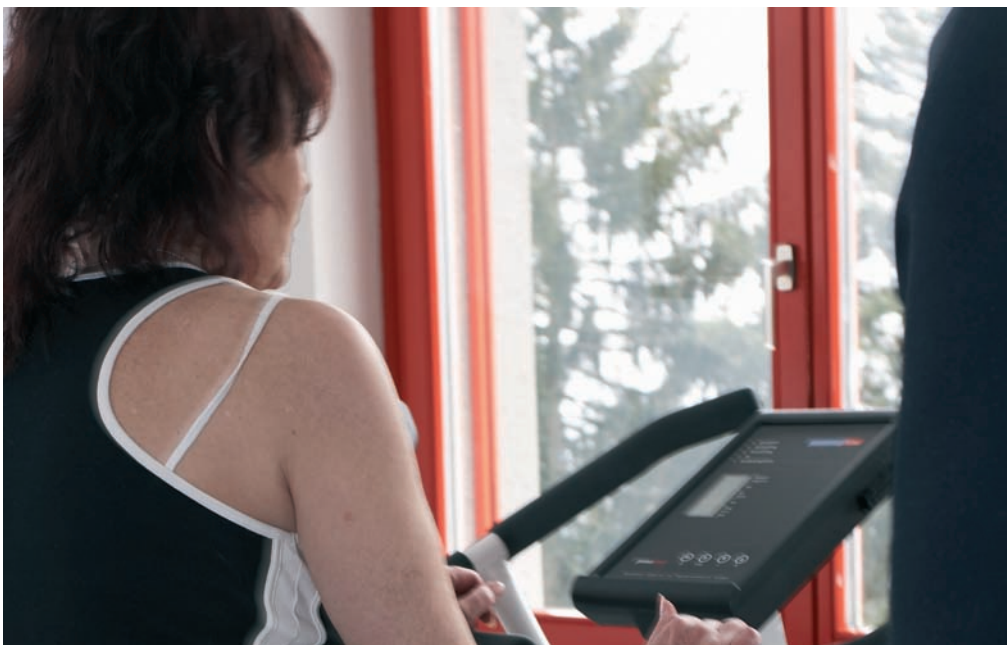


This article has been modified from an ERS School Course held in Pisa, Italy in 2008. The original slides, webcast and material can be found at www.ers-education.org

Home-based rehabilitation



R. Guell

Departament de Pneumologia
Hospital de la Santa Creu I Sant Pau
Av. Sant Antoni Ma Claret, 167
08025 Barcelona
Spain
E-mail: mguellr@santpau.es

Competing interests
None declared

Provenance
Adapted from an ERS School Course

Educational aims

- › To review the benefits of home-based pulmonary rehabilitation programmes.
- › To describe the structure, contents and limitations of these programmes.

Summary

The evidence to date suggests that, in terms of exercise capacity and HRQoL, home-based programmes offer similar benefits to those provided by hospital-based programmes. Home-based PR programmes have also been shown to reduce the use of medication, and the number of exacerbations and hospitalisations. These programmes may even provide longer-lasting benefits. Therefore, such programmes can be prescribed with confidence. However, they must be well-structured and adhere to some guidelines.

Systematic reviews of a number of randomised trials have demonstrated small-to-moderate improvements in functional exercise capacity and health-related quality of life (HRQoL) in patients with chronic obstructive pulmonary disease (COPD) who receive pulmonary

rehabilitation (PR) [1–4]. PR may also impact positively on health expenditure, mainly by reducing the number of hospitalisations [1].

Inpatient (and outpatient) hospital-based PR programmes for COPD patients are expensive. Moreover, the scientific evidence to support such

Educational questions

1. What are the possible limitations of home-based PR programmes?

- The lack of a multi-disciplinary support team
- Training intensity.
- Disease severity.
- All of the above.

2. What are the PR components of PR programmes?

- Education, physiotherapy and muscular training.
- Education.
- Respiratory muscle training.
- Psychosocial support.

3. What is the best structure for a home-based PR programme?

- Give instructions at the hospital, design the programme according to the disease and offer some degree of supervision.
- Explain the components of the programme and give some instructions to patients.
- Prescribe a high-intensity muscular training programme alone.
- Give instructions about respiratory muscle training.

Home-based PR programmes

- > Home-based PR programmes are as beneficial as hospital-based ones and may even be more so in the long run.
- > The benefits are independent of disease severity.
- > Education, physiotherapy and training of upper and lower extremities should be considered.
- > Both high- and low-intensity training are beneficial.
- > An initial evaluation in the hospital and periodic supervision are important.

programmes, in terms of cost-effectiveness, is extremely weak (evidence grade 2C) [1]. In addition, hospital-based programmes generally have limited capacity and may be unable to accommodate all patients.

In recent years, rehabilitation specialists have established home-based PR programmes as an alternative to hospital-based rehabilitation. The evidence to date suggests that in terms of exercise capacity and HRQoL, home-based programmes offer similar benefits to those provided by hospital-based programmes [5–10]. Home-based PR programmes have also been shown to reduce the use of medication and the number of exacerbations and hospitalisations [11–12].

Home-based PR programmes have three possible limitations compared to hospital-based programmes. These are detailed below.

Programme intensity

The first potential limitation is programme intensity. While the lack of adequate supervision and proper equipment may seem to preclude a high-intensity home-based exercise programme, several studies have evaluated such programmes and made positive findings. In a randomised clinical trial, STRIJBOS *et al.* [5] compared the effects of a hospital-based outpatient PR programme with those of a home-care rehabilitation programme. The authors observed improvements in exercise capacity, dyspnoea and wellbeing for both groups; notably, these benefits were maintained significantly longer in the home PR group. In a study assessing a home-based PR programme for severe COPD patients, WIJKSTRA *et al.* [6] found a significant improvement in exercise tolerance and HRQoL. Both of the aforementioned studies included intensive home programmes in combination with conventional physiotherapy, inspiratory muscle training, and high-intensity exercise training on a home trainer. Other studies [7–10] of home-based programmes have evaluated

low-intensity training, such as walking, and have found similar benefits in exercise capacity and HRQoL. In fact, the American College of Chest Physicians/American Association of Cardiovascular and Pulmonary Rehabilitation Guidelines [1] conclude that exercise training produces clinical benefits for COPD patients regardless of intensity (grade of evidence, 1A).

Patient support

The second potential limitation of home-based rehabilitation may be (as the American Thoracic Society/European Respiratory Society statement [2] on PR suggests) the lack of support from a multidisciplinary team. Many of the studies that have shown significant improvements in exercise capacity and HRQoL [5–8] provided home supervision and emotional support through a physiotherapist or physician. However, other studies of programmes that provided either no supervision or only minimal support have also shown significant benefits [9, 10]. In a recent multicentre study in Spain, the current author and co-workers compared a simple nonsupervised home-based PR programme with a hospital-based programme [9]. Patients in both groups received two educational and four chest physiotherapy sessions. Patients in the hospital group then followed a supervised exercise programme at the hospital, while the home group performed a low-intensity exercise training programme at home without supervision. Our results showed that the two PR programmes result in a similar improvement in functional exercise capacity, although the hospital group showed a greater improvement in HRQoL, particularly in emotional function. We believe that the difference between the findings from our study and those of other previous studies of home-based PR results from the fact that we provided no supervision to the home-based PR group.

Disease severity

A third potential limitation of home-based PR programmes may be related to the severity of disease. In a randomised controlled study of COPD patients stratified for dyspnoea according to the Medical Research Council (MRC) scale, WEDZICHA *et al.* [13], found no improvement in HRQoL in severely dyspnoeic COPD patients (MRC 5) who participated in a home-based PR programme in which they were treated by physiotherapists. The

authors suggest that the lack of benefits may have been due to disease severity, the relatively short duration of the programme and the low intensity of exercise. In a prospective randomised study of a home-based PR programme in severe COPD patients (Global Initiative for Chronic Obstructive Lung Disease stage III–IV, MRC 3–5) [14], the current author and co-workers observed improvements in exercise tolerance and HRQoL. These were maintained at 6 months.

Recently, NEDER *et al.* [15] have shown improvements in muscle strength, muscle endurance, and breathlessness in patients with severe COPD and incapacitating dyspnoea after a neuromuscular electrical stimulation programme at home.

Conclusion

In conclusion, if we accept that home-based and hospital-based PR programmes are equally beneficial and that home-based programmes may

even provide longer-lasting benefits, as STRIJBOS *et al.* [5] have shown, it follows that such programmes can be prescribed with confidence. However, they must be well-structured and adhere to the following guidelines:

- 1) Initial instructions should be given at the hospital, based on the severity of the disease; moreover, the intensity and type of programme, comorbidities and the need (or otherwise) for supplemental oxygen should all be considered carefully.
- 2) Some degree of supervision, either at home or in the hospital, should be included in the programme.

Although the contents of each particular PR programme may differ, they should all contain the following basic components: education, physiotherapy, and exercise training of the upper and lower extremities. Respiratory muscle training should be included only for patients with proven respiratory muscle weakness, because the evidence does not support the routine use of such training in PR (recommendation grade 1B) [1, 2].

Suggested answers

1. d
2. a
3. a

References

1. ACCP/AACVPR Pulmonary Rehabilitation Guidelines Panel. Pulmonary rehabilitation. Joint ACCP/AACVPR Evidence-Based Guidelines. *Chest* 2007; 131: 4s–51s.
2. Nici L, Donner CL, Wouters E, *et al.* American Thoracic Society/European Respiratory Society Statement on Pulmonary Rehabilitation. *Am J Respir Crit Care Med* 2006; 173: 1390–1413.
3. British Thoracic Society, Standards of Care Subcommittee on Pulmonary Rehabilitation. Pulmonary rehabilitation. *Thorax* 2001; 56: 827–834.
4. Lacasse Y, Brosseau L, Milne S, *et al.* Pulmonary rehabilitation for chronic obstructive pulmonary disease. *Cochrane Database Sys Rev*; 2002; 3: CD003793.
5. Strijbos JH, Postma DS, van Altena R, Gimeno F, Koeter GH. Comparison between an outpatient hospital-based pulmonary rehabilitation program and a home-care pulmonary rehabilitation program in patients with COPD. A follow-up of 18 months. *Chest* 1996; 109: 366–372.
6. Wijkstra PJ, Ten Vergert EM, van Altena R, Otten V, Kraan J. Long term benefits of rehabilitation at home on quality of life and exercise tolerance in patients with chronic obstructive pulmonary disease. *Thorax* 1995; 50: 824–828.
7. Hernandez MT, Rubio TM, Ruiz FO, Riera HS, Gil RS, Gomez JC. Results of a home-based training program for patients with COPD. *Chest* 2000; 118: 106–114.
8. Puente Maestu L, Sanz ML, Sanz P, Cubillo JM, Mayol J, Casaburi R. Comparison of effects of supervised versus self-monitored training programs in patients with chronic obstructive pulmonary disease. *Eur Respir J* 2000; 15: 517–526.
9. Güell MR, De Lucas P, Gáldiz JB, *et al.* Comparación de un programa de rehabilitación domiciliario con uno hospitalario, en pacientes con EPOC: estudio multicentrico español [Comparison of a home-based with a hospital-based rehabilitation programme in COPD patients: a Spanish multicentre study]. *Arch Bronconeumol* 2008; 44: 386–392.
10. Wewel AR, Gellermann I, Schwertfeger I, Morfeld M, Magnussen H, Jorres RA. Intervention by phone calls raises domiciliary activity and exercise capacity in patients with severe COPD. *Respir Med* 2008; 102: 20–26.
11. Murphy N, Bell C, Costello RW. Extending a home from hospital care programme for COPD exacerbations to include pulmonary rehabilitation. *Respir Med* 2005; 99: 1297–1302.
12. Behnke M, Jörres RA, Kirsten D, Magnussen H. Clinical benefits of a combined hospital and homebased exercise programme over 18 months in patients with severe COPD. *Monaldi Arch Chest Dis* 2003; 59: 44–51.
13. Wedzicha JA, Bestall JC, Garrod R, Garnham R, Paul EA. Randomized controlled trial of pulmonary rehabilitation in severe chronic obstructive pulmonary disease patients, stratified with the MRC dyspnoea scale. *Eur Respir J* 1998; 12: 363–369.
14. Regiane Resqueti V, Gorostiza A, Gáldiz JB, Lopez de Santa Maria E, Casan Clarà P, Güell Rous R. Benefits of a home-based pulmonary rehabilitation program for patients with severe chronic obstructive pulmonary disease. *Arch Bronconeumol* 2007; 43: 599–604.
15. Neder JA, Sword D, Ward SA, Mackay E, Cochrane LM, Clark CJ. Home based neuromuscular electrical stimulation (NMES) as a new rehabilitative strategy for severely disabled patients with chronic obstructive pulmonary disease (COPD). *Thorax* 2002; 57: 333–338.