

The next steps of pulmonary rehabilitation

S98 EFFECTIVENESS OF HOME MAINTENANCE TELE-REHABILITATION ON COPD EXACERBATIONS

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Acute exacerbations are cardinal events in the natural history of chronic obstructive pulmonary disease (COPD) and are associated with increased morbidity and mortality. Tele-monitoring interventions are a relatively new field in COPD research and management. Furthermore, the effect of home tele-rehabilitation on COPD exacerbation has not been thoroughly studied. Therefore, we set out to investigate whether a home tele-rehabilitation program would be as beneficial as an outpatient maintenance rehabilitation program, in the context of COPD exacerbations, following completion of a 3-month course of supervised pulmonary rehabilitation.

We studied 137 Caucasian, ambulatory COPD patients. Forty seven patients were assigned to home maintenance tele-rehabilitation ($FEV_1, \%pred = 50 \pm 22$, mean \pm SD). Fifty patients were assigned to twice weekly hospital-based maintenance rehabilitation ($FEV_1, \%pred = 52 \pm 17$). Forty COPD patients ($FEV_1, \%pred = 52 \pm 21$), were not assigned to any rehabilitation program and served as controls. Tele-rehabilitation included home exercise reconditioning, self-management techniques, dietary, and psychological advice. Patients were provided with tablets and wireless devices to record and transmit data, related to symptoms, lung function, and vital signs, to a tele-health platform. Patients were followed up for 12 months.

At baseline there were no significant differences amongst the tele-rehabilitation (3.3 ± 3.1), hospital-based rehabilitation (3.4 ± 1.9), or control (3.3 ± 1.6), groups in terms of COPD exacerbations. After 12 months, COPD exacerbations in the group of home tele-rehabilitation were significantly reduced to 1.7 ± 1.7 . In the group of hospital-based rehabilitation COPD exacerbations were also significantly reduced to 1.8 ± 1.4 . In contrast, in the control group COPD exacerbations remained unchanged (3.5 ± 1.7). There were significant difference amongst the two rehabilitation groups (tele-rehabilitation and hospital-based) and the control group in terms of COPD exacerbations ($p < 0.001$).

In conclusion, ongoing home tele-rehabilitation with the use of tele-monitoring could significantly reduce COPD exacerbations and seems to be as beneficial as an outpatient hospital-based maintenance rehabilitation program in the context of COPD exacerbations. Thus, tele-rehabilitation may constitute a satisfactory alternative rehabilitative strategy to diminish health care costs.

S99 PULMONARY REHABILITATION IN INTERSTITIAL LUNG DISEASE – A PROSPECTIVE, OBSERVATIONAL STUDY

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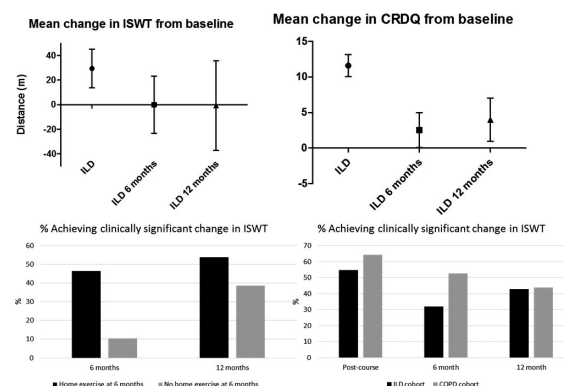
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Background Pulmonary rehabilitation (PR) is important in the management of interstitial lung disease (ILD), however it remains unclear how sustained the initial benefits in exercise capacity and quality of life are in this group of patients. An increasing number of ILD patients are participating in PR courses and it is vital that they be offered the most beneficial approach possible.

Methods We have analysed prospectively gathered data from a well characterised population of ILD participants with >24 months follow-up, from a well-established PR service. Participants completed incremental shuttle walk (ISWT) and chronic respiratory disease questionnaire (CRDQ) before PR, at course completion, 6 months and 12 months follow-up. These data were compared to establish changes over time compared to baseline. The ILD cohort was compared to a further group with chronic obstructive pulmonary disease (COPD). Semi-structured interviews were conducted with ILD participants to establish qualitative views on existing and possible future PR provision.

Results Data were available for 79 participants with ILD. PR gave initial improvements in ISWT (29.5 m (95% CI 13.7 to 45.2 m)) and CRDQ (11.6 (95% CI 8.5 to 14.7)), however these benefits were not sustained at 6 months (ISWT change 0.0 m (95% CI -23.2 to 23.2 m), CRDQ change 2.5 (95% CI -2.4 to 7.4)) and 12 months (ISWT change -0.7 m (95% CI -37.3 to 35.9 m), CRDQ change 4.0 (95% CI -2.2 to 10.2)). In contrast, the COPD group demonstrated more durable benefit in exercise capacity (ISWT change at 6 months 35.7 m, 95% CI 10.76 to 60.68, $p < 0.01$). A greater proportion of those who had continued with home exercise maintained an increase in walking distance above the MCID than those who had not (46.4% vs 10.5%, $p = 0.01$).

Interview responses highlighted the value attached to PR by participants with ILD, but also suggested that this could be improved by increased course duration, ongoing supervised exercise following course completion and greater tailoring of content to those with ILD.



Abstract S99 Figure 1

Conclusions PR as currently delivered gives initial benefits to participants with ILD, however these are not sustained. More tailored approaches to this group are needed to improve the sustainability of response to PR.

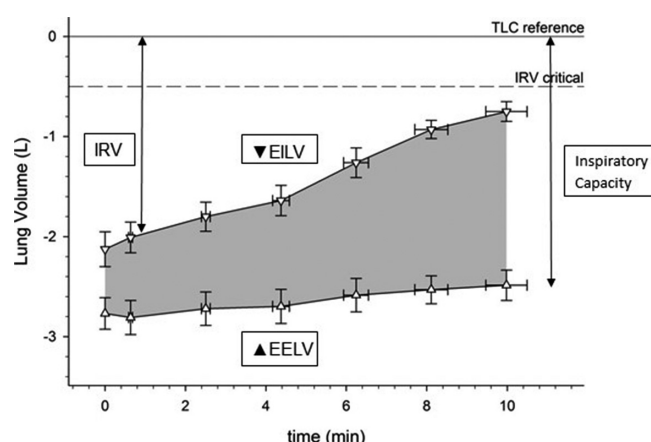
S100 IS IT FEASIBLE TO ASSESS DYNAMIC HYPERINFLATION DURING AN INCREMENTAL TREADMILL TEST IN PATIENTS WITH SEVERE ASTHMA?

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Introduction We wish to investigate whether dynamic hyperinflation contributes to exercise intolerance in patients with severe asthma. It is unclear whether there is an influence by the exercise platform. To begin with, we explored whether performing serial inspiratory capacity (IC) manoeuvres is feasible during a maximal incremental treadmill test in patients with severe asthma.

Method Patients with severe asthma (step 4–5 of the British Thoracic Society guidelines), MRC dyspnoea grade ≥ 2 , were recruited from physicians specialising in the care of patients with difficult-to-treat asthma at Glenfield Hospital, Leicester. Patients were excluded if they had both fixed airflow obstruction ($FEV_1/FVC < 70\%$) and a smoking history of ≥ 10 pack years. All participants performed an incremental treadmill test to intolerance, with expiratory gas analysis, designed to produce a linear increase in peak oxygen uptake (VO_2).¹ Patients performed a practice resting inspiratory capacity manoeuvre and then subsequently at rest, during the warm up phase and every two minutes during exercise.



EELV: End Expiratory Lung Volume, EILV: End Inspiratory Lung Volume, IRV: Inspiratory Reserve Volume, TLC: Total Lung Capacity.

Abstract S100 Figure 1 Inspiratory capacity during a maximal incremental treadmill test in patients with severe asthma

Results 18 participants (8 female, mean [SD] 49 [14] yrs, BMI 31 [7] kg/m², FEV_1/FVC 70 [13]%, 17% were ex-smokers) completed the treadmill test in a duration of 482 [120] s.

Observations at peak exercise were: VO_2 2.0 [0.4] L/min (100 [25]% predicted); ventilation 67 [18] L/min (87 [20]% maximum voluntary ventilation); heart rate 145 [17] beats/min (85 [9]% predicted); Borg Score for breathlessness 7 [2], perceived exertion 17 [3], 16 were predominantly limited by breathlessness. 115 IC manoeuvres were performed with only one data-point missed due to an incomplete manoeuvre. Figure 1 shows the mean end expiratory and inspiratory lung volumes during exercise. Six patients had an inspiratory reserve volume of < 500 ml.

Conclusion Assessment for dynamic hyperinflation with serial inspiratory capacity manoeuvres during a maximal incremental treadmill test is feasible in patients with severe asthma. The relationship among lung volumes, time and ventilation can be established from rest to peak exercise with minimal practice of the IC manoeuvre or interruption to the test in this patient population.

REFERENCE

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S101 DO THOSE PATIENTS WITH A CHRONIC RESPIRATORY DISEASE THAT WALK AT A FASTER WALKING SPEED IMPROVE MORE POST PULMONARY REHABILITATION?

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Introduction Several baseline factors influence the response to Pulmonary Rehabilitation (PR). The Incremental and Endurance shuttle walk test is used to prescribe an exercise walking speed for patients with a chronic respiratory disease as part of a PR programme. We wished to explore the speed and duration of baseline endurance performance and observe how this impacted upon changes post rehabilitation particularly around the higher speeds of the endurance shuttle walk test (ESWT).

Methods Patients completed a 7 week outpatient PR programme comprising of both endurance and strength training. The endurance training is based on the ESWT speed which is 85% of the individual maximal capacity derived from the incremental shuttle walk test (ISWT). The ISWT and subsequent ESWT were performed at baseline and discharge. Patients were categorised into low (< 3.6 km/hr) or high (> 3.6 km/hr) speed walkers based on their baseline ESWT performance.

Results 990 patients completed the SWT: 567 low speed walkers (mean age 70.9 \pm 9.7 years; FEV_1 1.5 L \pm 4.9; BMI 27.6 \pm 9.0 kg/m²; MRC 4 (IQR 3–4); ISWT pre 128.4 \pm 61.6 m; ESWT pre 166.3 \pm 161.5 secs) and 423 high speed walkers (mean age 67.8 \pm 9.2 years; FEV_1 1.62 L \pm 3.8; BMI 27.1 \pm 14.0 kg/m²; MRC 3 (IQR 2–3); ISWT pre 373.4 \pm 103.3 m; ESWT pre 262.4 \pm 147.6 secs). Those walking at a higher speed had a significantly higher pre ESWT ($p \leq 0.001$). A statistically significant improvement was observed in the ESWT within each group (low: mean change 344.2 \pm 401.5 $p \leq 0.001$; high: mean change 369.3 secs $p \leq 0.001$). However the change in ESWT was not significantly different between the groups ($p = 0.3$).