

Pulmonary Rehabilitation House Calls

In 2013, the American Thoracic Society (ATS) and the European Respiratory Society (ERS) published a joint statement on pulmonary rehabilitation.¹ In this statement, experts concluded that pulmonary rehabilitation is a recognized core component of managing patients with COPD.¹ Indeed, according to a recent Cochrane review, there is strong evidence that pulmonary rehabilitation benefits exercise capacity and quality of life in patients with COPD.² The ATS/ERS authors note that there is a need to improve the accessibility of pulmonary rehabilitation as well as develop new methods to effect long-term behavior change.¹ The Cochrane review authors suggest future studies should focus on which components of pulmonary rehabilitation are effective, the ideal location and level of supervision, and the intensity of the exercise.²

Keating et al³ report that a lack of available transportation, the need to travel to the rehabilitation center, and a lack of perceived benefit were the primary barriers to the uptake and completion of pulmonary rehabilitation. The authors also found that subjects who were depressed and current smokers were at greatest risk for not completing pulmonary rehabilitation. As noted by Holland et al,⁴ despite these access problems, the model for delivering pulmonary rehabilitation has not changed in more than 30 years.

Several studies of home-based pulmonary rehabilitation have been conducted with mixed results. In one multi-site study, investigators randomized 252 subjects with COPD to an 8-week, home-based pulmonary rehabilitation program or an 8-week, center-based program.⁵ Both groups received a 4-week educational program prior to commencing pulmonary rehabilitation. The center-based group completed exercise training 3 days/week for 8 weeks; each session consisted of 30 min of aerobic training at an intensity of 80% of peak work capacity and 30 min of strength-training exercises. The home-based group also exercised 3 days/week for 8 weeks; to ensure safety, these subjects exercised at 60% of their peak work capacity for 40 min and completed a similar strength-training program. Subjects in the home-based program

were loaned any needed equipment for the 8 weeks. Using an intent-to-treat analysis, investigators found no differences in outcomes between the groups, including

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dyspnea as measured by the Chronic Respiratory Disease Questionnaire, health status as measured by the St. George Respiratory Disease Questionnaire, 6-min walk distance, or cycling endurance at the end of the 8-week program or at 40 weeks.

In a more recent study out of Australia, investigators conducted a randomized clinical trial in 166 participants with stable COPD.⁴ Subjects were randomized to a standard, 8-week, center-based pulmonary rehabilitation program or a home-based program that included 1 home visit and 7 weekly telephone calls. A major difference between this study and the previous study by Maltais et al⁵ is that the subjects in the Australian study were not provided any specialized equipment for the home during the course of the study. Subjects in the home-based group were provided instructions on how to use their home environment to complete their exercises and were provided a pedometer to monitor step counts. The primary outcome was 6-min walk distance. Investigators confirmed the non-inferiority of the home-based rehabilitation and did not rule out superiority of the center-based program at 8 weeks and 12 months. Additionally, at 8 weeks, between-group differences for dyspnea-related quality of life did not rule out superiority for the home-based group, and the groups were equivalent at 12 months. However, when a per-protocol analysis was completed, the center-based participants had greater improvements in 6-min walk distance and quality of life, although there were no between-group differences. At 12 months, the inferiority of the home-based program could not be ruled out. Of interest, 42% of the eligible subjects who were excluded from randomization in this study did so because they wanted to attend the hospital-based program. In an editorial, Morgan⁶ infers that a patient's preference in the type of program they wish to participate in may influence their enthusiasm and commitment to the program and thus affect the outcome of the pulmonary rehabilitation services.

Several others have compared the effect of a home-based pulmonary rehabilitation program to a usual-care

The author has disclosed no conflicts of interest.

DOI: 10.4187/respcare.06088

control group. Generally, subjects assigned to the home-based pulmonary rehabilitation program demonstrated improved 6-min walk distances and improved perceptions of dyspnea and quality of life when compared to a usual-care control group.⁷⁻⁹ Modality of exercise, exercise intensity, and the duration of the programs varied greatly, however. McCrea et al¹⁰ suggest that there needs to be a universally agreed-upon definition of what constitutes a home-based pulmonary rehabilitation program and identify which groups of patients with COPD would benefit most.

Previously, Dr Benzo's group successfully utilized health coaching rooted in motivational interviewing in subjects with COPD.^{11,12} Dr Benzo's work that appears in *RESPIRATORY CARE* this month presents pilot work for a proposed randomized clinical trial focused on home-based pulmonary rehabilitation with health coaching.¹³ The group designed videos to be viewed by subjects in the home using a tablet provided by the study. Additionally, subjects wore an activity monitor for motivation, and pulse oximetry was monitored during exercise for safety reasons. Data were securely transmitted to the research center using the provided tablet. The exercise routine consisted of 6 full-body, low-intensity exercises and at least 12-min of slow walking. Subjects were asked to complete this routine 6 days each week. The first pilot study consisted of 3 subjects who took the system home and used it for 5 days. The purpose was to test feasibility and usability of the system. The subjects were 100% adherent, reported that the technology was easy to use, were able to complete the exercises and report back to the health coach, and overall felt that the program was easy to use. The group then used this information to inform the next pilot study. In this first pilot study, the researchers recognized that the most important critics of any new program, particularly those involving use of technology, are the end users. It is extremely important that we gain the patient's perspectives on new interventions to foster enjoyability and, ultimately, adherence to it.

The second pilot study reports on 12 subjects with COPD who participated in the home-based pulmonary rehabilitation program with health coaching. Overall adherence with the program was an impressive 87%, and the subjects reported that they enjoyed participating in the program. Unfortunately, no usual clinical outcomes such as dyspnea, quality of life, or 6-min walk distance were reported in this pilot study.

This work in health coaching and motivational interviewing for home-based pulmonary rehabilitation is to be commended. The integration of technology and the human touch was enjoyable for the enrolled subjects. Of concern, however, is that one of the hallmarks of pulmonary rehabilitation is the focus on improving exercise capacity, whereas the reported trial focuses on improving physical

activity. Although improving physical activity is important, perhaps equally or more important is increasing exercise capacity, so it would seem that an attempt at improving functional gains would be an essential component. Patients with COPD are often so deconditioned that utilizing exercise to increase aerobic capacity would be important. Additionally, one of the few things that subjects did not like about the pilot study was the slow walking. Although the authors explained that the slow walking was meant to improve balance, based on subjects' comments it would appear that they desired a program that was able to progress to higher-intensity exercise. This may be incorporated into the group's larger study design, but this point is unclear in the current article.

Nonetheless, it will be interesting to see if this low-intensity pulmonary rehabilitation program using health coaching will be successful in maintaining physical activity levels. The authors have sought to make pulmonary rehabilitation accessible to those who do not wish to come to or are unable to attend a center-based program;¹⁴ this study furthers that important work.

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