role — physical	27.7 $\pm$ 6.6
Bodily pain	65.9 $\pm$ 5.6
General health	42.9 $\pm$ 3.5
Vitality	47.3 $\pm$ 3.3
Social function	67.6 $\pm$ 5.6
Role — emotional	57.3 $\pm$ 8.9
Mental health	69.5 $\pm$ 2.6

SEM = standard error of the mean

Table 2. Changes in spirometry, shuttle walk distances, and CRQ domains between baseline and completion of the rehabilitation programme and between completion and the six-month follow-up assessment.

	Mean difference (95% CI)	
	Baseline versus completion	Completion versus follow-up
FEV <sub>1</sub> (l)	0.10 (–0.02 to 0.21)	0.04 (–0.01 to 0.10)
FVC (l)	0.23 (0 to 0.45)	0.04 (–0.21 to 0.13)
Shuttle walk (m)	100 (61 to 139) <sup>a</sup>	25 (–20 to 70)
CRQ domain		
Dyspnoea	0.71 (0.21 to 1.23) <sup>b</sup>	0.11 (–0.14 to 0.38)
Fatigue	0.60 (0.14 to 1.05) <sup>c</sup>	–0.18 (–0.50 to 0.15)
Emotion	0.63 (0.22 to 1.04) <sup>b</sup>	–0.56 (–0.93 to –0.18) <sup>b</sup>
Mastery	0.58 (0.18 to 0.98) <sup>b</sup>	–0.12 (–0.42 to 0.18)
SF-36 domain		
Physical	6.7 (0.8 to 12.5) <sup>c</sup>	–0.7 (–5.5 to 4.1)
Role physical	5.4 (–13.6 to 24.4)	–3.6 (–30.0 to 22.9)
Bodily pain	4.0 (–5.5 to 13.4)	7.0 (–1.8 to 15.8)
General health	1.2 (–6.7 to 9.1)	–1.1 (–8.4 to 6.3)
Vitality	6.1 (1.2 to 10.5) <sup>c</sup>	–1.2 (–9.3 to 6.9)
Social function	2.3 (–5.9 to 10.5)	0.8 (–9.1 to 10.7)
Role emotional	10.7 (–6.1 to 27.4)	7.1 (–13.1 to 27.4)
Mental health	10.8 (6.2 to 15.5) <sup>a</sup>	–2.5 (–9.5 to 4.4)

<sup>a</sup>P < 0.001; <sup>b</sup>P < 0.05; <sup>c</sup>P < 0.01.

walk distances of the patients entering this programme were similar to those reported for patients enrolled in secondary care-based programmes.<sup>7-9</sup> The baseline SF-36 scores were similar to those reported in other groups of patients with stable COPD, with the exception of the physical functioning and role physical domains, which were worse.<sup>23,24</sup> The baseline CRQ scores were also similar to those reported for patients entering pulmonary rehabilitation programmes.<sup>26</sup>

The benefits achieved in this community programme are at least as good as those reported from secondary care-based programmes. The improvement in walking distance was similar to that reported in other programmes<sup>7-9</sup> and was of considerable clinical importance. The improvements in the CRQ scores were both clinically and statistically significant and were similar to those previously reported.<sup>26</sup> The improvements in the SF-36 scores were similar to those seen, following pulmonary rehabilitation, in a group of patients awaiting lung volume reduction surgery.<sup>25</sup>

Running rehabilitation programmes in community hospitals offers advantages over secondary care-based programmes in terms of access and local ownership. They offer advantages over home-based programmes by maintaining motivation and ensuring compliance with the exercise programme, and they also provide peer support. Similar advantages could be gained by running programmes in other community settings using rooms large enough to accommodate the exercise stations. These could include sports centres, schools, and village or church halls. In fact, the sports centre in Honiton is now offering a follow-on programme for graduates of the group. Community-based rehabilitation programmes run by physiotherapists at their practices, involving between three and four patients only, have been reported from Holland and have also been shown to be effective.<sup>27</sup>

The East Devon Primary Care Trust, too, has agreed to fund the programme on a permanent basis as a result of the success of the programme. Programmes will be run in rotation at a number of the community hospitals in East Devon.

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