Home-based pulmonary rehabilitation in chronic obstructive pulmonary disease patients

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CRD summary
This review concluded self-monitored home-based exercise training for patients with chronic obstructive pulmonary disease (COPD) may be an equivalent alternative to out-patient pulmonary rehabilitation; endurance training programmes were beneficial for improving health-related quality of life and exercise capacity. As the evidence was poor to average and most trials found no significant between-group differences, the conclusions should be treated with caution.

Authors’ objectives
To assess the benefits of home-based pulmonary rehabilitation on exercise capacity in patients with chronic obstructive pulmonary disease (COPD).

Searching
MEDLINE, EMBASE (from 1980 to October 2009) and the Cochrane Library were searched for studies published in English, French and Spanish. Search terms were not reported, but the search strategy was available from the authors. References lists of included studies and the Internet (via general search engines) were searched for relevant studies.

Study selection
Published randomised clinical trials (RCTs) that compared home-based rehabilitation with a comparator, standard care (no pulmonary rehabilitation) or pulmonary rehabilitation in any other setting, in patients (aged at least 40) with chronic obstructive pulmonary disease (COPD) were eligible for inclusion. TO be included, trials had to have at least one treatment arm involving a home-based rehabilitation regime with lower-limb endurance exercise training and a minimum duration of four weeks or 12 sessions. Trials where the training was aimed at maintaining effects from in-patient or out-patient rehabilitation programs, or where the training was not completed solely at home, were excluded.

Outcomes of interest were health-related quality of life, exercise capacity as measured by field tests (six-minute walking test, shuttle walking test) or laboratory tests (incremental exercise test, endurance test, step test), dyspnea, muscle strength, exacerbation rate and hospital admissions.

Participants in included trials were aged 60 years or more with severe COPD (GOLD stage three or four) who were clinically stable. Most included trials were of short duration (six months or less). Included trials compared home-based rehabilitation with hospital-based rehabilitation, home-based rehabilitation with standard-care (no additional treatment apart from education and lifestyle advice); one trial included both comparisons. Home-based training programs were mostly of eight weeks duration or more, with three sessions or more per week for at least 30 minutes per session; they included endurance training such as walking, cycling and/or climbing stairs.

One reviewer selected the studies for the review; cases where inclusion was in doubt were discussed with a second reviewer.

Assessment of study quality
Trial quality was assessed with the PEDro scale by two reviewers independently, with disagreements resolved by consensus. PEDro criteria assessed included: eligibility criteria; method of randomisation and allocation concealment; baseline comparability of groups; blinding of patients, therapists and assessors; adequate follow-up; intention-to-treat analysis; between group comparisons; and reporting of point estimates and variability.

Data extraction
Data for the change from baseline within and between groups in exercise capacity were extracted, as well as other outcomes and adverse events if reported.

Data were extracted by one reviewer and checked by a second, with disagreements resolved by consensus.
Methods of synthesis
Results were presented in a narrative synthesis.

Results of the review
Twelve RCTs were included in the review (n=728 patients, range from 20 to 252). Trials were rated as average to poor for methodological quality. Adequate allocation concealment was described by five trials. Six trials had adequate follow-up. Three trials had outcome assessor blinding. Sample size calculation was presented by two trials. Only one trial used intention-to-treat analysis.

Home-based rehabilitation versus standard care (eight RCTs): Health-related quality of life was measured by the Saint George's Respiratory Questionnaire (three RCTs) and the Chronic Respiratory Questionnaire (three RCTs). Most trials reported statistically and clinically significant improvements from baseline for the home-based rehabilitation groups but not standard care groups. Three trials reported statistically significant differences between the groups. Improvements in exercise capacity as measured by the six or 12 minute walk tests, shuttle walk test, step test and constant work rate test were also seen for home-based rehabilitation but not standard care. Only two trials reported between-group differences and found statistically significant benefits for home-based rehabilitation for the six minute walk test and constant work rate test.

Home-based rehabilitation versus hospital-based rehabilitation (three RCTs): All three trials measured health-related quality of life with the Chronic Respiratory Questionnaire. There was a statistically and clinically significant improvement in dyspnea after pulmonary rehabilitation in both groups, but no statistically significant differences between groups. Maximal work level improved for both groups in two trials, but there was no significant difference between groups. Other outcomes, such as peak oxygen consumption, constant work rate exercise endurance, four and six minute walking tests, showed statistically significant improvements for one or both groups, but the between-group differences were not statistically significant.

Other outcomes: Two trials reported reductions in dyspnoea for the home-based group, but no significant between group differences. Six trials measured dyspnoea using the Borg scale; some reported significant changes for one or both groups but no significant between group differences. Two trials assessed muscle strength, but there were no significant differences between groups. Three trials assessed exacerbation rates and/or hospital admissions, but there were no significant differences between groups. Two trials reported adverse events; one reported shoulder and arm pain which resulted in patients stopping the exercises; another reported adverse events were mostly mild and any serious events were related to COPD exacerbations and not the exercise training program.

Authors' conclusions
Self-monitored, home-based pulmonary rehabilitation was useful and, if properly conducted, may be an equivalent alternative to out-patient pulmonary rehabilitation. Programmes with endurance training were shown to be beneficial for improving health-related quality of life and exercise capacity.

CRD commentary
This review had a clear research question and specified the inclusion criteria for study design, participants, interventions and outcomes. Restricting the search to three languages may have introduced language bias. Two reviewers were involved in the quality assessment and data extraction, but it appeared that only one reviewer selected the studies, which could have introduced some errors or bias into the review process.

The methodological quality of the included trials was assessed using an appropriate tool and the results were reported in full. Results were presented narratively, but in cases where trials reported the same outcome, meta-analysis may have been possible.

As the evidence was average or poor in quality and most trials did not find statistically significant differences between home-based rehabilitation and standard care or hospital-based rehabilitation, the authors' conclusions should be treated with caution.
Implications of the review for practice and research

**Practice**: The authors did not state any implications for practice.

**Research**: The authors stated that further work is needed to better understand the long-term benefits of home-based pulmonary rehabilitation and whether it is any different to hospital-based outpatient programs for increasing physical activities in daily life. They also stated that there is a need to define how to integrate self-management education into home exercise training for promoting positive health behaviour change, exercise maintenance and optimising disease control.

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