J Woo 胡令芳
E Hui 許鷗思
D Hui 許樹昌
CM Lum 林楚明
KH Or 柯加恆
T Kwok 郭志銳

A pilot study to examine the feasibility and acceptability of a community model for exercise prescription for patients with chronic disease

Key Messages

1. A model of community care for chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF) that incorporates exercise prescription is lacking, although the benefits of exercise for these diseases are established.
2. Group programmes incorporating exercise, disease education, and social support consisting of weekly sessions for 12 weeks were designed for COPD and CHF patients, in groups of 8 to 10. A home exercise programme was also prescribed.
3. This model was feasible, enjoyed good compliance, improved symptoms and measures of psychosocial outcome for both disease and improved exercise tolerance in the CHF group.
4. This model could be further developed as an integral part of community management for patients with chronic diseases.

Hong Kong Med J 2009;15(Suppl 2):S12-6

Department of Community and Family Medicine, The Chinese University of Hong Kong
J Woo, E Hui, D Hui, CM Lum, KH Or, T Kwok

HHSRF project number: 02030711

Principal applicant and corresponding author:
Prof J Woo
Department of Community and Family Medicine, The Chinese University of Hong Kong, Shatin, NT, Hong Kong SAR, China
Tel: (852) 2632 3141
Fax: (852) 2637 3852
E-mail: jeanwoowong@cuhk.edu.hk

Introduction

Chronic diseases such as osteoarthritis, heart disease, chronic obstructive airways disease, and diabetes mellitus, account for a large proportion of the Hong Kong Hospital Authority's health care expenditure. For example, during 1997, chronic obstructive airways disease accounted for the largest number of bed days occupied (BDO) in its acute hospitals, and the second largest number of BDO in all types of its hospitals. Ischaemic heart disease, heart failure, and diabetes ranked 5th, 6th, and 7th highest in terms of BDO for acute hospitals. Although accounting for half the BDO compared with diabetes mellitus, osteoarthritis is a common condition affecting the elderly population that gives rise to disability. With the ageing of the population, problems with mobility are also prevalent. Currently there is an emphasis on pharmacological treatment for chronic diseases for which there is no cure, when the approach should be to maximise the remaining quality of life. This might be achieved through promoting the capacity for independent living and social functioning, as well as psychosocial well being. Although the benefits of exercise in chronic disease prevention are well known, the benefits of physical activity among those with established diseases are not widely appreciated. Thus, in general an exercise prescription is seldom incorporated as part of chronic disease management. Currently, exercise forms part of short-term, hospital rehabilitation-based programmes for stroke, myocardial infarction, chronic obstructive lung disease, and osteoarthritis. In reality, exercise prescription should be applied to a wider spectrum of patients on a continuing basis as part of their therapy. Patients with the above chronic heart failure, diabetes mellitus, as well as the frail elderly with mobility problems merit exercise prescriptions.[1] Thus, improvements in exercise tolerance as well as psychological and social well being have been achieved in patients with chronic obstructive airways disease as well as heart failure.[1] This is in addition to the use of exercise in health promotion for disease prevention. However, it is uncertain how this should be incorporated into the disease management programme. Questions such as the site (home versus health care facility), the contents of the programme, whether it should be a group or individual programme, have largely been unexplored. A key target for any model of exercise prescription should be to motivate patients to persevere with such programmes. Therefore, any model should include characteristics that are likely to encourage compliance. The assumption of primary care patient services by the Hospital Authority in 2003 provides an opportunity to develop and test such a model for incorporating exercise prescriptions into the management of chronic diseases and frailty. Although this model of service provision has theoretical benefits, it is not known how the public or health care professionals may perceive its usefulness. Moreover, there is little information regarding the feasibility and possible benefits of such a model. Before this model is incorporated into existing services, a pilot study is needed to test its feasibility, with a view to a subsequent larger study to evaluate its effectiveness.

Aims

- To develop a model for community management of chronic disease and frailty, that incorporates exercise prescription, using chronic obstructive pulmonary disease (COPD) and chronic heart failure (CHF) as examples;

- To test its feasibility in community centres linked to COPDs;
- To determine patient response using quantitative and qualitative methods; and
- To document means of measuring physical performance as well as psychosocial well being before and after the programme.

Subjects and methods

This study was conducted from September 2004 to February 2005. Ambulant patients with COPD and CHF living in the community and able to go outdoors were targeted. From among these, patients admitted to hospital at least once in the past 12 months were recruited from (i) the medical wards of the Prince of Wales Hospital, Shatin Hospital, (ii) out-patient clinics, and (iii) enhanced home care facilities.

Subjects who were dyspnoeic at rest or on the slightest exertion (eg getting out of bed), who could not walk or follow instructions (eg due to dementia); who had uncontrolled angina; resting systolic blood pressure of >180 mm Hg or resting diastolic blood pressure of >100 mm Hg, resting tachycardia >100 bpm, unstable or acute heart failure were excluded. Patients with acute systemic illness (eg pneumonia), uncontrolled visual or vestibular disturbances, and any recent injurious fall were also excluded.

Exercise programmes

Although patients may be taught exercise routines to be carried out at home, we hypothesised that compliance may be better if conducted with a group in a community centre, since group settings could promote social interaction, simultaneously act as a chronic disease mutual support system, and allow regular contact with health carers. The programme was designed by a team of doctors, nurses and physiotherapists. In general aerobic exercise routines were suitable for improving cardiorespiratory function,[2] while resistance exercises were suitable for improving muscle strength and balance,[3] and exercise in general had metabolic benefits. In order to improve compliance, the exercise programme was devised to be enjoyable. For example, in a previous study it has been shown that walking exercise had a higher dropout rate than Tai Chi. Each disease group consisted of five to 10 patients, and was led by a trained research assistant, and two sessions per week (for each disease) were held, for a total of 12 weeks. At least three groups were held for each disease. Patients were also encouraged to carry out exercises on their own for the rest of the week.

Chronic obstructive pulmonary disease programme

Baseline measurements

These consisted of St Georges Respiratory Questionnaire,[4] the General Health Questionnaire (to assess subject knowledge regarding the disease), lung function measurements (FEV1, FVC), and the 6-minute walk test.

Intervention

This consisted of an educational talk, a group discussion, group exercises (warm up, breathing, free arm raising and sit-stand exercises with and without resistance, aerobic activities such as dancing), and weekly review of exercises carried out at home.

End of intervention assessment

Primary outcome measures

These were related to compliance (attendance rate at group sessions, number of days of exercise at home [recorded in a diary]) and patients' view of the service.

The patients' view of the usefulness of the service in relation to their functional ability, symptoms, general well being, intention to continue the programme, and value of mutual support were sought, using a structured questionnaire as well as by running focus groups. The focus group evolved as part of the last session. The following areas were explored with the group: the reason for agreeing to join the programme, comments on the running of the programmes (positive and negative aspects), and their perspective of the benefits of the programme itself. In addition, other spontaneous comments were also entertained from the participants. The discussions were recorded and then transcribed. Common themes were identified, and the responses grouped according to the categories. Additional comments that did not fall into these common themes were also listed.

Secondary outcome measures

These included repeat of baseline measurements to assess any symptom improvement, imporvement in general health, disease knowledge and exercise tolerance.

Chronic heart failure programme

Baseline measurements

These consisted of the CHF questionnaire, the test of knowledge regarding heart failure, the Social Support Survey Questionnaire,[5] and the Hospital Anxiety Depression Scale. These scales have already been used in an ongoing community study to evaluate the effect of relaxation therapy in CHF patients admitted to hospital. Comparison of results from the proposed study with the ongoing study can give some indication of the representativeness of the subjects, an important consideration pertinent to the small sample size of this pilot study. Body weight and blood pressure were recorded; body weight being an indicator of fluid balance, an important parameter related to the control of heart failure. The 6-minute walk test was used as an indicator of exercise tolerance, and biceps and quadriceps strength were measured using a dynamometer.

Intervention

This was similar to the programme for COPD, but with

Table 1. Comparison of psychological status at baseline and at the 12-week follow-up

Questionnaire*	Baseline† (n=33)	12-week follow-up† (n=33)	P value
GHQ- somatic symptoms domain	4.15 (2.54)	2.36 (1.82)	<0.001
GHQ- anxiety and insomnia domain	4.00 (2.96)	1.82 (1.93)	<0.001
GHQ- social dysfunction domain	8.85 (3.36)	6.48 (1.94)	<0.001
GHQ- depression domain	3.61 (3.57)	1.55 (2.22)	<0.001
GHQ- total score (/28)	20.61 (10.09)	12.21 (5.97)	<0.001
SGRQ- symptom domain (/99.99)	60.52 (24.10)	38.91 (19.27)	<0.001
SGRQ- activity domain (/99.99)	62.76 (29.52)	52.13 (25.90)	0.044
SGRQ- impact domain (/99.99)	46.36 (23.36)	26.34 (13.21)	<0.001
SGRQ- total score (/99.99)	53.69 (19.61)	34.72 (14.12)	<0.001

* GHQ denotes General Health Questionnaire, SGRQ St George's Respiratory Questionnaire

† Data presented as mean (standard deviation). Lower score represent better quality of life

Table 2. Comparison of the exercise endurance, and chronic obstructive pulmonary disease (COPD) knowledge at baseline and at the 12-week follow-up

	Baseline* (n=33)	12-week follow-up* (n=33)	P value
6-minute walking distance (m)	285 (96)	303 (98)	0.051
COPD knowledge test (/10)	6.6 (2.0)	8.8 (1.1)	<0.001

* Data presented as mean (standard deviation)

deletion of breathing exercises, which are specific to COPD.

End of intervention assessment

Primary outcome measures were the same as for COPD. Secondary outcome measures were repeat of baseline measurements to assess any change in disease knowledge, improvement in symptoms, psychological function, and muscle strength.

Results

Chronic obstructive pulmonary disease

Based on the recruitment criteria, 44 subjects with COPD participated in the Community Pulmonary Rehabilitation Programme (CPRP). Their mean age was 74 (standard deviation [SD], 7) years. After 12 weeks of CPRP, 33 subjects finished and 11 dropped out, mainly due to frequent readmissions to hospital, moving to Old Aged Homes or out of the Shatin district, transport problems, and comorbidity. Only two subjects refused exercise. Among those who completed the programme, the average attendance rate at the sessions was 78% (40%-100%). Compliance with home exercises, calculated as the number of sessions recorded in the diary divided by the prescribed number, was 77%.

Outcome evaluation

There was a statistically significant improvement in symptoms and all psychological domains (Table 1), as well as disease knowledge (Table 2). Mean exercise tolerance improved by 18 metres (6%) in the 6-minute walking test, although this was not statistically significant.

Programme evaluation

The vast majority (97%) of the subjects could follow the exercise and noted a general improvement in physical status. Most (86%) did not have problems travelling from home to the community centre. Three quarters (76%) of the participants felt that the group setting was supportive; it enabled continuous coping with their disease and were willing to re-attend any similar course next time. Over half (52%) preferred group exercise to home exercise.

In the focus group interviews regarding the disease, a major preoccupation was with finding ways to minimise the shortness of breath interfering with normal daily activities and consequential social isolation. Other comments regarding the disease included: lack of control, a desire to live longer in the event that newer, more effective treatments became available, and the expectation that the programme could improve symptoms.

Regarding the intervention programme, seven major themes emerged, relating to: acquiring knowledge, increasing exercise tolerance, encouragement to stop smoking, fewer visits to doctors or hospitals, making life happier and more meaningful, gaining a sense of accomplishment and improvement in self confidence, and psychological support.

Other general comments showed that the subjects perceived the programme as filling a service gap. However, participants wanted the group leader to demonstrate exercises by doing the moves simultaneously with the subjects at the same pace, to facilitate following all the steps. The group leaders have noted that in the group setting, participants commented on each other's health behaviours (eg smoking), and discussed the impact of their disease on family relationships.

Chronic heart failure

Thirty-seven subjects participated in the programme. The

Table 3. Evaluation of programme questionnaire

No.	Question	Disagree (%)	Ambiguous (%)	Agree (%)
1	I will attend the similar course next time	3	16	81
2	I can finish all exercises	0	9	91
3	I prefer group exercise than home exercise	28	19	53
4	I feel that my physical health is better than before	0	6	94
5	The group mates help me handle my disease	3	9	88
6	I did not have any travelling problem	0	3	97

Table 4. Baseline and 12-week follow-up data in psychosocial measures

	Baseline score* (n=37)	12-week score* (n=32)	Differences within groups* (pair=32)	P value
The Hospital Anxiety and Depression Scale†				
Anxiety	5.86 (3.84)	3.47 (3.03)	-2.41 (3.26)	<0.001
Depression	8.59 (4.67)	5.44 (3.28)	-2.97 (3.61)	<0.001
Medical Outcome Study Social Support Survey				
Tangible	67.40 (24.70)	85.94 (14.02)	16.99 (18.26)	<0.001
Affectionate	56.08 (26.55)	73.18 (26.84)	16.41 (19.68)	<0.001
Positive social interaction	46.79 (26.54)	60.94 (27.03)	13.48 (22.46)	0.002
Emotional/informational	46.96 (21.47)	59.47 (22.13)	13.28 (19.67)	0.001
The Chronic Heart Failure Questionnaire				
Dyspnoea	4.05 (0.95)	5.31 (0.92)	1.26 (0.82)	<0.001
Fatigue	4.21 (1.17)	5.01 (0.94)	0.80 (0.92)	<0.001
Emotional function	4.60 (1.39)	5.37 (0.99)	0.77 (0.85)	<0.001
Mastery	4.69 (1.20)	5.31 (0.92)	1.20 (1.03)	<0.001

* Data are presented as mean (standard deviation)

† Lower scores represent better condition

Table 5. Baseline and 12-week follow-up data in the 6-minute walking test, muscle strength test, and chronic heart failure (CHF) knowledge questionnaire

	Baseline score* (n=37)	12-week score* (n=32)	Differences within groups* (pair=32)	P value
Muscle strength test (kg)				
Quadriceps right	12.78 (4.97)	19.12 (5.28)	6.34 (5.57)	<0.001
Quadriceps left	12.88 (5.38)	18.31 (4.35)	5.43 (5.22)	<0.001
Biceps right	15.98 (6.63)	18.88 (6.20)	2.89 (4.45)	0.001
Biceps left	14.88 (5.64)	18.09 (5.45)	3.20 (3.82)	<0.001
6-minute walking test (m)	329.51 (103.18)	380.87 (90.32)	30.13 (38.93)	<0.001
CHF knowledge test (/10)	7.76 (1.69)	9.63 (0.55)	1.56 (1.39)	<0.001

* Data are presented as mean (standard deviation)

mean age of the subjects was 74 (SD, 8) years. The mean participation rate for the 12 sessions was 91% (SD, 11%). A total of 87% of the subjects completed the 12-week course. The majority gave a positive questionnaire assessment of the programme (Table 3). While there was general agreement with the beneficial nature of the programme, only about half preferred participating in a group. There was significant improvement in all psychosocial measures (Table 4), muscle strength, exercise tolerance, and disease knowledge (Table 5).

In the group interviews, discussions targeted three main themes: the reasons subjects wanted to join the programme, experience with the group programme, and the perceived benefits and effectiveness of the programme. Regarding the reasons for joining the programme, four common themes were identified: improving physical health, improving symptoms, desire for more knowledge, and a hope to reduce hospital admissions.

Seven common themes were identified in discussing the experience with the group programme: more motivation to exercise in a group; benefits of mutual support in promoting learning; enjoyment; reduced psychological burden; benefit of group sessions in behaviour modification; improved awareness of disease prevention; and increased social contact.

Regarding the benefits and effectiveness of the programme, seven themes were identified: ability to develop a regular exercise habit; improvement in symptoms; ability to modify diet; increased knowledge in disease management; psychological support; increased social contact; and prevention of hospital admissions.

Discussion

This study showed that a group programme for COPD and CHF patients is feasible in the setting of a community

centre, and was able to achieve improvement in symptoms and quality of life, with good compliance. It catered to current unmet needs, in the area of patient education, and rehabilitation group support, in an easily accessible setting. The emphasis on patient empowerment follows the Wagner model of management of chronic illness, in mobilising community resources, to enable patients to be the principal caregivers. Such models have also been widely promoted in the UK, and the US.

The main advantage of a group setting is that one group leader can cater for more than one patient at a time, whilst achieving similar results to more labour-intensive one-to-one settings. Other advantages include: feedback from patients, the exercise programme can become part of a daily social routine, knowledge can be reinforced in a group setting, and facilitation of behaviour modification such as smoking cessation. The group environment could also reduce social isolation, and anxiety/depression, possibly by improving self-efficacy or self-esteem, or through mutual support. A palliative care component may be built on this framework in future. Such a service in the setting of a community centre attached to a primary care clinic would be easily accessible, and referrals to doctors could be easily arranged. With the development of the nurse practitioner or nurse consultant, the programme can be nurse-led, or led by trained volunteers (under the supervision of a nurse, or patient leader).

Currently, in Hong Kong patients with COPD and CHF form the largest group of patients readmitted within 28 days of discharge, but it is unclear what percentage of these is avoidable. This study shows that a considerable improvement could be made in the care of these patients in the community. Addressing these unmet needs, particularly in the psychosocial category, may help reduce use of hospital services. However, improvement in quality of care of chronic diseases may not always translate into cost savings, as demonstrated for diabetes mellitus. In the case of COPD and CHF, since the intervention largely dealt with exercises, education and mutual support rather than investigations and multiple drug therapies, such a community model may result in cost savings as well as improved quality of care.

There were limitations to the study. This was essentially a pilot study where a group community intervention programme was designed and tested for feasibility and acceptability. It was not a randomised controlled trial comparing intervention versus usual management. Since there were many components in the programme, it is uncertain whether one or more of them was responsible for the good outcomes. Moreover, some of the benefits highlighted in the focus group were difficult to quantify. The number of subjects was small, and there was no information on what percentage of eligible patients would agree to join. Arguably those who participated were a select group who were already motivated. No costings were carried out, and the impact on hospital readmissions was not measured, due to the small number of subjects and the short duration of the observations. It is uncertain whether a programme of 3 months duration would have a long-lasting impact. From the exercise and psychological viewpoint, the intervention should ideally form part of the regular activity of community centres, in place of the predominantly social nature of activities. In spite of these limitations, this pilot study shows that a group community intervention programme for COPD and CHF patients is feasible and acceptable, achieves improvement in disease knowledge, symptoms and quality of life. Such a model could be developed further as an initiative in the management of chronic diseases in the community.

Acknowledgement

This study was supported by the Health and Health Services Research Fund (HHSRF: 02030711), Food and Health Bureau, Hong Kong SAR Government.

References

1. Young A, Harries M Edr. Physical activity for patients: an exercise prescription. Royal College of Physicians 2001.
2. Kavanagh T, Myers MG, Baigrie RS, Mertens DJ, Sawyer P, Shephard RJ. Quality of life and cardiorespiratory function in chronic heart failure: effects of 12 months' aerobic training. Heart 1996;76:42-9.
3. Feigenbaum MS, Pollock ML. Prescription of resistance training for health and disease. Med Sci Sports Exerc 1999;31:38-45.
4. Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self-complete measure of health status for chronic airflow limitations. The St. George's Respiratory Questionnaire. Am Rev Respir Dis 1992;145:1321-7.
5. Yu DSF, Lee DTF, Woo J. Establishing the validity and reliability of the Chinese versions of the Chronic Heart Failure Questionnaire and the Medical Outcome Study Social Support Survey. HSRC Report September 2002 and Annual Symposium of the 10th HK Association of Gerontology Nov 30, 2002. Available at: http://fhbgrants.netsoft.net/report/S112002fr.pdf.